

Archaeological Excavation Report  
10E0117 - Sawpit Lane, Tuam, Co. Galway  
Early medieval graveyard and enclosure



EACHTRA  
Archaeological Projects



Archaeological Excavation Report

# Sawpit Lane, Tuam

Co. Galway

Date: April 2012

Client: Galway County Council

Project: Tuam Town Water Supply

License No: 10E0117

Excavation Director: Finn Delaney





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### Co. Galway

Excavation Director  
Finn Delaney

Written By



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## Summary

Following the discovery of human remains during archaeological monitoring of engineering trial pits in Sawpit Lane a 1 m wide trench was excavated along Sawpit Lane, Church Lane and The Mall in advance of pipelaying associated with the Tuam Town Water Supply in July 2010. The remains of 15 individuals were recorded and excavated along with a series of ditches and pits. A stone culvert and the remains of a boundary wall were also identified. Two of the skeletons and a bone fragment from the base of one of the ditches returned calibrated radiocarbon dates centring on the seventh century. In addition a smithing hearth cake typical of early iron smithing was recovered from the upper fill of the ditch along with a bone trial motif piece which has sixth/seventh century parallels. The other pits and ditches had fills containing relatively mixed finds and animal bone fragments. The excavated features are located outside the present Temple Jarlath enclosure in the middle of Tuam and close to the site of the early medieval market area and the site of the post-medieval shambles. The pits may have acted as refuse pits for waste and the ditches may have demarcated areas or being used as open drains. The early burial evidence and the early possible enclosing ditch coupled with reports of an early unclassified cross slab suggest that the graveyard and enclosure at Temple Jarlath may be associated with St Jarlath's original early Christian foundation.

Townland	Townparks (2 <sup>nd</sup> Division)
Civil Parish	Tuam
Barony	Clare
County	Galway
License Number	10E0117
Ordnance Survey Map Sheet	GA029
National Grid Reference	143459/251923
Elevation	36m OD
Site Type	Burials, ditches and pits



## Acknowledgements

The excavation director was Finn Delaney and the senior site supervisor was Nik Bower, The site supervisor was David O'Reilly. The excavation crew were Ann Bingham and Brendan Kelly. Illustrations are by Enda O'Mahony and Robin Turk. Specialist analysis was undertaken by Linda Lynch (oste archaeology) Paul Rondelez (metallurgy) Margaret McCarthy (animal bones), Orla Scully (metal artefacts), Farina Sternke (lithics), Jacinta Kiely (artefact catalogue), Penny Johnston (plant remains) and 14 Chrono Centre at Queen's university Belfast (radiocarbon dates). The excavation was undertaken as part of the Tuam Town Water Supply Scheme undertaken by Galway County Council. Sean Whelan was the resident engineer for Galway County Council. John Gibbons was the site manager for Coffey Group the construction contractors for the project.

# 1 Introduction

This report constitutes the final excavation report of an archaeological excavation carried along Sawpit Lane Church lane and the Mall in Tuam Co. Galway. The excavation was undertaken under license (10E0117) in July 2010. Eachtra Archaeological Projects were appointed archaeological consultants to the Tuam Town Water Supply Scheme and the archaeological licence covers pre-development testing in specified greenfield areas and excavation of archaeological material which may be discovered during monitoring of works associated with the Tuam Town Water Supply Scheme.

The Scheme proposed the construction of new trunk watermain, new reservoir at Slievedarragh and a new water distribution mains system for the town of Tuam, Co. Galway. The Scheme also proposed the construction of foul, combined and surface water sewers, service ducts and a new storm-water holding tanks for the town. An archaeological Impact Assessment Report was prepared for the proposed works in January 2010 and the mitigation measures outlined in the report were endorsed by the Department of the Environment, Heritage and Local Government (DEHLG).

Sections of the proposed watermain, combined sewer and service duct networks are routed through the Zone of Archaeological Potential (ZAP) established for Tuam and adjacent to a number of individual sites and monuments within the town (Fig 1). In addition, the proposed watermain network in the environs of the town will be routed close to a number of Recorded Monuments located outside the Zone of Potential.

# 2 Background

Following the discovery of human remains in a slit trench (TM4) at the junction of The Mall and Sawpit Lane outside the Temple Jarlath enclosure 6 more slit trenches (TM5, MA1-5) were opened under archaeological guidance along Sawpit Lane following the proposed route of the watermain (Fig 2). No further human remains were identified and only a limited amount of undisturbed deposits were recorded.

A Ground Penetrating Radar survey undertaken on Thursday 20<sup>th</sup> May 2010 attempted to identify the previously recorded human remains and the surrounding undisturbed deposit. The survey could not record a signature for the human remains; however areas of undisturbed deposits were identified (Fig 3).

# 3 Archaeological and Historical Background

St Jarlath lived in the late fifth early sixth centuries and he belonged to a family associated with the Conmaicne tribe who inhabited land immediately to the east of Mag Seola – the fertile plain between Lough Corrib and the river Clare. Jarlath embraced the new religion and was educated by St Benignus at the Patrician monastery of Kilbennan to the north

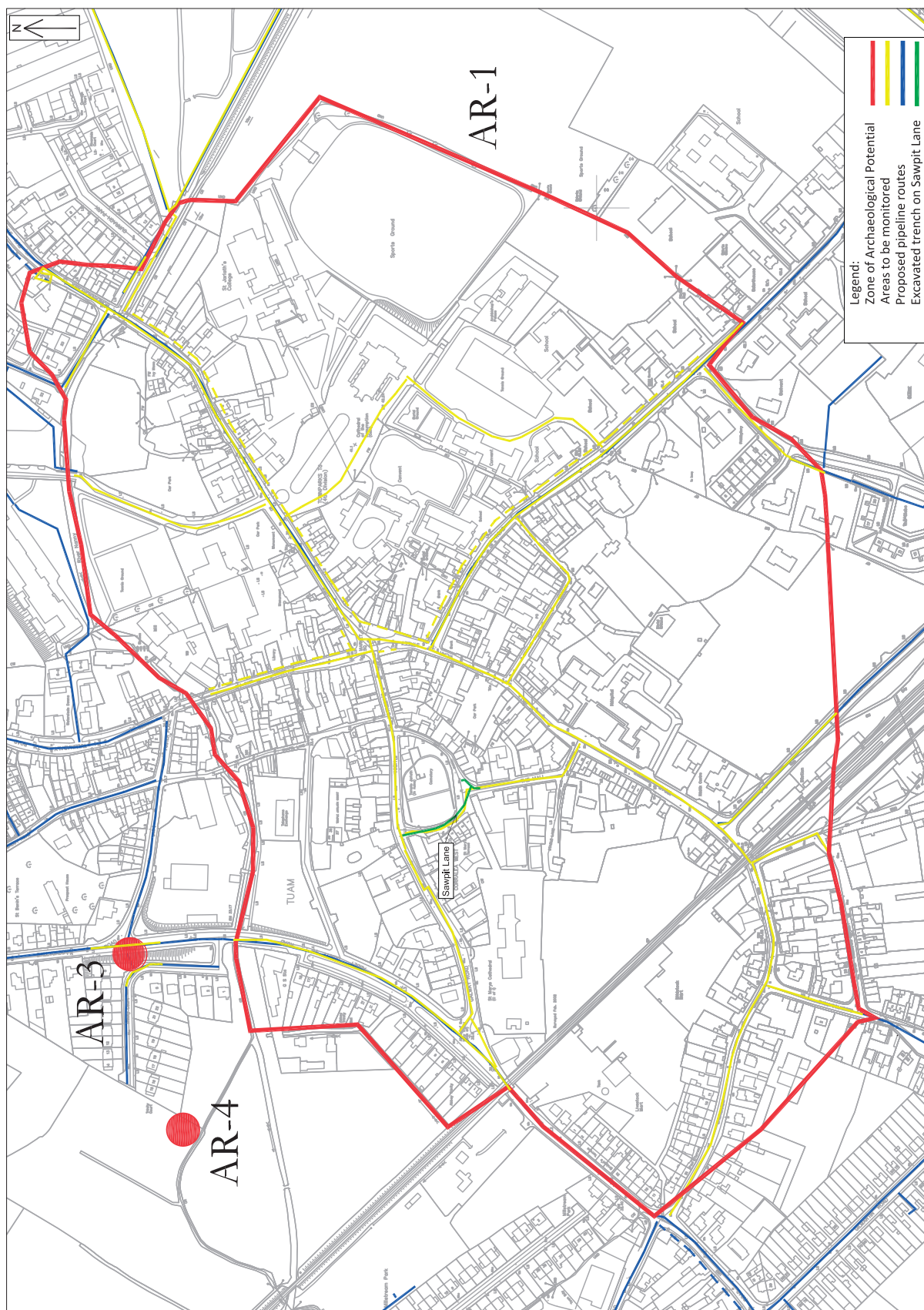


Figure 1: Map of Tuam showing the Zone of Archaeological Potential and the proposed pipeline routes.

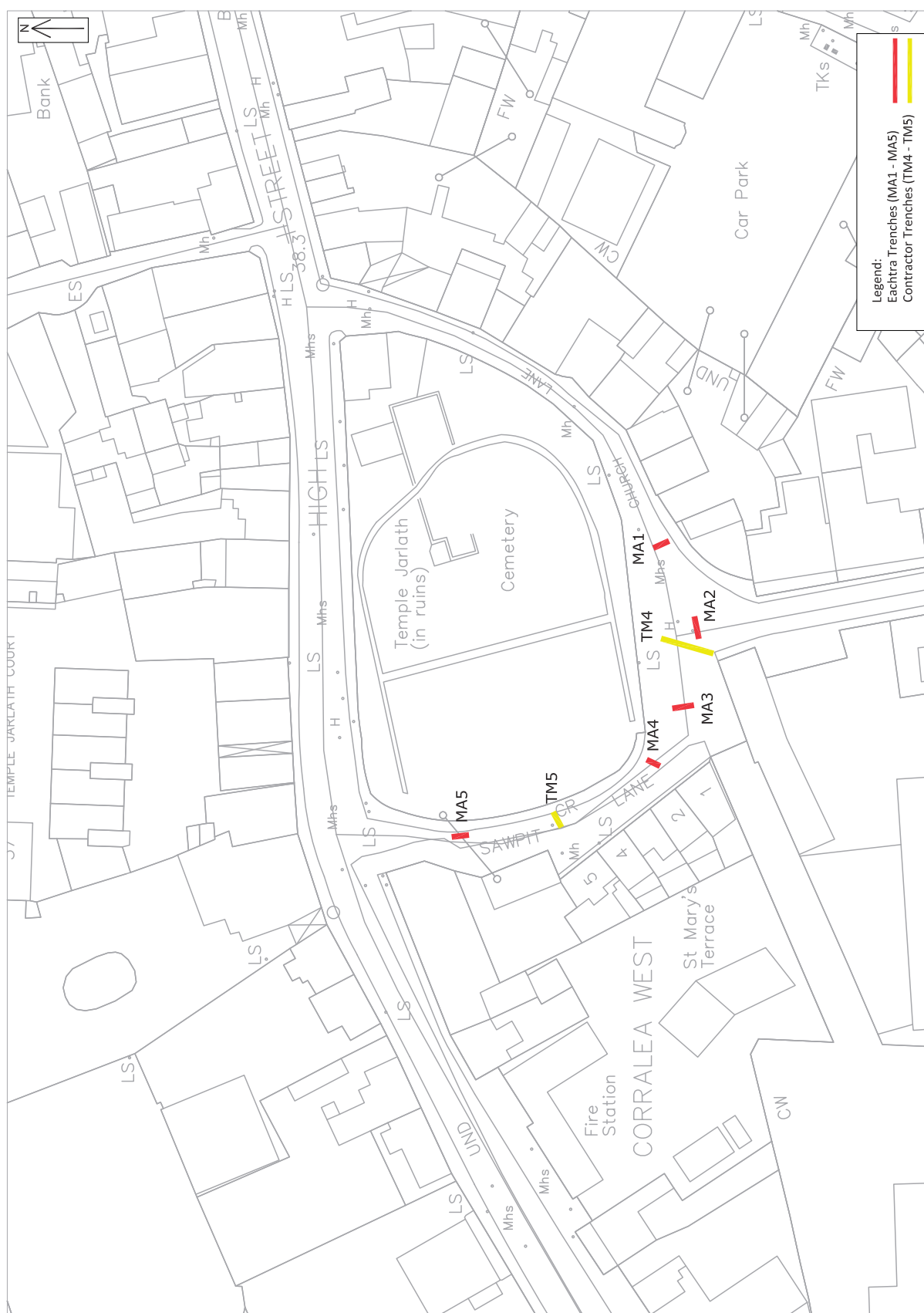


Figure 2: Location of slit trenches along Sawpit Lane (Yellow trenches – original trenches excavated by the contractor, Red trenches – additional trenches excavated by the contractor on behalf of Eachtra).

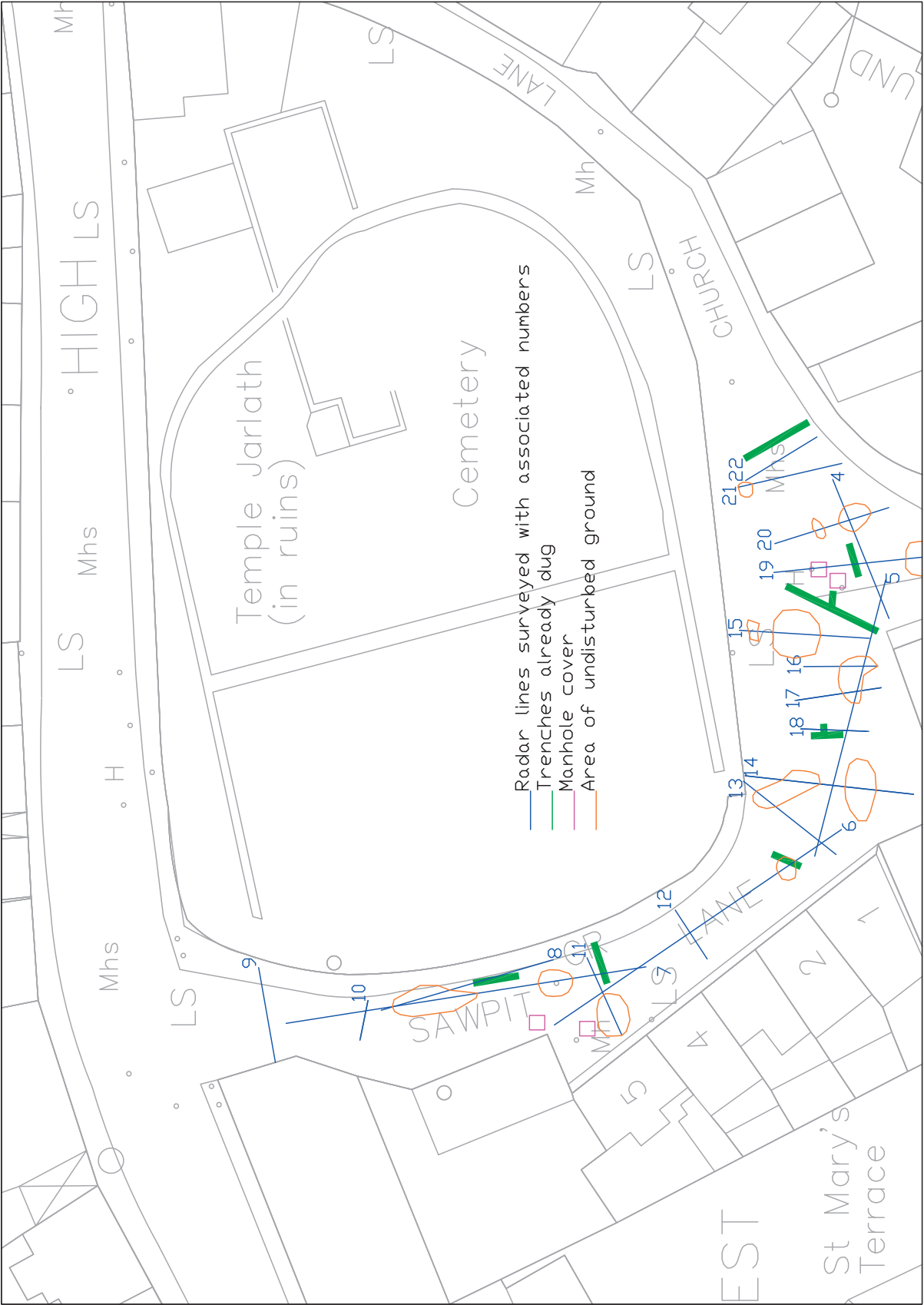


Figure 3: Location of slit trenches and GPR transects along Sawpit Lane overlaid with the proposed pipeline route and the location of undisturbed areas as revealed by the GPR survey.



west of Tuam he went on to found a monastic school at Clonfush two miles west of Tuam but ended his days at Tuam as bishop and abbot (Claffey 2009, 1).

The first definite evidence for the existence of a monastery is recorded in 781, when the Annals of Ulster note the death of Nuada O Bolcain, abbot of Tuam. Abbots are subsequently recorded until 1085 when Aed Ua hOissin is styled as Archbishop - *comarba Iar-laithe ocus ardescop Tuama* (Annals of the Four Masters) (Bradley & Dunne 1992, 166).

St Jarlath then appears to have founded the first monastery at Tuam in the early sixth century AD. The exact site of the early monastery is unclear although most attention now focuses on Temple Jarlath and its curving surrounding streets however there are two other early churches; Templenascreen and Tober Jarlath both of which were surrounded by large sub circular enclosures. Generally these monuments are particularly fragile and many survive only as reflections in the modern day map as curvilinear shaped roads and lanes.

A factor in the choice of location for this early monastery is hinted at in Tuam's older name *Tuaim da Ghualainn*, i.e. the mound of two shoulders. This probably refers to the high ground on either side of the River Nanny, overlooking a probable fording point over the River Nanny (or Corchra). The ford drew travellers from several different directions. St Jarlath's monastery, is likely to have been close to a prominent feature of the landscape, and the focus of local interaction (Flanagan 2002, 3).

Swan (1985) identified a potential early monastic enclosure at Temple Jarlath which has been fossilized in the curving eastern and southern boundary wall of the graveyard. The original enclosure would possibly have been up to 120 m in diameter and is now bisected by High Street which was probably laid out in the seventeenth century. The remains comprise a large raised and roughly D-shaped graveyard at the eastern end of which is a ruined church. The Poorly preserved remains of a rectangular church indicate it was a thirteenth century parish church with a later tower at its western end. The eastern gable survives intact and contains fine triple light pointed arch window in what is known by Leask as the transitional style. In the masonry above it are a number of Romanesque heads which were probably reused from an earlier church (Alcock et al 1999).

Jim Higgins (1987) has catalogued an unclassified cross slab which was recorded by Macalister in 1949 who describes the find location as the 'ancient graveyard in tuam' which seems to have been that surrounding Temple Jarlath. Higgins states that Macalister recorded that the stone was in a private collection but was replaced in the wall of the church in which it was found after he examined it. The slab a mere fragment cannot now be found.

The fording point and surrounding area seems to have been dominated by the Conmaíne in the sixth and seventh centuries. They were identified with the southern O'Neill, who held the high kingship of Ireland for five hundred years. The O'Neill rule appears to decline in the early part of the tenth and eleventh centuries in the face of the rise of Brian Boru and the Viking towns. The Vikings made their mark in Connacht as early as 835, causing disruption to the status quo (Flanagan 2002, 3).



This instability paved the way for the O'Connor tribe, based in Cruachu, County Roscommon, to challenge for the control of the country. At the beginning of the eleventh century, the O'Connors appear to have pushed the rival O'Flaherty family away from Tuam, and then constructed a fortress on the eastern banks of the Corchra or Nanny River by 1049 (Flanagan 2002, 3). Claffey (2009, 1) believes that the site of Temple Jarlath was probably newly chosen for a re-established settlement built by Áed Ua Conchobair or 'Áed of the gapped spear', in the eleventh century. The O'Connors chose to make Tuam their provincial stronghold and built numerous churches and monasteries in order to embellish it. This proliferation of religious houses and ecclesiastical foundations in a small town has led to a certain amount of confusion and uncertainty regarding the exact location of various features.

The ecclesiastical and cathedral status of the town was established under the O'Connor hegemony. The market status was undoubtedly initiated by them, and endorsed by subsequent Anglo-Norman monarchs. Its military status, however, declined greatly, and the fortifications of the last High King of Ireland are now nowhere apparent. Their foundations have yet to be uncovered and the only reliable evidence for a portion of them was the appearance in the OS Town Plan 1839 when a small stretch of a battered wall was recorded in Shop Street.

At the Synod of Rathbresail in 1111 Tuam was named as one of the five episcopal sees of Connacht and in 1127 a new enclosure was erected around the monastery and it was endowed with lands. The position of Tuam as the greatest church site in the west was further strengthened in 1152 when, at the Synod of Kells, it was named as the principal see and archbishopric of Connacht.

In 1177 it was raided by the Anglo-Normans but their impact was slight. It is clear from the surviving remains that O'Conchobair patronage continued into the thirteenth century, with the construction of St Mary's Cathedral, the rebuilding of St Jarlath's in transitional style and the foundation of the Premonstratensian house. Even after the Anglo-Norman invasion of Connacht Tuam seems to have been left undisturbed in the possession of the church. In 1244 the annals record that Tuam "with all its churches" was destroyed by fire. The archbishops were responsible for the development of Tuam and although there is no record that it became a borough it was clearly functioning as an important market place in the mid thirteenth century (Bradley & Dunne 1992, 167).

Gosling (1995, 127) states that;

'during the thirteenth century Tuam had become one of the foremost ecclesiastical centres in Ireland..... It appears to have been focused around the ecclesiastical enclosures surrounding Temple Jarlath and Templenascreen. These may have contained the residence of the bishop and the guesthouse. Two high crosses probably stood on or just outside their circumference, one probably marking the site of a market place. These enclosures were situated on the low ridge immediately to the south of the ford on the River Nanny. Between them, and overlooking the ford itself, was a major military fortification. A watermill probably stood on the river bank nearby. A short distance to the south-east of Temple Jarlaith was the priory of St. John, while to the south-west stood the Romanesque

cathedral. Just beyond it, a newly founded house of the Premonstratensian order, known as the abbey of the Holy Trinity, was being built. Standing amidst these structures was at least one other high cross, as well as the humble houses of the lay tenants, artisans and servants, each with their adjoining yards and paddocks. Finally, at a distance of 800m or so the southeast of this cluster was a third ecclesiastical enclosure at Toberjarlath.'

Little is known of Tuam in the later middle ages but it seems to have survived into the sixteenth century as a nucleated settlement, even if it was a small one. Because of its westerly situation the town and its monasteries stayed Catholic until 1587-8 when the cathedral and its revenues passed into Protestant hands (Bradley & Dunne 1992, 167). The English conquest of Connacht and the influx of Protestant settlers in the late sixteenth and early seventeenth centuries marks a turning point in the history of the settlement. In 1613 it became a borough and it subsequently received its charter of incorporation from James I.

The borough and its parliamentary representatives appear to have overseen the establishment of the town as a commercial and trading centre. The population increased for much of the following two centuries and the pattern of streets characterising the towns centre probably took shape. According to Gosling (1995, 129);

'the principle feature of the new layout was the triangular Market Square from which five streets radiated. These included two completely new streets, High Street and Shop Street, the former of which cut through the old monastic enclosure of Temple Jarlath, while the latter sloped downhill to a new new bridge across the River Nanny, eclipsing the old crossing point further downstream..... Finally, to the south ran Dublin Road and Vicar Street. When exactly the subsidiary street known as The Mall was laid out is unclear, however, the other side of the street in this area, Circular Road, was not created until the mid-eighteenth century'.

The revival continued apace in the eighteenth century, with the arrival of Archbishop Synge (1716 -1742) heralding a period of notable improvement. The citizens of the borough established breweries, tanneries, tuck mills and gig mills. By the late eighteenth century Tuam was a prosperous, confident, provincial market town, and many of its finer buildings are testimony to this. Apart from the demesne, other notable additions to the town included the Bishop Street Bridge (1735), the Market House in Market Square (1780), and several other fine residences. The shambles on Vicar Street was laid out in 1795. Slaughtering at the shambles was forbidden in 1818 (Comerford 1817-22). The shambles appears to have been the site of the original market place and the market cross. There were meat markets and fish markets to the east of church lane in the nineteenth century.

## Cartographic Analysis

Sawpit Lane, Church Lane and The Mall are all marked but unnamed on Morris's 1720 map of Tuam (Fig 4). A regular D-shaped enclosure is shown surrounding what is marked as the parish Church. Chapel Lane to the north of High Street has yet to be laid out at the time of Morris's map. The site of St Mary's Cathedral is shown to the south west of





Figure 4: Morris's map of Tuam



Temple Jarlath and a lane is shown running between property boundaries from sawpit lane down to St Mary's Churchyard. Another lane is shown running further south and connecting with southern end of the mall along what was later to become Stable Lane.

The 1839 Ordnance Survey map names Church Lane. An RC Chapel built in 1783 is shown to the west of Chapel Lane (Fig 5). The Mall is also named. The regular D-shaped enclosure shown on the Morris map appears slightly less regular on the western side along Sawpit Lane which is shown but not named. Buildings have been inserted into the graveyard enclosure at its north east corner at the junction between High Street and Church Lane. The ruined church is shown within the enclosure along with a series of trees. The area to the east of St Mary's cathedral is depicted as a series of landscaped gardens with an entrance avenue running between Sawpit Lane and the main St Mary's Churchyard. The avenue exits onto sawpit lane to the south of the previous exit marked on Morris's map. The exit along Stable Lane appears to have been closed off. The shambles area to the west of Vicar Street is marked and the site of the original market cross and market place are named and marked within it.

Most of the same features from the Ordnance Survey map of 1839 are marked and replicated on Bourkes 1863 map of Tuam (Fig 6). The trees within the graveyard enclosure at Temple Jarlath are not shown. The RC chapel to the east of Chapel Lane is now marked as being in ruins. The area to the west of Vicar Street which was marked out as a shambles in 1795 is now named as the potato market and on later Ordnance Survey editions was named as the Turf Market.

## Previous archaeological work

Previous archaeological monitoring of the insertion of railings around the church in Temple Jarlath was undertaken by Jerry O'Sullivan of the National Roads Authority in 2001 (O'Sullivan 2001). One *in situ* skeleton was uncovered, as well as the disarticulated remains of another three individuals: an adult female, an adult male, and a 15-18 year old individual (Lynch 2002).

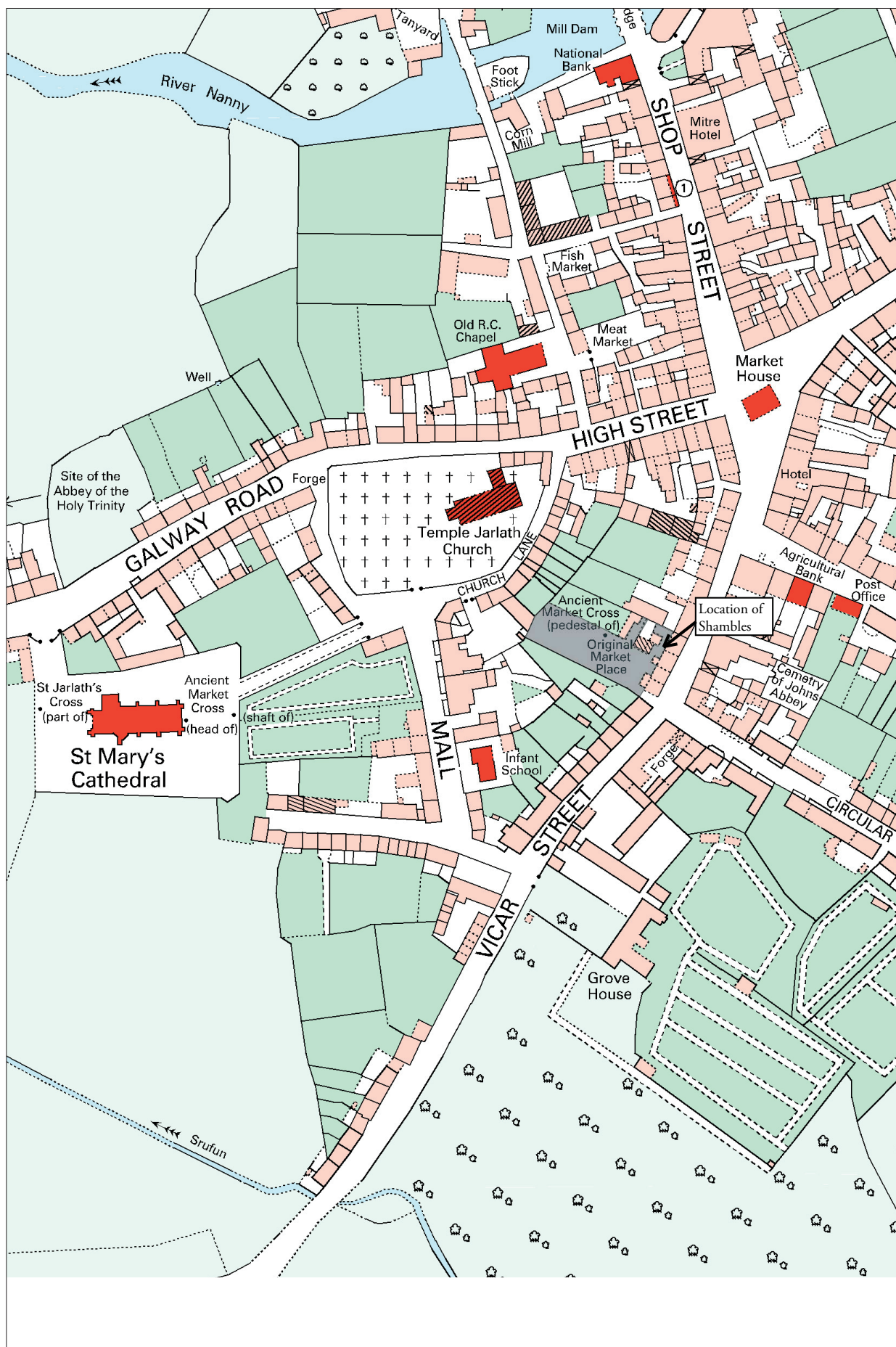


Figure 5: Claffey's 1839 reconstruction map of Tuam (Claffey 2009)





Figure 6: Bourke's map of Tuam



## 4 Methodology

Following consultation with Martin Reid from The Department of the Environment, Heritage and Local Government and Galway County Council it was proposed that Eachtra would excavate a 1 m wide trench for approximately 100 m in advance of the pipe-laying along Sawpit Lane and at the junction with The Mall. The trench was back-filled with temporary material to be re-excavated by the pipe-laying crew. All live services were avoided by the archaeological led trench excavations

A tracked excavator was used to remove the modern road surface and disturbed ground. All undisturbed ground was hand excavated. Where archaeological features finds or deposits were encountered these were recorded and removed. Where human remains were encountered full recording and excavation of the human remains located within the trench was undertaken. Following advice from Linda Lynch (consulting osteoarchaeologist to the project) the trenches were not extended to recover complete skeletons and so only the bones exposed within the trenches were removed.

## 5 Site Description

The archaeological led excavations were undertaken to the south of the graveyard wall surrounding Temple Jarlath and across the junction between Sawpit Lane Church lane and the Mall. The street opens out at this junction and an entrance gate through the graveyard enclosing wall which is shown on the 1839 Ordnance Survey map is still in use today (Fig 5). An entrance avenue leading down to St Mary's cathedral also opens out, through a gate, into Sawpit lane at this point. The excavations continued along Sawpit Lane to the west of the new railings inserted along the western side of the Temple Jarlath enclosure. Sawpit Lane runs parallel with the 36 m OD contour line and corresponds with the western edge of the High ground south of the river Nanny. The ground falls away to the south along the Mall and to the north along Chapel Lane.

## 6 Excavation

Three trenches were excavated at the junction between Sawpit Lane, The Mall and Church Lane and along the full length of Sawpit Lane (Fig 7, 8, 9 and 10). Trench 1 was short and measured 2 m x 1 m it contained the remains of a single skeleton (Sk 5) and once this was revealed and recorded the remains were left in situ covered by sand and marked by plastic warning tape. The trench was then backfilled and the road surface reinstated. Trench 2 ran from just west of trench 1 parallel to the curb on the eastern side of Church Lane southward into The Mall. The trench contained the truncated remains of a large ditch (C.13) and possible bank (C.17), two large pits (C.11 and C.20) and four skeletons (Sk 1, Sk2 Sk3 and Sk4) all of which were excavated and recorded. Trench 3 was the longest single trench and was excavated across the road at the top of the mall and east and

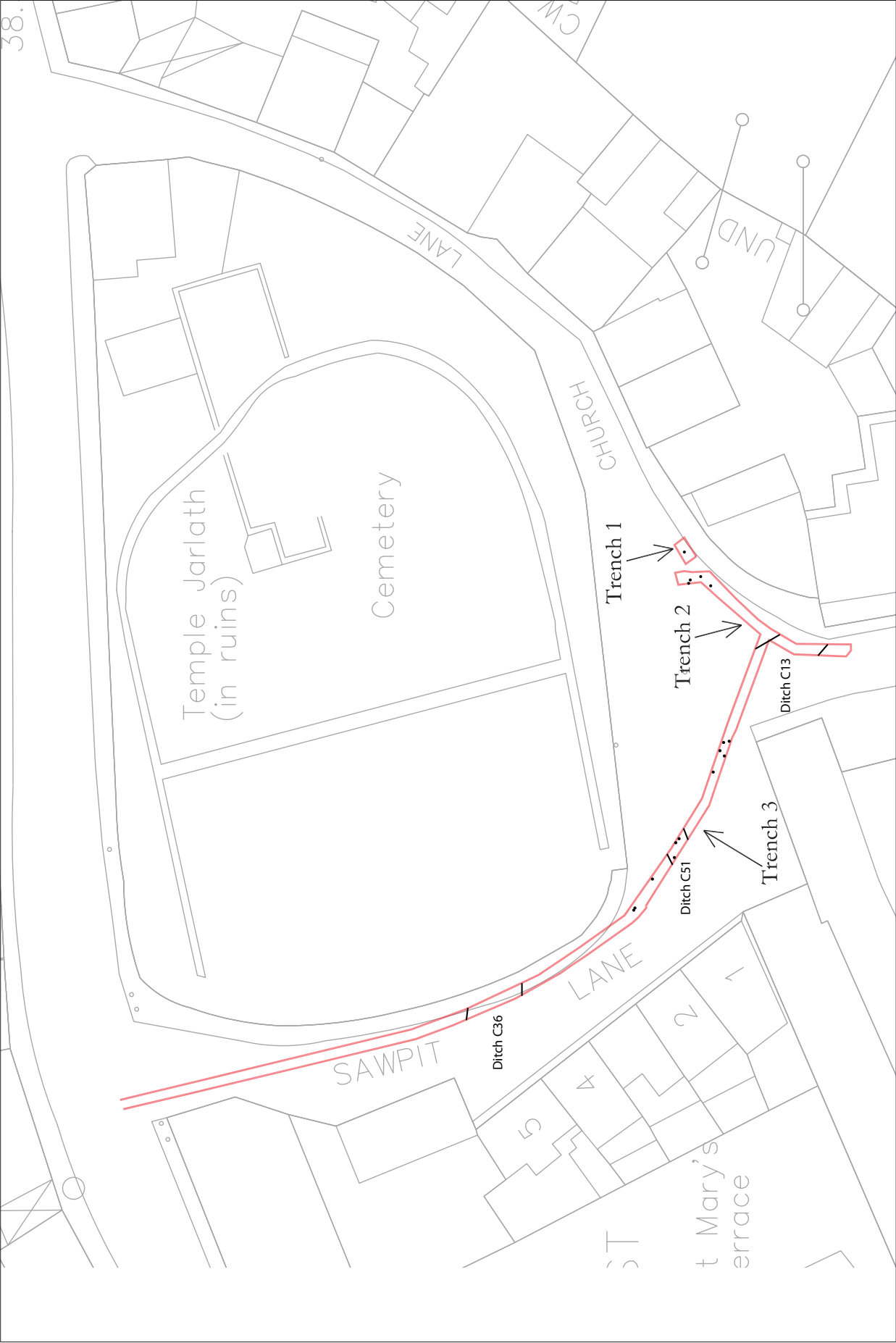


Figure 7: Post excavation plan of the three excavated trenches

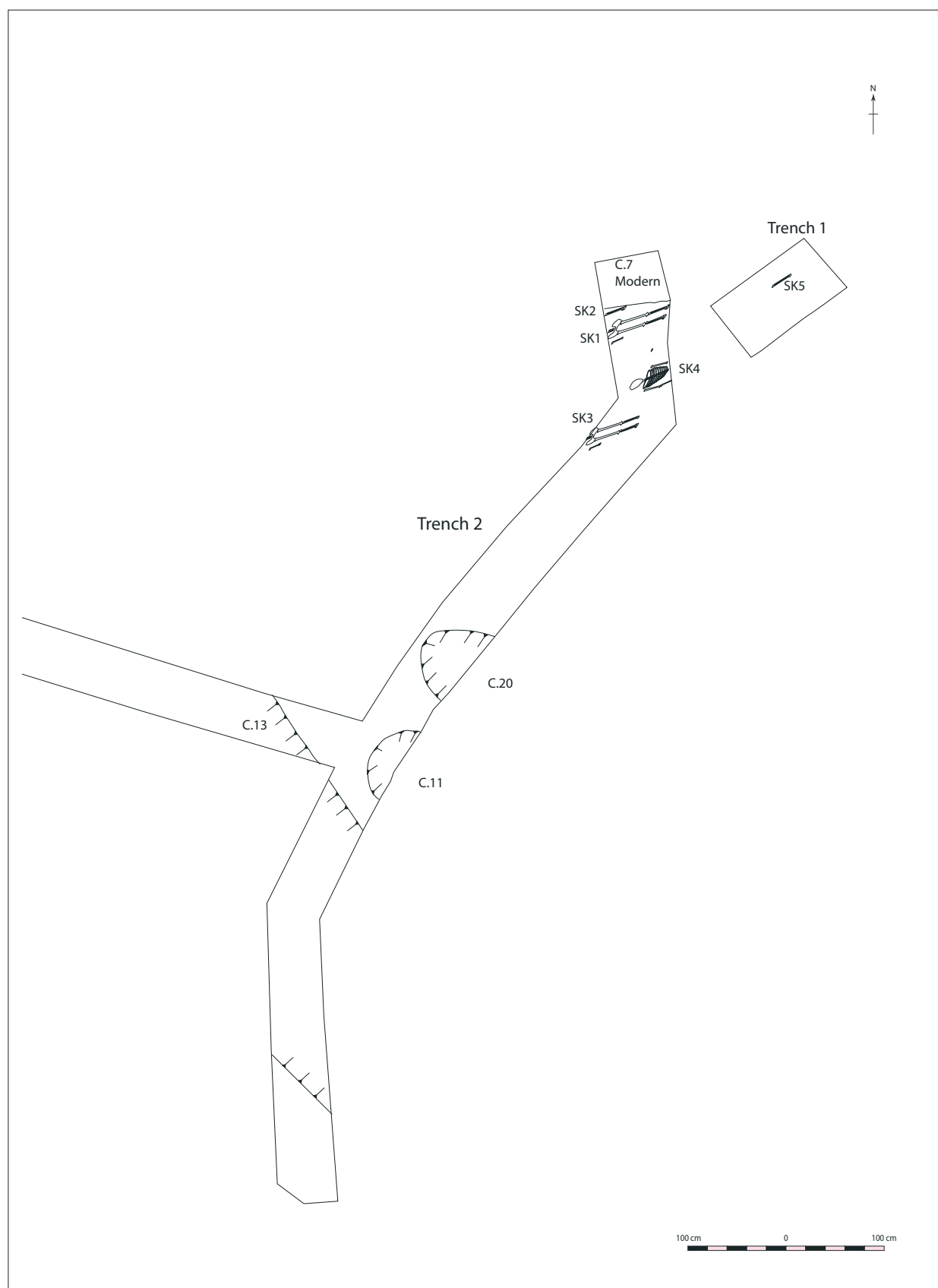


Figure 8: Post excavation plan of trench 1 and 2



Plate 1: Looking south at Skeleton 6 and 7, which were truncated by a modern service pipe.

north along sawpit lane up to the junction with High street. The trench contained three ditches (C.36, C.48 and C.51), a pit (C.46), a stone culvert (C.62), a boundary wall (C.59) a cobbled surface (C.52) and eleven skeletons (Sk 6 – 16). The excavated trenches were backfilled with hardcore prior to the insertion of the water pipes and final reinstatement.

## Human remains

In total 15 skeletons were identified and recorded. Specialist analysis was undertaken by Linda Lynch (Appendix 1). Skeleton 5 was left in situ as the proposed line of the watermain was moved to the west. Skeleton 10 was originally recorded as a burial but analysis revealed that it was a collection of disarticulated bones. The skeletons were generally directly overlain by a dark brown silty clay (C.3) identified below the older road surface (C.2) underlying the present tarmacadam. A grave cut was rarely identifiable and the human remains were generally resting on the underlying natural subsoil which was a greenish yellow boulder clay (C.19). Skeletons 6 and 7 were buried together (Plate 1). A full term foetus was recovered from the abdomen of Skeleton 16. A possible example of a pillow stone was noted below the cranium of Skeleton 16 (Plate 2). There were no indications for the use of coffins. Shrouds and/or winding sheets are likely to have been used instead. Certainly the feet of at least one individual, Skeleton 2, were very close together, which suggests that the feet were bound within the trappings of burial. No shroud pins were recovered. A number of variations in burial orientations were apparent. There were

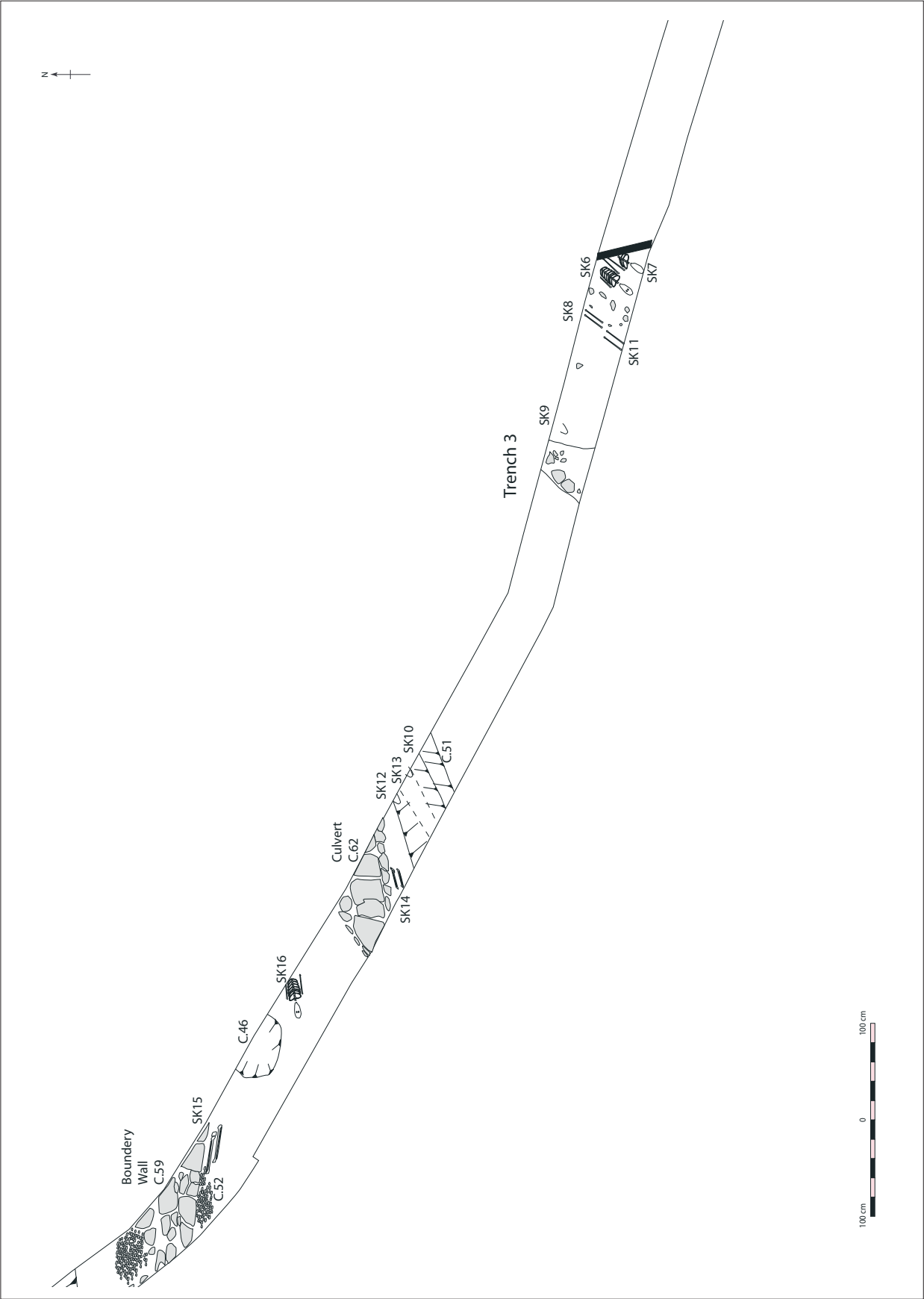


Figure 9: Post excavation plan of eastern half of trench 2

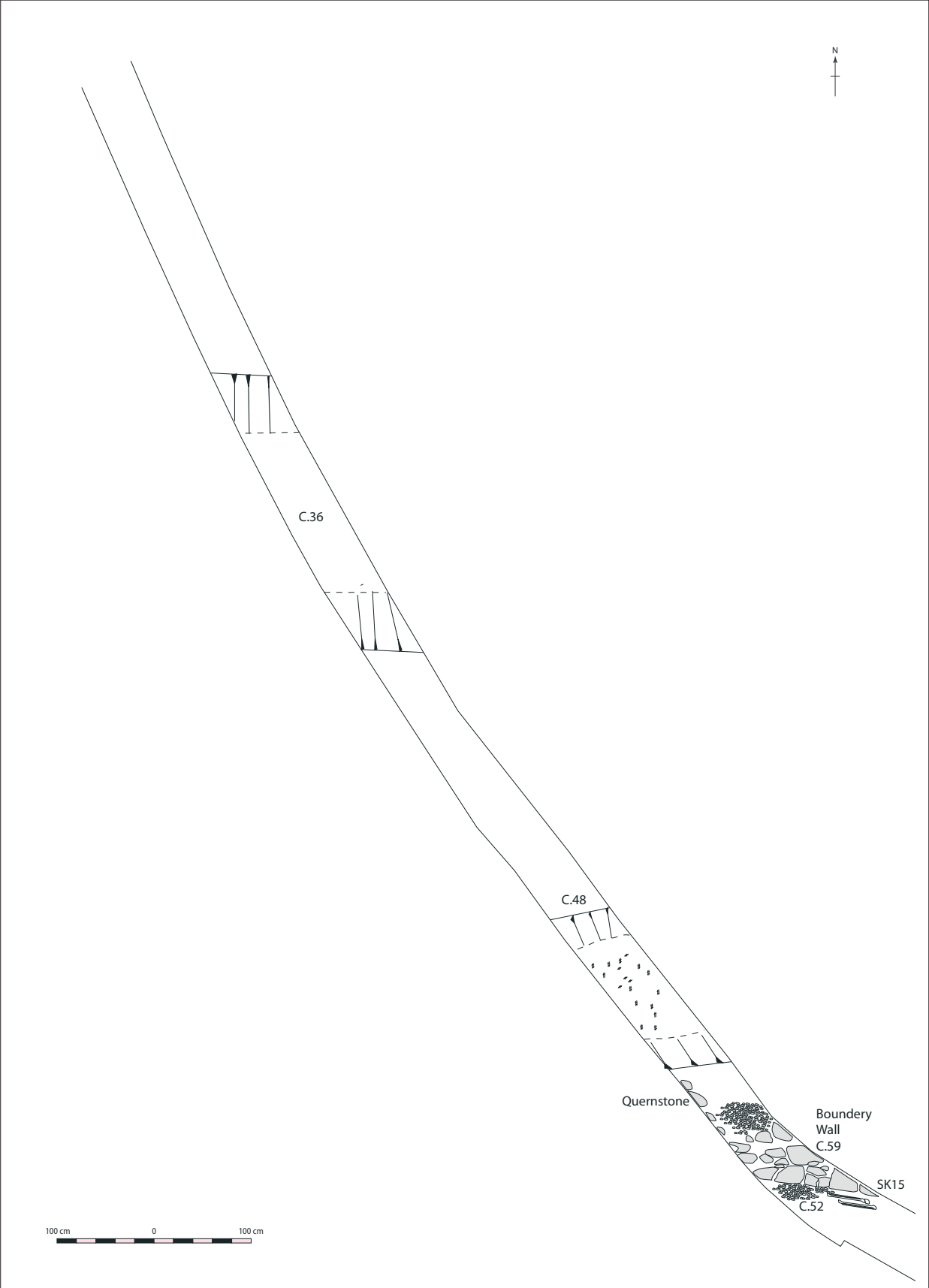


Figure 10: Post excavation plan of western half of trench 2





Plate 2: Looking south at Skeleton 16 and its possible pillow stone.

burials within the range of the standard west/east Christian orientation, including Sk1, Sk2, Sk3, Sk4, Sk6, Sk7, Sk11, and Sk16. A number of burials however, were orientated with the heads broadly to the east. These include Sk5 (unexcavated), Sk8, Sk12, Sk13, Sk14, and Sk15.

Skeleton No.	Orientation (head to)	Description
1	North west	Incomplete but well preserved remains of a 45+ year old female. The remains were covered by orange brown silty clay (C.4) and were lying on the natural subsoil (C.19). The burial was located in Trench 2 in close association with SK2, 3 and 4 and just west of SK 5
2	West	Extremely incomplete but well preserved adult. Covered by dark brown loose silty clay (C.4) found in undisturbed sections of the trench below the road surface and bedding layers. The burial was disturbed by a modern service trench (C.7). The burial was located in Trench 2 in close association with SK 1, 3 and 4 and just west of SK 5
3	West	Incomplete but well preserved remains of a juvenile aged 8 – 10 years. The remains were covered by orange brown silty clay (C.9) and were lying on the natural subsoil (C.19). The burial was located in Trench 2 in close association with SK 1, 2, and 4 and just west of SK 5.
4	West	Very incomplete but well preserved remains of an adult male. The remains were covered by orange brown silty clay (C.25) and were lying on the natural subsoil (C.19). The burial was located in Trench 2 in close association with SK 1, 2, and 3 and just west of SK 5.

Skeleton No.	Orientation (head to)	Description
5	North east	Unexcavated burial left in situ due to re-routing of the pipeline.
6	South west	Incomplete but well preserved remains of adult male aged 30-45 years. Interred in the same grave (C.33) as Sk 7 which was cut into the underlying subsoil (C.19). The remains were covered with brown loose organic silty clay (C.27). The burial was located at the eastern end of trench 3 and the eastern half was truncated by a modern service trench. Bone from the skeleton was dated to cal AD 591 – 766 (UBA-17157).
7	South west	Fairly incomplete but well preserved remains of an adult male aged 25 – 30 years. Interred in the same grave (C.33) as Sk 6 which was cut into the underlying subsoil (C.19). The remains were covered with brown loose organic silty clay (C.27). The burial was located at the eastern end of trench 3 and the eastern half was truncated by a modern service trench.
8	North east	Very incomplete but well preserved remains of a possible male. The remains were covered by greyish brown silt (C.30) and were placed in a shallow grave cut (C.58). The burial was truncated by the later interment of Sk 11. The burial was located in Trench 3 just to the west of Sk 6 and 7.
9	Unclear	Very incomplete but well preserved remains of an adult. The remains were covered by orange brown silty clay (C.31) and were lying on the natural subsoil (C.19). The burial was located in Trench 3 to the west of Sk 8 and Sk 11.
10	n/a	Originally recorded as a burial but specialist analysis revealed that it was a collection of disarticulated bones.
11	South west	Very incomplete but well preserved remains of an adult male. The remains were covered by greyish brown silt (C.30) and were placed in a shallow grave cut (C.58). The burial truncated the remains of Sk 8 however it was not possible to differentiate between the grave cuts and the fills. The burial was located in Trench 3 just to the west of Sk 6 and 7. The relationship with the nearby ditch (C.51) is unclear.
12	North east	Incomplete significantly fragmented remains of a possibly male adult. The remains, like SK 13 and 14 were buried within a deposit of compact orange brown silty clay (C.40) which overlay the natural subsoil (C.19) and contained a sherd of 17 <sup>th</sup> century pottery and an iron nail. The burial was located to the south east of a modern stone culvert (C.62) in Trench 3.
13	North east	Very incomplete but well preserved remains of a young adult female aged 15 – 18 years. The remains, like SK 12 and 14 were buried within a deposit of compact orange brown silty clay (C.40) which overlay the natural subsoil (C.19) and contained a sherd of 17 <sup>th</sup> century pottery and an iron nail. The burial was located to the south east of a modern stone culvert (C.62) in trench 3. The relationship with the nearby ditch (C.51) is unclear.
14	East-north-east	Very incomplete fragmented remains of an adult female. The remains, like SK 12 and 13 were buried within a deposit of compact orange brown silty clay (C.40) which overlay the natural subsoil (C.19) and contained a sherd of 17 <sup>th</sup> century pottery and an iron nail. The burial was truncated by a modern stone culvert (C.62) in trench 3.
15	East-north-east	Quite incomplete but well preserved remains of a middle adult female aged between 35-39 years. The burial was located to the south west and partly below a rough stone surface (C.52) which formed a base for a stone boundary wall (C.59) in trench 3.
16	North west	Partially incomplete and well preserved remains of a young adult female aged 17 – 25 years. The cranium was resting on a large stone which is possibly a pillow stone. Foetal remains of Sk 17 were recovered from the abdomen. The remains were covered with brown silty clay (C.64) and were located in trench 3 between the boundary wall (C.59) and the modern culvert (C.62). A Bone from the skeleton was dated to cal AD 637 – 771 (UBA-17157).
17	n/a	Almost complete and well preserved remains of a full term foetus recovered from the abdomen of Sk 16.

## Early medieval

In trench 3 the brown silty clay upper fill (C.49) of a large ditch (C.48) appeared to be overlain by the remains of an old boundary wall (C.59) and contained frequent animal bone inclusions, charcoal flecks, and a piece of slag. A portion of a cow mandible inscribed on two faces with trial motif decoration (10E0117:49:1) was also recovered from this upper fill (C.49). The boundary wall aligns with and appears to be a westward extension of the wall which surrounds Temple Jarlath graveyard. The ditch was 3.2 m wide and was V-shaped in profile. The two recorded lower fills (C.55 and C.57) were orange silts which contained burnt and unburnt animal bone and charcoal flecks. The ditch runs roughly east/west across sawpit lane and lay to the south of a larger ditch (C.36). Animal bone from the lowest fill (C.57) of the ditch has returned a radiocarbon date of cal AD 652-766 (UBA-17156). The only wild animal present in the ditch was red deer, identified from two sawn portions of an antler tine and beam.

## Medieval/post-medieval

### Ditches

The largest ditch (C.36) was 6 m wide with an estimated depth of up to 3 m. It had an upper modern fill of gravel and large stones (C.37) and a lower fill of brown silty clay (C.38) which contained animal bone and charcoal flecks. The ditch ran directly east west across sawpit lane and was the most northerly feature identified in trench 3.

A 2.25 m wide ditch (C.51) in trench 3 appears to disturb the disarticulated human bones originally recorded as Skeleton 10. The ditch ran north-west / south-east across the trench and was filled with dark brown silty clay (C.50) mixed with loose gravel and small stones. The fill contained frequent butchered animal bone and charcoal fragments. Three red deer bones were present in the ditch, all identified as sawn portions of antler and representing waste from craft manufacture.

A 2 m wide ditch (C.13) was identified in trench 2 running north-west / south-east (Plate 3). It had a deep fill of dark brown silty clay (C.14) which contained butchered bone, horn, burnt bone, charcoal, a sherd of modern earthenware (10E0117:14) and some slag. It had frequent stone towards its base and possibly acted as a drain before naturally silting up. A possible bank (C.17) was identified in section on its western side. The ditch was recut (C.15) to a much shallower depth which subsequently filled with orange/light brown silty clay (C.16) which contained occasional animal bone fragments and some slag. Six red deer antler fragments; two shed rosettes, three beam fragments and a small piece of a tine were also recovered. All of these fragments were sawn through and clearly represent waste from artefact manufacture. The presence of two rosettes indicates that shed antler was collected in nearby areas of woodland during the spring time specifically for the craft industry.



Plate 3: Looking north west across trench 2 with the large 2 m wide ditch (C.13) visible in the section,

## Pits

The remains of three large pits were excavated. The eastern halves of two pits (C.20 and C.11) were excavated in trench 2 and the southern half of another pit (C.46) in trench 3. The excavated portion of the northern pit (C.20) within trench 2 was 1.1 m long and 0.7 m wide. It was 0.9 m deep and had almost vertical sides. The primary fill (C.21) consisted of grey gravel mixed with some animal bone fragments. A layer of butchered animal bone (C.22) covered this lower fill to a depth of 0.2 m which was in turn covered by a dark brown silty clay (C.23) containing domestic refuse, animal bones, frequent charcoal fragments, an iron leather working awl (10E117:23:1) and a flint flake (10E117:23:2). Two small pieces of red deer antler tines which had been sawn through and represent off cuts from craft manufacture were also present.

The southern pit (C.11) excavated in trench 2 was 1.7 m long and 0.65 m wide (Plate 4). It was 0.43 m deep had steep sides and a flat base. The fill (C.12) was a brownish-black, silty clay which contained butchered bone, burnt bone, horn, charcoal fragments and oyster shells. It also contained clay pipe fragment (10E117:12:1) and glass.

The pit (C.46) located in trench 3 between the stone culvert (C.62) and the boundary wall (C.59) measured 1.6 m x 0.6 m and was 1 m deep. It had steep sides and a flat base and was filled with dark brown silty sand with occasional large boulders and stones. It contained frequent charcoal flecks and animal bone. Red deer was represented by two antler fragments which consisted of the sawn tips of tines.





Plate 4: Looking east at the southern pit (C.11) in trench 2.

## Post-medieval/Modern

### Boundary wall

A stone surface (C.52) measuring 2 m x 1 m was identified within trench 3 below the old road surface. The surface consisted of rounded water rolled small stones measuring between 0.15 m and 0.03 m which were set into an orange clay. A stone wall (C.59) consisting of mortared rectangular blocks measuring 0.4 x 0.2 x 0.8 m ran roughly east/west across the trench (Plate 5). The wall overlay the stone surface and was 0.6 m wide and survived to a depth of 0.5 m. Fragments of a quernstone (10E117:59:2) had been mortared into the wall. The stone surface underlying the boundary wall overlies Skeleton 15.

### Stone Culvert

A well built stone culvert (C.62) ran north-east to south-west across trench 3 (Plate 6). Skeleton 14 was truncated by the culvert. The walls of the culvert were mortared and built to three or four courses. It was roofed by larger lintel stones which were between 0.1 and 0.15 m thick. The base of the culvert was formed with tightly spaced cobble stones. The culvert was 0.42 m wide and 0.75 m high, internally. Clay pipes, iron fragments, pottery and glass were recovered from within the culvert.



Plate 5: Looking north at the boundary wall (C.59) and cobble surface (C.52) overlying Skeleton 15 in trench 3.



Plate 6: Looking south west at the stone culvert (C.62) truncating Skelton 14 in trench 3.



## 7 Finds

A large iron pin was recovered from the upper fill (C.23) of a pit (C.20) in trench 2. The pin, (10E117:23:1), has a large robust shaft, with a blunt point. The upper half of the shaft is roughly circular in section however this changes to a rectangular shape in section below the centre. It is flattened towards the terminal. The point itself is damaged, with some undiagnostic adhesions projecting from it. The object is more than likely a leather-worker's awl. It would have been used to pierce leather in preparation for stitching (Appendix 2).

A flaked piece of flint (10E117:23:2) was found in the same upper fill (C.23) of a pit (C.20) as the leather working awl. The flint probably dates to the late Neolithic period or Early Bronze Age and possibly represents domestic waste (Appendix 3).

An iron nail (10E117:40:2) and a sherd of 17<sup>th</sup> century north devon ware (10E0117:40:1) were recovered from a deposit containing three of the Skeletons (Sk 12 13 and 14) in Trench 3.

A fragment from the upper stone of a rotary quern stone (10E117:59:2) was recovered from remains of the boundary wall (C.59) recorded in trench 3. The working surface is flat and worn. The sides and top are dressed. A portion of the central perforation survives.

Two king George V copper pennies, a decorated copper shank button, a 20<sup>th</sup> century heart shaped miniature padlock, two ceramic marbles or bottle stoppers, modern glass fragments and a clay pipe stem fragment were recovered from the upper trench fills and older road surface deposits.

## 8 Metallurgical Residues

Paul Rondelez has examined the metallurgical material recovered during the excavations (Appendix 4). The pieces from the fills (C.14 and C.16) of the ditch (C.13) and its recut (C.15) in trench 2 are rather undiagnostic, but fit well into the range of types of slag which are the result of blacksmithing. A larger piece was recovered from the upper fill (C.49) of a large ditch (C.48) in Trench 3. It is identifiable as the central part of a Smithing Hearth Cake, which is the typical result of early iron smithing (Crew 1996). The assemblage from the Sawpit Lane area in Tuam indicates that iron smithing was taking place here, both in the early medieval period and at a later date in the post-medieval period.

## 9 Animal Bone

Margaret McCarthy examined the animal bone from the site and the impression gleaned from the analysis is that the assemblages from both the early medieval and medieval periods represent typical domestic samples consisting of bones from the slaughter, preparation and consumption of animals in this area of the town (Appendix 5). With the exception of a small collection of sawn waste red deer antler and single occurrences of rabbit and dog, all of the bones were either specific to domestic animals or to small fragments

derived from them. While the recovered samples are too small to be conclusive, the results indicate that the meat diet for both periods of activity was based mainly on cattle with a lesser sheep and pig component. Cattle husbandry seems to have been focused on the rearing of animals to at least three years of age as very few bones from young individuals were found. Ageing data for sheep indicated that they were slaughtered at a stage when they had reached their maximum size for meat production and in common with other contemporary sites, pigs were slaughtered between one to two years of age. Apart from the main livestock animals, no other species were present in significant numbers. Just one dog bone was identified, a vertebra from a medieval pit. The samples are too small to comment meaningfully on the local economy but the results confirm those obtained from other contemporary sites suggesting a husbandry based mainly on cattle with sheep and pigs playing a less significant role. The recovery of numerous waste antler fragments from craft manufacture and a cattle mandible that had been used as a trial piece for art-work highlights the importance that was placed on bone as a secondary product during these periods.

## 10 Radiocarbon Dates

Radiocarbon analysis was carried out by the  $^{14}$  Chrono Centre in Queen's University Belfast.

Dates were calibrated using Calib Rev6.0.0 (©1986-2010 M.Stuiver & P.J. Reimer) and in conjunction with Stuiver & Reimer 1993 and Reimer et al. 2009.

Dates were obtained from two of the skeletons (Sk 6 and 16) excavated and an animal bone fragment recovered from the basal fill (C.57) of one of the large excavated ditches (C.48). All three dates correspond to the early medieval period.

Lab. Code	Context	Sample	Material	Years BP	$\delta^{13}\text{C}$	1 sigma calibrated AD	2 sigma calibrated AD	Period
UB-17156	Basal fill (C.57) of a large ditch (C.48)	14	Animal bone	1330 $\pm$ 22 BP	-22.3	658 - 684	652 – 710 747-766	Early Medieval
UB-17157	C.26 Skeleton 6		Human bone	1377 $\pm$ 41	-22.8	622-673	591-710 747-766	Early Medieval
UB-17158	C.63 Skeleton 16		Human bone	1343 $\pm$ 35	-22	648-688 754-759	637-724 738-771	Early Medieval



## 11 Monitoring Along The Mall

Permanent works along The Mall commenced in August 2010 and were archaeologically monitored. Trenching began at the intersection of The Mall and Sawpit lane and progressed south along The Mall. The trench ran along the centre of the road and was on average less than 1 m wide and 1.2 m deep. Previous works had heavily truncated and disturbed the subsurface deposits along The Mall and the size of the excavated trench did not lend itself to the identification of archaeological features.

Two possible backfilled ditches both located outside the Mall House were tentatively identified. Due to previous disturbance the ditches were revealed only along the eastern side of the trench. The northern ditch was 2.2 m wide. Its full depth was not recorded as it extended beyond the depth of the 1.2 m deep trench. The possible ditch was V-shaped in profile with steep sides. A shallower ditch was identified 3 m to the south. It was 3 m wide and was deeper than the 1.2 m deep trench. The sides sloped gently and the fill was uniform. The exact orientation and alignment of both ditches could not be obtained. The natural subsoil in the area was a light grey loose gravely glacial till.

## 12 Discussion

The three excavated trenches along Sawpit Lane have produced a wide range of features and finds. Modern service pipes and road surfacing have previously disturbed the features however interesting and important features have been excavated and recorded. The limitations of excavations in a 1 m wide trench and the modern disturbance have meant that the stratigraphic relationships between the excavated features were not always clear and could not be fully resolved.

The three radiocarbon dates have revealed an early Christian context for some of the excavated features. Two of the human burials and animal bone from the base of one of the large ditches have returned a series of calibrated radiocarbon dates centring around the seventh century.

In total 15 skeletons were excavated and recorded. Both males and females and all demographic groups were represented in the small assemblage. The majority of the burials conformed to a standard early medieval treatment. They were buried without grave goods in east-west orientation (with the head to the west) in an extended supine position in a long dug grave (O'Sullivan & Harney 2008, 143). There were no indications for the use of coffins and based on the limited evidence of the arm, hand leg and feet positions it is likely that shrouds or winding sheets were used instead.

Six of the burials however had an alternative orientation with the head to the east. This variation may indicate different phases of burial. Three of these burials (Sk 12, 13 and 14) were located together and appear to have been buried within a separate deposit (C.40) unlike the other burials which are largely dug into or placed on top of the natural subsoil. This deposit contained a single sherd of 17<sup>th</sup> century pottery and an iron nail. This association possibly suggests that this group of burials are substantially later in date. However another example of the east orientated group Skeleton 8 appears to be cut by Skeleton 11 which has a western orientation.

Skeleton 16 was buried with a possible pillow stone which while are rare in the archaeological record but can be found across all periods (O'Sullivan & Harney 2008, 144). Foetal remains (Sk 17) were found in the abdominal region of this young adult female and this fact may have influenced the decision to add the pillow stone.

Two adult males were buried together, Skeleton 6 (male 30-45 years) and Skeleton 7 (male 25-30 years). Double burials are not particularly rare in archaeological contexts and examples have been found in many early medieval cemeteries including Johnstown 1 (Clarke 2010) and Mount Gamble (O'Donovan and Geber 2010). Certainly before the advent of modern medicine diseases could ravage populations, and the death of two adult males in their prime may not have been that unusual. Famine and conflict could also account for their deaths. Interestingly, enamel hypoplastic defects, indicative of childhood stress, were present in the dentitions of both of these individuals, while none were present in the female adults. This may suggest that the sexes were subject to different stresses in childhood, but this may only be examined with a larger sample.

The recorded stratigraphy, body position or associated finds does not allow us to phase the burials and all that can be said for certain about their date is that two of the burials have been dated to the Early Christian period and they are located outside the boundary walls of Temple Jarlath graveyard which has possible Early Christian associations.

Animal bone from the lowest fill (C.57) of a large V-shaped ditch (C.49) has returned a radiocarbon date of cal AD 652-766 (UBA-17156). This date ties in strongly with the dates returned from the two dated burials. The ditch ran east/west across the trench and was located just to the north of the possible east/west extension of the present graveyard boundary wall (C.59) which was also revealed in trench 3. A smithing hearth cake typical of early iron smithing was recovered from the upper fill (C.49) along with a bone trial motif piece. Motif pieces were scraps of portable material usually bone or stone carved or incised with discreet positive patterns and are believed to be associated with fine metal-working (Comber 1997, O'Meadhra 1987).

The decoration on the trial piece is very closely paralleled with five bone motif pieces recovered from enclosure 1 at Roestown 1 excavated along the route of the M3 in Co. Meath. The available radiocarbon dates for enclosure 1 suggest a late sixth or seventh century date for some of the pieces. The excavator at Roestown has suggested that the closest parallels for the Roestown 2 pieces both geographically and stylistically can be found at Lagore. It was also suggested that there are clear chronological and stylistic parallels between metal working assemblages of Roestown 2 and Lagore (O'Hara 2009).

The rest of the ditches and pits excavated and recorded in Trenches 2 and 3 have been assigned to a medieval/post-medieval phase of activity. The finds, slag and animal bone recovered from the fills are relatively undiagnostic and appear to be rather mixed.

The condition of the animal bones from all the features along Sawpit Lane was quite poor with high values for erosion and weathering. While the material was mostly recovered from cut features such as pits and ditches, the extremely fragmented and eroded condition of the bones indicates that they were lying in a secondary, if not tertiary position, when excavated. High rates of fragmentation are indicative of a slow build up of deposits where bone specimens were left exposed on the occupation surface to be subjected to weathering, gnawing and trampling before eventually being discarded into the ditches and pits. The overall impression from the analysis of the animal bones is that the assemblages from both the early medieval and medieval periods represent typical domestic samples consisting of bones from the slaughter, preparation and consumption of animals in this area of the town. With the exception of a collection of sawn waste red deer antler and single occurrences of rabbit and dog, all of the bones were either specific to domestic animals or to small fragments derived from them. While the recovered samples are too small to be conclusive, the results indicate that the meat diet for both periods of activity was based mainly on cattle with a lesser sheep and pig component.

The recovery of numerous waste antler fragments from craft manufacture and a cattle mandible that had been used as a trial piece for artwork highlights the importance that was placed on bone as a secondary product during these periods. A leather working awl found in one of the pits is also reflective of craft manufacture. The small metallurgical

waste assemblage from the excavations shows that iron smithing was taking place here, both in the early medieval period and at a later date in the post-medieval period.

The location of the pits and ditches particularly those in Trench 2 to the general area known as the location of the original market cross and early medieval market area and just east of the town shambles which was laid out in 1795 suggests that the features are reflective of activity in the area from the early medieval period through to the post medieval times. The pits may have acted as refuse pits for waste and the ditches may have demarcated areas or being used as open drains.

Irish society was gradually converted to Christianity from the fifth century onwards and ecclesiastical cemeteries appear to have developed by the seventh century (O'Sullivan & Harney 2008, 162). As we have seen St Jarlath is believed to have founded a monastery at Tuam in the early sixth century AD. One of the defining characteristics of an ecclesiastical site was an enclosure which served to symbolically demarcate the boundary between the dead and the living (O'Sullivan & Harney 2008, 164).

The ditch dated to the early medieval period appears to follow the line of the circular boundary wall surrounding Temple Jarlath prior to the insertion of the new railing along the western side of the enclosure. A change was also noted to the line of the enclosure along Sawpit Lane between the Morris map of 1720 and the first edition Ordnance survey map of 1839. The ditch therefore may have formed the original ecclesiastical enclosure identified by Swan (1985) and which has been fossilized in the curving eastern and southern boundary wall of the graveyard surrounding Temple Jarlath. The evidence for early iron smithing and the bone trial piece reinforce the early date for the ditch. The early burial evidence and the early enclosing element coupled with reports of an early unclassified cross slab suggest that the graveyard and enclosure at Temple Jarlath substantially predates the re-established settlement in the eleventh century and that they may be associated with St Jarlath's original early Christian foundation. The burials identified during the excavation however are located outside the line of this inner enclosure which it is believed represented the holiest core of an ecclesiastical site and would have contained the church and the cemetery. The non standard orientation of some of the burials also remains a puzzle as O'Brien (2003, 67) has argued that the standard burial rite by the seventh/eight century was extended east-west inhumation located in ecclesiastical cemeteries.

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## Appendix 1 Osteoarchaeological Report

By Linda G. Lynch

### Abstract

This report details the osteoarchaeological analysis of 14 human skeletons excavated at Sawpit Lane, Tuam in Co. Galway by Eachtra Archaeological Projects (licence number 10E0117). Another burial was left *in situ*. Two of the 14 skeletons were adult males that had been buried at the same time. One of the female adults appears to have been pregnant with a full-term foetus at the time of death. A varied selection of pathological lesions was present in the skeletal remains. The excavation was limited due to the nature of the works involved and most of the skeletons were very incomplete. However, despite this, the yield of information is impressive.

## Osteological Terms Used

A number of basic terms are used frequently in osteo-archaeology and these are outlined below. The definitions are taken from White and Folkens (1991, 28-35) and Bass (1995, 319-321).

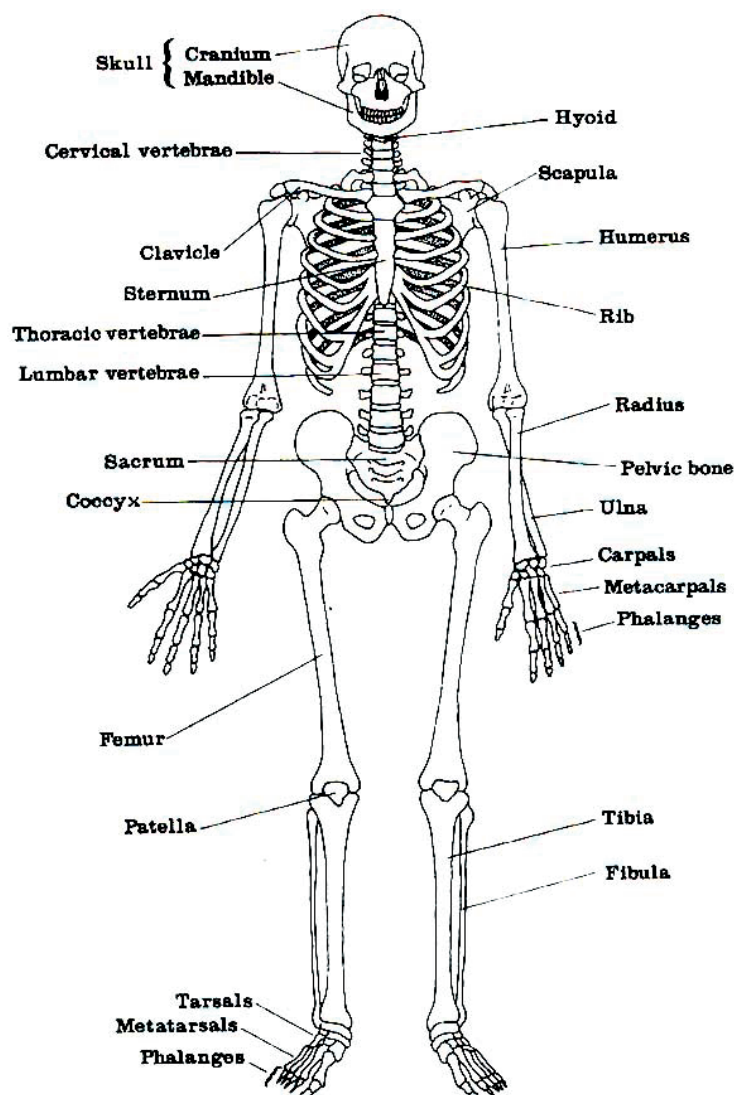


Figure 1. Annotated diagram showing main skeletal elements (after Mays 1998, 2, fig. 1.1)

### Directions - General

**Superior** - toward the head of the body.

**Inferior** - opposite of superior, body parts away from the head.

**Anterior** - toward the front of the body.

**Posterior** - opposite of anterior, toward the back of the individual.

**Medial** - toward the midline of the body.



**Lateral** - opposite of medial, away from the midline of the body.

**Proximal** - nearest the axial skeleton, usually used for long bones.

**Distal** - opposite of proximal, furthest from the axial skeleton.

**Palmar** - relating to the hand, the palm side

**Plantar** - relating to the foot, towards the sole of the foot

**Dorsal** - relating to the hand and foot, the back of the hand, the top side of the foot

**External** - outer.

**Internal** - opposite of external, inside.

**Endocranial** - inner surface of the cranial vault.

**Ectocranial** - outer surface of the cranial vault.

**Osteoclastic** - process of bone resorption

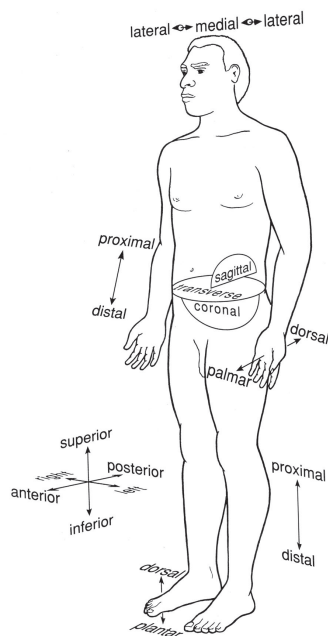


Figure 2. Anatomical directions (from White & Folkens 1991, 29, Fig. 3.1)

### Direction - Teeth

**Mesial** - toward the point on the midline where the central incisors contact each other.

**Distal** - opposite of mesial.

**Lingual** - toward the tongue.

**Labial** - opposite of lingual, toward the lips.

**Buccal** - opposite of lingual, toward the cheeks.

**Incisal** - the biting surface of the tooth.

**Occlusal** - the chewing surface of the tooth.

### General bone features/terms

**Process** - a bony eminence.

**Eminence** - a bony projection, usually not as prominent as a process.

**Spine** - generally a long, thinner, sharper process than an eminence.

**Tuberosity** - a large, usually roughened eminence of variable shape, often the site of a ligament attachment.

**Tubercle** - a small, usually roughened eminence, often a site of a ligament attachment.

**Trochanters** - two large, prominent, blunt, rugose processes found on the distal femur.

**Malleolus** - a rounded protuberance adjacent to the ankle joint.

**Boss** - a smooth round broad eminence.

**Articulation** - an area in which adjacent bones are in contact at a joint.

**Condyle** - a rounded articular process.

**Epicondyle** - a non-articular projection adjacent to a condyle.

**Head** - a large, rounded, usually articular end of a bone.

**Shaft or diaphysis** - the long, straight section between the ends of a long bone.

**Epiphysis** - usually the end portion or extremity of a long bone which is expanded for articulation.

**Neck** - the section of a bone between the head and the shaft.

**Torus** - a bony thickening.

**Ridge** - a linear bony elevation, often roughened.

**Crest** - a prominent, usually sharp and thin ridge of bone.

**Line** - a raised linear surface, not as thick as a torus or as sharp as a crest.

**Facet** - a small articular surface, or tooth contact.

**Metaphysis** - a line of junction between epiphysis and diaphysis.

**Osteoblastic** - process of bone formation

### Other osteological terms

**C1-C7** - cervical vertebrae (neck) numbered from 1-7.

**CEJ** - cemento-enamel junction, junction of crown of tooth and root.

**DJD** - degenerative joint disease.

**T1-T12** - thoracic vertebrae (torso) numbered 1-12.

**TMJ** - temporomandibular joint, joint of lower jaw.

**L1-L5** - lumbar vertebrae (lower back) numbered 1-5.

**S1-S5** - sacral vertebrae (in between left and right pelvis) numbered 1-5.

**MC** - metacarpal (bones of the palm of the hand).

**MT** - metatarsal (bones of the arch of the foot).

**IAM** - Internal Auditory Meatus in temporal bone of cranium.

**EAM** - External Auditory Meatus in temporal bone of cranium.

**MNI** - Minimum Number of Individuals.

## Introduction

### 1.1 Background to Project

The *in situ* skeletal remains of up to 16 individuals were recently excavated by Eachtra Archaeological Projects in 2010 in the area of Temple Jarlath in Tuam, Co. Galway (licence number 10E0117). The excavations entailed the excavation of a 1m wide trench for approximately 100m in advance of pipe-laying for Tuam Town Water Supply Scheme. The trench was located along Sawpit Lane and at the junction with The Mall. The writer visited the excavation on a consultancy basis, and recommended that only the human remains that would be directly impacted on by the services works should be excavated. Thus no trench was extended to recover complete skeletons. While this ensured that, in most cases, only partial skeletons were recovered, it ensured minimal disruption to other potential human remains that would not ordinarily have been affected by the development. The following is a summary of the excavation as provided by Jacinta Kiely of Eachtra Archaeological Projects:

*Three trenches were excavated at the junction between Sawpit Lane, The Mall and Church Lane and along the full length of Sawpit Lane. Trench 1 was short and measured 2 m x 1 m it contained the remains of a single skeleton (Sk5) and once this was revealed and recorded the remains were left in situ covered by sand and marked by plastic warning tape. The trench was then backfilled and the road surface reinstated. Trench 2 ran from just west of trench 1 parallel to the curb on the eastern side of Church Lane southward into the Mall. The trench contained the truncated remains of a large ditch (C.13) and possible bank (C.17), two large pits (C.11 and C.20) and four skeletons (Sk 1, Sk2 Sk3 and Sk4) all of which were excavated and recorded. Trench 3 was the longest single trench and was excavated across the road at the top of the mall and east and north along sawpit lane up to the junction with High street. The trench contained three ditches (C.36, C.48 and C.51), a pit (C.46), a stone culvert (C.62), a boundary wall (C.59) a cobbled surface (C.52) and eleven skeletons (Sk 6 – 16). The excavated trenches were backfilled with hardcore prior to the insertion of the water pipes and final reinstatement.*

*In total 16 skeletons were identified and recorded. Skeleton 5 was left in situ as the proposed line of the watermain was moved to the west. The skeletons were generally directly overlain by a dark brown silty clay (C.3) identified below the older road surface (C.2) underlying the present tarmacadam. A grave cut was rarely identifiable and the human remains were generally resting on the underlying natural subsoil which was a greenish yellow boulder clay (C.19). Skeletons 6 and 7 were apparently buried together and Skeleton 16 was interred with a pillow stone and was possibly pregnant (Plates 1 and 2). Judging from the alignment of the feet and hands skeleton 1 and 4 were possibly wrapped in a shroud.*

## 1.2 Scope of Study

This report details the osteoarchaeological analysis of the 14 excavated skeletons, and the foetal remains recovered with Sk16. In addition a very small quantity of disarticulated human skeletal remains recovered and analysed. There is a brief outline of the materials (that is, the bones) that were examined (**Section 1.3**). The methodology utilised in the study is presented in **Section 1.4**. The results of the osteological analysis are presented in **Section 2**. A summary of the analysis and a discussion of the osteoarchaeological results are provided in **Section 3**, while the conclusions of the present study are provided in **Section 4**. The skeletal remains of are catalogued in **Section 6.1**, while the metrical information on the *in situ* skeletal remains is provided in **Section 6.2**. A catalogue of the disarticulated human skeletal remains is presented in **Section 6.3**.

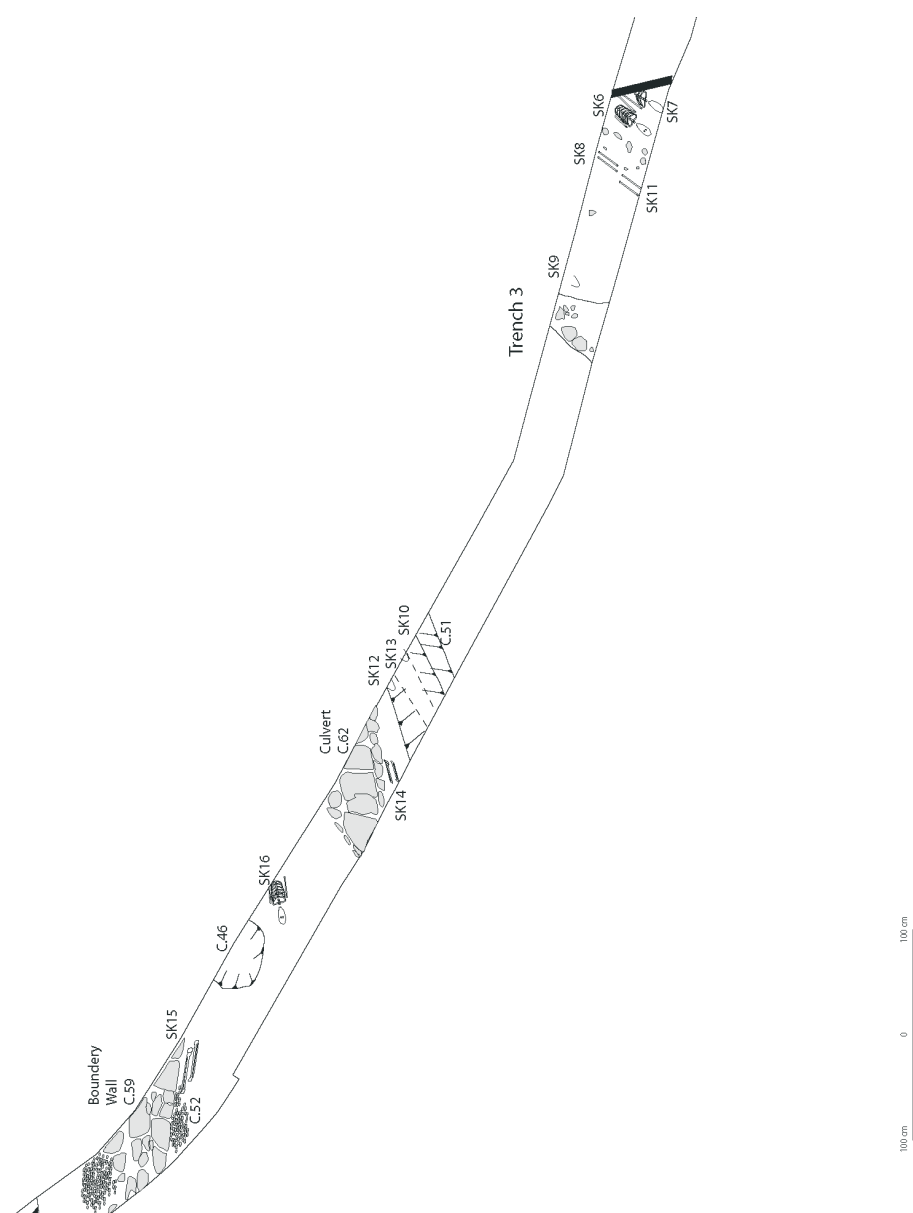


Figure 3. Plan of in situ skeletal remains (copy supplied by client)

## Materials

In total, sixteen skeleton numbers (1-16) were allocated during the excavation. However, Sk5 was left *in situ* as the services modern services were diverted to avoid it. In addition, post-excavation analysis of Sk10 indicates that those bones were not in fact an *in situ* burial but rather a collection of disarticulated skeletal remains. Sk9 comprised a 'skull cap' only and there is no osteological evidence of an actual *in situ* burial. However, in order to err on the side of caution for any future investigations of the site, this cranium will be treated and recorded as a burial. Finally, another skeleton number – Sk17 – was allocated post-excavation to the foetal remains recovered in the abdomen of Sk16, following consultation with Jacinta Kiely of Eachtra Archaeological Projects. Although the infant is likely to have been *in utero* at the time of burial, and as such does constitute an actual burial, it is right and proper that the remains be treated as an individual skeleton. At final count then, a total of 15 *in situ* burials were uncovered, 14 of these were excavated and one of those 14 contained the remains of a foetus in the abdomen. Technically then, there were 15 graves containing 16 individuals. However, it is noted that Sk6 and Sk7 were been buried together in a single grave-cut (Bower and Delaney 2011).

The skeletal remains were processed in post-excavation by the excavation team following the established standards (see Buckley *et al* 1999). The disarticulated material had also been washed by the excavation team. All of the *in situ* skeletons were incomplete, as necessity by the limitations of the excavation. However, in general, the bones were very well preserved. Many bones had suffered from fragmentation but there was very little erosion. A catalogue of the *in situ* skeleton is provided in **Section 6.1** (standardised for all articulated assemblages examined by the writer), along with the metrics (**Section 6.2**), while the disarticulated human remains are catalogued in **Section 6.3** (see **Section 1.4** for details on fields used in database). Eachtra Archaeological Projects furnished the writer with all relevant excavation records prior to the onset of the project.

## Methods

The analysis of human skeletal remains from archaeological contexts can provide information on demography, health, diet, disease, trauma, and possible genetic variations and relations, as well as data on sociological and cultural trends. Standardised methods of assessing the osteological aspects of various skeletal populations allow for comparisons and contrasts to be made across both space and time. When the osteological information is broadened using a bioarchaeological approach the results of osteoarchaeological analysis can yield detailed and invaluable information. The keys to this approach are firstly the use of standardised methods of analysis, and secondly the size and preservation of the skeletal population in question. The assessment of age-at-death, sex, stature, and dental remains are the primary methods that have been standardised. These methods have generally been formulated using data from known populations.

The ages-at-death of the adult individuals from Sawpit Lane were determined on the basis of the morphology of both the auricular surface of the ilium (Lovejoy *et al* 1985),

and the pubic symphysis (Brooks and Suchey 1990). The method of assessing the rates of dental attrition to determine age-at-death of the adults (Brothwell 1981, 71-2) were not utilised in this study. Dental attrition may be affected by a wide variety of factors, such as individual mastication or chewing traits, dietary preferences, and access to foodstuffs. Rates of fusion of secondary epiphyses were also considered in relation to any younger adults (Scheuer and Black 2000). Archaeological adult skeletons cannot be aged very accurately and are assigned into broad age categories. These are 'young adult' (18-24 years), 'middle adult' (25-44 years), and 'old adult' (45+ years). The middle category is further divided into 'young middle adult' (25-34 years) and 'old middle adult' (35-44 years). The method used for each individual is provided in the catalogue in **Section 6.1**.

The sex of the adults was determined on the basis of morphological traits in the pelvis and skull (Buiskstra and Ubelaker 1994), and on metrical analysis (Bass 1995). The basis of the differences between the female and male skeletons lies in the basic principle that females tend to be slender and small, with marked particular traits in the pelvis for the birthing process. Males tend to be larger and more robust. The methods used in the determination of the sex of each adult are provided in the catalogue in **Section 6.1**.

The statures of the adults were estimated using the equations of Trotter (1970).

The methods used in the determination of the age-at-death of juvenile individuals are more accurate and specific, and are assessed on the basis of the known rates of growth and development of parts of the skeleton. The most reliable method is to assess the calcification and eruption of teeth (Moorrees *et al* 1963a, 1963b; Smith 1991). However, in the case of the single juvenile burial (Sk3) from Tuam, no teeth were recovered. Therefore, the lengths of the long bones were used to determine the age-at-death (Maresh 1970; Scheuer and Black 2000). The age-at-death of the foetus (Sk17) recovered with Sk16 was again determined on the basis of long bone length (after Scheuer *et al* 1980). This is considered the most accurate method for determining the age-at death of perinates (from 24 weeks gestation to 7 postnatal days; Scheuer and Black 2000, 468). The methods utilised to determine the age-at-death of each individual is provided in **Section 6.1**. It is not possible to accurately determine the sex of juvenile individuals as the sex-specific morphological bone manifestations do not develop clearly until the onset of puberty.

Permanent teeth were recorded using the following chart:

18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38
right								left							

The upper row represents the maxilla and the lower row represents the mandible. These are further sub-divided into left and right quadrants. Each permanent tooth (1-8) is prefixed by the number of the quadrant it belongs to (1-4).

Deciduous teeth (a single tooth was recovered with the foetal remains of Sk17) were recorded using the chart below:

55	54	53	52	51	61	62	63	64	65
85	84	83	82	81	71	72	73	74	75
<i>right</i>					<i>left</i>				

Again, the upper row represents the maxilla while the lower row represents the mandible, and is subdivided into left and right quadrants. Each deciduous tooth (1-5) is prefixed by the number of the quadrant it belongs to (5-8). In some instances, a combination of the two charts was used.

The following symbols can be used to record the teeth:

<i>P - tooth present</i>	<i>B - tooth broken post-mortem</i>
<i>E - tooth erupting</i>	<i>PM - tooth lost post-mortem</i>
<i>U - tooth unerupted</i>	<i>AM - tooth lost ante-mortem</i>
<i>CA - tooth congenitally absent</i>	<i>R - root only</i>
<i>tz - socket absent</i>	

All incidences of dental diseases such as calculus, caries, abscesses, enamel hypoplastic defects, as well as any other anomalies, were also recorded (**Section 2.3**).

Finally, a number of pathological conditions were observed on the bones and these are detailed in **Section 2.4**.

A catalogue of all the skeletons is provided in **Section 6.1**, with a basic summary of the age-at-death, sex, stature, and dental and skeletal pathological lesions provided at the beginning. The main catalogue details the age-at-death, sex, and stature (including the methods of determination) of each individual. It also summarises the level of preservation, the *in situ* position, attitude, and orientation of the burial, whether there were any other skeletons directly associated and whether there were any finds. However, primarily the catalogue provides details on the bones and teeth present, and the pathological lesions that may have been observed on both. Any anomalies are noted and any additional comments are also included.

Metrical information relating to the skeletons is provided in **Section 6.2**.

A catalogue of all of the disarticulated bones recovered from Sawpit Lane is provided in **Section 6.3**. A Microsoft Access database package was used for the catalogue. Most individual bone fragments were given a unique identification number (ID) to facilitate the osteological analysis. For example, each tooth and the bone of a mandible was given a unique identification number. This enables total bone counts to be more accurate, and helps in matching bone fragments together. There were some exceptions in the cataloguing where, for example, multiple rib fragments were all allocated a single ID number (for



example see ID no. 1021). One hundred and ten entries are listed in the inventory in **Section 6.3**. This represents a total of 389 individual pieces of bones.

Fifteen fields were used to compose the database. The 'ID number' is the first field of the database, and gives a unique number to each bone (or group of fragments). There are also fields listing the 'associated skeleton', 'context', 'cut' number, and 'find' number, if relevant. The identified fragment/s is then listed as a bone type under 'Skeletal Element' and a 'Code' is also provided for each identified fragment (based on Chamberlain and Witkin 2000, see **Section 6.3**). The 'Side' from which the bone is from also noted, as well as the 'Age 1' (general Adult (AA) or Juvenile (JUV)), 'Age 2' (specific age), and the 'Sex' of the individual, if known. Any 'Dental Pathology' or 'Skeletal Pathology' lesions are noted, and there is also a field for further 'Notes'. In general, the identified fragments are noted in more detail in the 'Notes' section, which also details information on possible links with other fragments. The final field lists the number of fragments assigned to each individual ID number, as already described above.

All of the raw osteological data on the human skeletons recovered from Sawpit Lane, Tuam, Co. Galway is housed with the writer. The skeletal remains will presently be returned to the client for storage, and the curation of these individuals will be determined by the National Museum of Ireland.

## Analysis

The analysis of this particular assemblage is limited by the nature of the recovery of the skeletal elements. The excavation was rightly limited to the confines of the excavated trenches, and therefore only partial skeletons were recovered. This will however, significantly limit the interpretation of, for example, pathological lesions. However, the analysis at least provides a key-hole view of the osteological remains on the site.

## Demographic Profile

A total of 13 adults and two juvenile skeletons were recovered from Sawpit Lane, with the remains of one of the juveniles being recovered from the abdomen of a young female adult. It was possible to determine the sex of 11 of the adults: there were five females and six males. It was possible to determine the age-at-death of four of the adult females. There was an older adolescent/young adult (Sk13, 15-18 years, will be classed as an adult from here on), a young adult (Sk16, 17-25 years), an older middle adult (Sk15, 35-39 years), and an old adult (Sk1, 45+ years). The determination of the age-at-death of the two young females was based on the rates of fusion of specific skeletal elements. It was only possible to determine a specific age-at-death for two of the adult males. Male Sk6 was between 30 and 45 years at the time of death. He was buried with another male adult, Sk7, who was aged between 25 and 30 years at the time of death.

A single *in situ* juvenile burial was recovered. This was Sk3, and that individual was aged between 8 and 10 years at the time of death. The skeletal remains of a foetus were also recovered in the abdominal area of Sk16 (female 17-25 years). On the basis of long



bone length this individual was aged 39.8 foetal weeks at the time of death, that is, a full term infant.

The disarticulated human remains were examined in order to determine the minimum number of individuals present in the assemblage. It is not meant to be representative of the site as a whole. Just a single juvenile bone was recovered. This was a fragment of the humerus or upper arm, ID no. 1092, of a young juvenile (aged between 1 year and 6 years at the time of death). The remains bones were all from adult individuals. All of the skeletal elements were assessed for duplication, and the presence of two right mandible fragments (ID nos 1075 and 1107) indicate that there are a minimum of two adults represented in the disarticulated assemblage. Cranial remains indicate one possible female (ID no. 1094) and one possible male (ID no. 1076). It is entirely possible that at least some of these bones are from the *in situ* skeletons that were recently excavated, but it is not possible to confirm this. The bones may also easily be from other truncated burials in the area, not exposed in the recent excavations.

## Dental Analysis

Dental remains were recovered from four of the adult burials and a single tooth was also recovered from the remains of the foetus Sk17. The total number of teeth recovered was 96. The four adults with dentitions were two females (Sk15 35-39 years, Ck 16 17-25 years) and two males (Sk6 30-45 years, Sk7 25-30 years). Eleven teeth were recovered in the disarticulated assemblage, with five of them (ID nos 1095-9) being contained in a right maxilla (ID no. 1101). The dental conditions that were present in the teeth are common in all archaeological population samples.

Calculus, or calcified plaque, were present on the teeth of all four observable adults (100%) or in 89.5% of all observable teeth (85/95). The deposits varied from slight to severe in condition. It was also recorded in 9/11 of the disarticulated teeth, and was slight to moderate in severity. Calculus is often the most frequently observed dental condition on archaeological teeth and its rates of occurrence are typically high. The deposits can be generally removed through good dental hygiene using for example a small brush or stick, but the deposits may also be inadvertently removed through the consumption of grittier foods. Calculus deposits in a population may suggest both poor oral hygiene and the possible consumption of quite a soft and sucrose-based diet (Roberts and Manchester 1995, 55). The aetiology is multi-causal but its formation is aided by alkaline in the mouth and a high protein diet (Lieverse 1999).

Cariou lesions, or cavities in the teeth, were present in the dentitions of two individuals. Bacteria contained in plaque can metabolise certain carbohydrates into an acidic waste that can dissolve the enamel of the teeth resulting in cavities (Mays 1998, 148). Sugars are known to be cariogenic (Hillson 1986, 293; Woodward and Walker 1994). There is also some evidence to suggest that carbohydrates may be a contributory factor, although this is not certain (Hillson 1986, 293). The frequency of dental caries has increased over time, particularly with the increased consumption of refined sugars from

the post-medieval period onwards. Five of the teeth of Sk7 (male 25-30 years) had caries while a single tooth from Sk16 (female 17-25 years) had a lesion. This represents 50% (2/4) of observable individuals, or 6.3% (6/95) of observable teeth. Caries had completely destroyed the crown of one of the teeth of Sk7, the lower left second premolar. No dental abscesses, which are often associated with caries, were present. In addition, there was no evidence of any ante-mortem loss of teeth, a trait common in post-medieval assemblages.

Two individuals had lesions known as enamel hypoplastic defects. These manifest as a depressed line or series of line or pits on the surface of the enamel. They occur as a result of a disturbance to the growth of the organic matrix, which is later mineralised to form enamel. The disturbance to the growth is thus reflected in the enamel (Mays 1998, 156; Hillson 1986). The defects can occur as a result of a number of diseases and/or nutritional deficiencies including diarrhoea, parasitic infestations of the gut, scurvy, rickets, allergic reactions, and general malnutrition (Mays 1998, 158). Once the enamel is formed the defects are preserved in the enamel. Teeth calcify in childhood and therefore, enamel hypoplastic defects are a reflection of stresses suffered by an individual in youth. By measuring the location of a lesion on a particular tooth it is possible to determine approximately the age at which the stress occurred, as teeth form at a known rate. Each of the four canines of Sk6 (male 30-45 years) had a single line, indicating a period of stress around the age of 3.5 years. Multiple lines were present in the four canines of Sk7 (male 25-30 years), which indicated intermittent periods of physiological stress between the ages of 2.5 years and approximately 5 years.

## Pathological Conditions

A summary of the pathological lesions that were observed on the skeletons from Sawpit Lane are presented in **Table 1**.

SK	Age-at-death	Sex	Skeletal Pathology
1	45+ years	Female	DJD of wrists, right hand, hips, knees, and spine; Schmorl's nodes in spine.
2	Adult	?	DJD of right wrist (osteoarthritis)
3	8-10 years	-	Partially healed remodelled bone on left tibia.
4	Adult	Male	DJD of spine; Healed fracture to diaphysis of left ulna.
6	30-45 years	Male	DJD medial right clavicle and spine; Schmorl's nodes in spine; Bilateral <i>os acromiale</i> .
7	25-30 years	Poss. male	Mild cribra orbitalia in left and right eye orbits.
11	Adult	Male	Mild DJD left knee and left and right foot.
12	Adult	Poss. male	Spinal DJD with Schmorl's node; fusion of T8 and T9, and the right rib
16	17-25 years	Female	Mild cribra orbitalia in left and right eye orbits; Schmorl's nodes in T11 and T12.

Table 1. Summary of pathological lesions

Degenerative joint disease (DJD) was the most common pathological condition in these skeletons, as is the case with most archaeological populations. The onset of the disease tends to be age related, as it appears to primarily occur as a result of repeated 'wear and tear' on the joints through degeneration of the articular cartilage (Ortner and Putschar 1981, 419-20). The disease can be accelerated by occupational activities and may also be brought on by trauma. The evidence of joint degeneration in skeletal remains is manifested in the form of porosity or pitting of the joint surface and/or additional bone growths or osteophytes. In more advanced cases, eburnation or polishing of the bone can occur as the bones of the joint rub off each other. The presence of eburnation is pathognomonic of osteoarthritis (Rodgers and Waldron 1995).

It was present in seven adult skeletons from Tuam, despite the incomplete nature of the remains. For this reason also it is not feasible to attempt to quantify the lesions in terms of frequency or severity. The older female in the sample, Sk1 female 45+ years, had the most lesions, as indicated above. The spine was commonly involved. As well as Sk1 above, the lesions were present in the spines of Sk4 (male adult), Sk6 (male 30-45 years), and Sk12 (possible male adult). DJD was also recorded in the medial right clavicle of Sk6 (male 30-45 years) and in the left knee and both feet of Sk11 (male adult), while evidence of osteoarthritis was present in the right wrist of Sk2 (adult). DJD was also recorded in a number of disarticulated vertebral fragments (ID nos 1087-90), a toe bone (ID no. 1027), and a wrist bone (ID no. 1015).

In addition to the typical lesions of degeneration noted above, a defect known as a Schmorl's node was recorded in a number of vertebra including Sk1 (female 45+ years), Sk6 (male 30-45 years), Sk12 (possible male adult), and Sk16 (female 17-25 years). These manifest as small, depressed lesions on the superior and/or inferior bodies of the vertebra. The nodes occur in youth as a result of the rupturing of the nucleus pulposus – the pulposus gelatinous core of the intervertebral disk. This expands or bursts into the adjacent vertebral body as a result of pressure (Mann and Murphy 1990, 52; Ortner and Putschar 1981, 323). This pressure can be caused either by a fall or by straining the spine by – for example – lifting heavy objects incorrectly.

Serious joint disease was present in the spine of Sk12 (male adult). The bodies of T8 and T9 are completely fused together, with post-mortem damage revealing that the trabecular sections of the two vertebrae are now a single entity. The apophyseal facets of the two vertebrae also appear to be completely phased though (see **Plate 1, 2**). There is no evidence of fusion with either T7 and/or T10. Only the vertebrae from T8 to L1 were recovered for this individual. Although there is post-mortem damage to the margins of the bodies, there does not appear to be any significant bone growth. The fusion has resulted in slight kyphosis or anterior bending of the spine. There is post-mortem damage to the costal facets of the vertebra. The left costal facet is clearly visible and appears unaffected. The right costal facet has suffered post-mortem damage. There is a raised platform of exposed (post-mortem) trabecular bone at the point of the right costal facet which suggests that the rib had fused to the vertebra at that point. Unfortunately it is not possible to determine if it is the eighth or ninth rib.

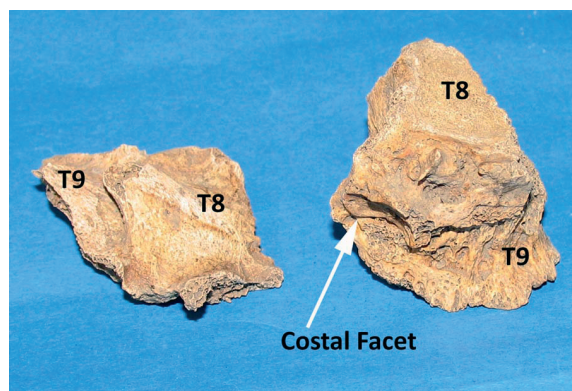


Plate 1. Right lateral aspect of T8 and T9 of Sk12 (male adult)

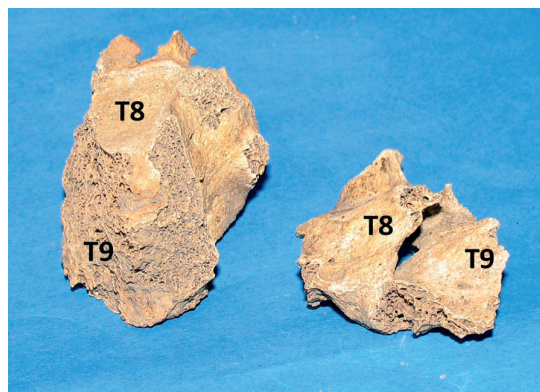


Plate 2. Left lateral aspect of T8 and T9 of Sk12 (male adult)

No other such lesions were observed in the remainder of the spine, although it is noted that the preservation is very poor. There are a number of conditions which can cause fusion or ankylosis of elements of the vertebrae.

Ankylosing spondylitis is a progressive inflammatory disease of unknown aetiology. It results in fusion of both the bodies and the apophyseal joints of the spine. It typically progresses upwards through the spine from the lumbar vertebrae, and is more frequent in males than in females. In addition, the fusion of the bodies tends to result in a 'squaring off' of the body - that is, there is no excessive osteophytic growth. All of the above are similar to the findings from Sk12. However, ankylosing spondylitis also affects the sacroiliac joint (Ortner and Putschar 1981, 411; Roberts and Manchester 1995, 119; Rogers 2000, 175-6; Schwartz 1995, 249), and in fact, the involvement of the sacroiliac joint is considered to be 'the hallmark of ankylosing spondylitis' (Roberts and Manchester 1995, 119 after Resnick and Niwayama 1988, 1112). Unfortunately most of the lumbar vertebrae and the pelvis were not observable. There are also indications that at least the right 8<sup>th</sup> or 9<sup>th</sup> rib was fused to the vertebrae, a very common finding in this disease (Aufderheide and Rodríguez-Martín 1998). Unfortunately, due to the poor preservation, it is not possible to confirm that the aetiology is ankylosing spondylitis.

Another condition which can cause ankylosis of the spine is diffuse idiopathic skeletal hyperostosis or DISH. This disease typically affects the older male and is believed to be associated with obesity and diabetes. The vertebral bodies, in particular, can become fused by the growth of osteophytes which take on the appearance of 'flowing wax' (Mays 1998, 127; Roberts and Manchester 1995, 120; Rogers 2000, 170-1; Schwartz 1995, 243). However in DISH the apophyseal joints are typically unaffected, it is usually the thoracic vertebrae that are involved, and the fusion tends to occur on the right side of the bodies. In addition, other parts of the skeletal structure would also be affected by enthesopathies or small bony growths (Rogers 2000, 170-1; Schwartz 1995, 243). Although the vertebrae from Sk12 are poorly preserved, there is no evidence of the large osteophytic growths so characteristic of DISH. In addition, the apophyseal joints are clearly affected in Sk12. These would argue against a diagnosis of DISH.



Spondylosis deformans, or spinal osteophytosis, can also result in fusion in the spine and is relatively commonly observed in older individuals (Ortner and Putschar 1981, 421; Rogers 1995). The fusion is caused by the outgrowth of osteophytes along the edges of the vertebral bodies. However, the osteophytes tend to form at almost right angles to the body itself, 'shelf-like bony protrusions' (Ortner and Putschar 1981, 421) and indeed, can resemble DISH. In addition, there is no involvement of the apophyseal joints (Schwartz 1995, 239).

Other diseases, which can lead to fusion of the spine, include tuberculosis and osteoarthritis. This individual, despite being incomplete, has no skeletal indicators of tuberculosis. The fusion may be a case of severe osteoarthritis. There are moderate expressions of DJD in the remainder of the preserved spine, but none as severe as that on T8 and T9. Alternatively, the fusion may have occurred as a result of some time of trauma. Certainly the obliteration of the joint space, both in the apophyseal joints and the joint of the centra, would suggest that the condition is a very long-standing one. And it has been noted that there is slight kyphosis, or forward bending of the spine. Perhaps this individual injured the back in some manner many years before his death which resulted in fusion. Without the benefit of complete preservation of the skeletal remains it is not possible to confirm with any certainty the cause of the fusion.

A number of other pathological lesions were observed in this sample. Two individuals, Sk7 (male 25-30 years) and Sk16 (female 17-25 years), had mild porous lesions in both the left and right eye orbits. These lesions are referred to as cribra orbitalia, and are indicative of a metabolic disorder relating to iron deficiency. This condition occurs when, as a result of a deficiency of iron, the body's marrow increases its output of iron (Mays 1998, 142). The middle layer of the bone expands and there is a corresponding thinning of the outer surface of the bone. This can result in the diagnostic appearance of small holes or foramina on the outer surface of the bone. Although it is frequently assumed that these lesions are indicative of iron deficiency anaemia, recent studies indicate that when a body is under stress from an invading organism (such as a parasitic infestation of the gut), the system increases its output of iron in order to counteract the stress. Thus this pathological process may actually be a sign of a healthy defence system (Stuart-Macadam 1991, 105; Roberts and Manchester 1995, 166-7)

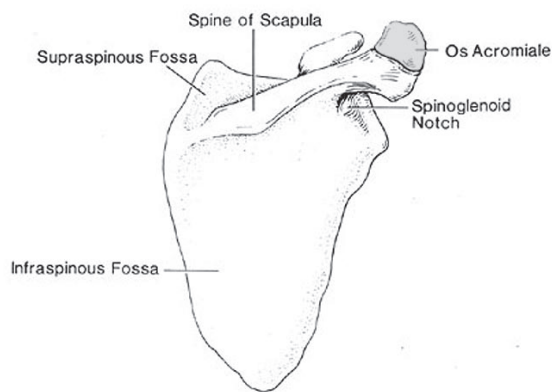


Figure 4. Posterior view of right scapula. Location of os acromial shaded.

A distinct defect was present in both of the scapulae or shoulder blades of Sk6 (male 30-45 years). The lesion involves the non-union of the acromion process of the scapular blade. This can occur as a result of either an actual fracture or through non-union of the epiphysis (Roberts and Manchester 1995, 76). The defect is believed to occur in as much as 15% of the modern population (Resnick 1995, 4281, after Murphy and McNeill 1993, 128). Although this condition may be genetically linked, current osteological theory links the process to culturally induced factors (Roberts and Manchester 1995, 113). In a study of the condition on the skeletal remains recovered from the 16<sup>th</sup> century ship the *Mary Rose*, the high incidence of *os acromiale* were attributed to the possible long term use of longbows (Stirland 2000; Stirland 1986).



Plate 3. Distal end of left ulna of Sk4 (adult male), with well-healed fracture (at right end of bone)

A healed fracture was present on the diaphysis of the left ulna (the forearm) of Sk4 (adult male). It was approximately 45mm superior to the distal epiphysis. The distal half of shaft has been displaced laterally and superiorly, presumably due to lack of traction.

This is a classic location for a fracture that occurs as a result of a fall on an outstretched hand. The left radius was not recovered.

Finally, partially remodelled striated bone was present on the left tibia of Sk3 (8-10 years). No lesions were present on the right tibia. Striated bone such as this is a common finding in archaeological skeletons, and it is indicative of inflammation and infection. Acute infections, by their nature, rarely leave any trace on skeletal remains. Chronic, long-term infections, where an individual is actually strong enough to survive long enough for the disease to manifest on the bone, are often identified in archaeological populations. In most instances the bone lesions are non-specific, although specific infections may occasionally be identified, such as leprosy. Periostitis occurs when the fibrous layer – the periosteum – directly overlying the bone becomes infected. The process of inflammation, with the accumulation of pus and infected matter, forces the periosteum to rise and a new layer of bone may form underneath. When the lesions are active the layer of bone may be grey in colour and may be striated or disorganised. With time the new layer of bone can heal and be remodelled into lamellar bone (the normal surface of the bone). Periostitis is confined to the surface of the bone.

## Synthesis

### Summary of Analysis

A summary of the analysis of the Sawpit Lane skeletons is provided below in **Table 2**.

SK	Age-at-death	Sex	Stature (cm)	Skeletal Pathology
1	45+ years	Female	-	DJD of wrists, right hand, hips, knees, and spine; Schmorl's nodes in spine.
2	Adult	?	-	DJD of right wrist (osteoarthritis)
3	8-10 years	-	-	Partially healed remodelled bone on left tibia.
4	Adult	Male	-	DJD of spine; Healed fracture to diaphysis of left ulna.
6	30-45 years	Male	171.2	DJD medial right clavicle and spine; Schmorl's nodes in spine; Bilateral <i>os acromiale</i> .
7	25-30 years	Poss. male	165.3	Mild cribra orbitalia in left and right eye orbits.
8	Adult	Poss. male	163.0	-
9	Adult	?	-	-
11	Adult	Male	172.9	Mild DJD left knee and left and right foot.
12	Adult	Poss. male	-	Spinal DJD with Schmorl's node; fusion of T8 and T9, and a right rib
13	Adolescent?	Female	156.1	-
14	Adult	Female	-	-
15	35-39 years	Female	158.6	-
16	17-25 years	Female	154.7	Mild cribra orbitalia in left and right eye orbits; Schmorl's nodes in T11 and T12.
17	39.8 foetal weeks	-	52.2	-

Table 2. Summary of analysis of Sawpit Lane skeletons

## Discussion

In osteological terms, the highly incomplete remains of 14 adults were uncovered, with 13 of these being excavated. The remains of two juveniles were also recovered: one 8-10 years old and the other a full-term foetus. Despite the highly incomplete nature of the skeletal remains a significant amount of information has been revealed.

The range of pathological lesions is quite interesting. While none of the diseases identified are uncommon in archaeological populations, the level of lesions present in such a relatively small number of highly incomplete skeletons is unusual. This would indicate that any future broader excavation of the cemetery, with the recovery of higher numbers of complete individuals, would yield substantial osteoarchaeological evidence.

What is perhaps of note is the high level of DJD in the population. This also particularly refers to the presence of Schmorl's nodes in the spines of 50% of observable adults (two females and two males). Two of the four spines that were unaffected were extremely poorly preserved, which may suggest that the rate of occurrence is underestimated. In any

case this suggests two things: individuals were engaged in hard physical labour from a young age, and both females and males were engaged in such labour.

There are other indications of nutritional stresses and/or disease loads. The presence of *cribra orbitalia* in at least two individuals indicates physiological stress. Similarly, the non-specific lesions in a leg bone of the 8-10 year old child suggest s/he was subject to certain stresses. In addition, hypoplastic defects in the teeth of Sk6 (male 30-45 years) and Sk7 (male 25-30 years) indicate these individuals suffered some physiological insults in early childhood. The numbers available for analysis are simply too low for proper assessment. However, it is perhaps also important to note that these individuals appear to have survived with the physiological stresses for considerable periods and/or recovered completely from them, indicating a certain resilience and immunity to various physiological insults.

Two adult males were buried together, Sk6 (male 30-45 years) and Sk7 (male 25-30 years). Double burials are not particularly rare in archaeological contexts. Certainly before the advent of modern medicine diseases could ravage populations, and the death of two adult males in their prime may not have been that unusual. Famine and conflict could also account for their deaths. Interestingly, enamel hypoplastic defects, indicative of childhood stress, were present in the dentitions of both of these individuals, while none were present in the female adults. This may suggest that the sexes were subject to different stresses in childhood, but this may only be examined with a larger sample.

Finally of note is the young female (Sk16) with the remains of a foetus (Sk17) in her abdominal area. The foetus was full-term and viable at the time of death. It is assumed they are mother and infant. The young woman may have died in labour and both she and her unborn infant were buried. However, she may have given birth and both she and the baby died, and they were buried with the infant lying on her stomach. This is a difficult aspect to assess. Certainly however, they both died very close to the time of birth. The foetus, at 52.2cm in length, was within the average range of crown-to-heel lengths of full-term fetuses (48cm to 53cm, Williams and Bannister 1995, 345). In addition, although the female adult was young, she was not so young as to be in a high-risk pregnancy group (Berkow and Fletcher 1992, 1876). However, prior to modern medicine, pregnancy and the birthing process were extremely hazardous. Deaths such as these would have been a common occurrence. Another late adolescent female was also recovered from Sawpit Lane (Sk13). In contrast to today, women in the past actually had a lower life expectancy than men, partly due to the dangers in pregnancies. Interestingly, it has been recorded that in medieval times women who died in pregnancy may sometimes have had their infant cut out of them as the child would not have been baptised at the time of death and so therefore would have been excluded from burial in consecrated ground (Shadar 1992, 51). That does not appear to have occurred in this case.

As yet, it is not known when these skeletons date to and/or if they are contemporary. Samples have been taken from Sk6 (male 30-45 years) and Sk16 (female 17-25 years) for accelerated radiocarbon dates and the results are pending. However, a number of variations in burial orientations were apparent. There were burials within the range of the standard west/east Christian orientation, including Sk1, Sk2, Sk3, Sk4, Sk6, Sk7, Sk11,



and Sk16. This follows the Christian teaching that the corporeal body will rise on the Day of Judgement to stand and face the rising sun in the east. A number of burials however, were orientated with the heads broadly to the east. These include Sk5 (unexcavated), Sk8, Sk12, Sk13, Sk14, and Sk15. This variation in orientation may indicate different phases of burial. It may also suggest that the burials with the heads to the east are perhaps pagan in origin. However, the traditional Christian orientation may not always have been strictly followed in the past, and it has certainly lost favour in modern times. There were no indications for the use of coffins. Shrouds and/or winding sheets are likely to have been used instead. Certainly the feet of at least one individual, Sk2, were very close together, which suggests that the feet were bound within the trappings of burial. No shroud pins were recovered.

Previous archaeological monitoring of the insertion of railings around the church in Temple Jarlath was undertaken by Jerry O'Sullivan of the National Roads Authority in 2001 (licence number 01E1193, see [www.excavations.ie](http://www.excavations.ie)). One *in situ* skeleton was uncovered, as well as the disarticulated remains of another three individuals: an adult female, an adult male, and a 15-18 year old individual (Lynch 2002). The recent excavations by Eachtra Archaeological Projects in Sawpit Lane confirm that the graveyard for Temple Jarlath extends significantly outside the relatively modern present enclosure. In addition, the very low amount of disarticulated bone recovered, particularly during the larger scale investigations by Eachtra, would suggest that there may not be a lot of disturbance/truncation to other skeletons in the area. That, and the excellent preservation of the actual bones, indicates that any future investigations in this area would have a high yield in osteoarchaeological terms.

## Conclusions

The skeletons recovered during the recent excavations in Sawpit Lane, in Tuam, Co. Galway were very incomplete due to the context of recovery. However, they still provide a wealth of information and they clearly indicate the vast potential of osteoarchaeological information that may be forthcoming from any excavations in the area in the future. The bones reveal that the individuals buried here had lived very physically demanding lives, which left indelible marks on the skeletal remains. The harshness of lives is well attested in the burial of a young mother and her full-term infant, and in the double burial of two adult males in the prime of life.

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[www.excavations.ie](http://www.excavations.ie)

## Appendices

### Catalogue of *In Situ* Human Skeletal Remains

#### SK1

*Age:* Old Adult 45+ years (auricular ilium and pubic symphysis)

*Sex:* Female (pelvis and metrics)

*Stature:* -

*Skeletal Preservation:* Poor. Very incomplete with some fragmentation, but bone is well preserved.

*Skeletal Position:* Supine.

*Skeletal Attitude:* Extended.

*Orientation:* Northwest/southeast, head to northwest.

*Associated Skeleton/s:* -

*Associated Finds:* -

*Bones Present:* Left ulna and radius, incomplete left and right carpals, metacarpals and hand phalanges. Vertebrae from L4 to S1, incomplete left ilium, incomplete right ilium and ischium. Femora, proximal epiphysis of left tibia, proximal half of right tibia.

*Dental Inventory:* -

*Dental Pathology:* -

*Skeletal Pathology:*

Joint Disease – DJD of left and right wrist, right hand, left and right hips, left and right knees, and spine. Schmorl's node present on S1.

*Anomalies:* -

*Comments:* -

#### SK2

*Age:* Adult (specific age cannot be determined)

*Sex:* -

*Stature:* -

*Skeletal Preservation:* Very poor. Extremely incomplete. Bone well preserved.

*Skeletal Position:* Supine.

*Skeletal Attitude:* Extended?

*Orientation:* West/east, head to west.

*Associated Skeleton/s:* -

*Associated Finds:* -



*Bones Present:* Incomplete right carpals and metacarpals. Proximal half of right femur.

*Dental Inventory:* -

*Dental Pathology:* -

*Skeletal Pathology:*

Joint Disease – DJD of right wrist including osteoarthritis (eburnation).

*Anomalies:* -

*Comments:* -

### SK3

*Age:* Juvenile 8-10 years (diaphyseal length)

*Sex:* -

*Stature:* -

*Skeletal Preservation:* Poor. Quite incomplete, but well preserved and fragmented.

*Skeletal Position:* Supine.

*Skeletal Attitude:* Extended.

*Orientation:* West/east, head to west.

*Associated Skeleton/s:* -

*Associated Finds:* -

*Bones Present:* Incomplete right humerus, radius (including distal epiphysis), and ulna, incomplete right carpals, metacarpals, hand phalanges. Shaft fragments of right ribs, incomplete right ilium, ischium, and pubis. Incomplete femora (including proximal epiphysis of right femur and both distal epiphyses), tibiae (including both proximal epiphyses and left distal epiphysis), fibulae, complete left and right tarsals.

*Dental Inventory:* -

*Dental Pathology:* -

*Skeletal Pathology:*

Non-specific Infection – partially remodelled striated bone on anterior diaphysis of left tibia.

*Anomalies:* -

*Comments:* -

### SK4

*Age:* Adult (specific age cannot be determined)

*Sex:* Male (metrics)

*Stature:* -

*Skeletal Preservation:* Very poor. Very incomplete. Bone is well preserved but fragmented.

*Skeletal Position:* Supine.

*Skeletal Attitude:* Extended.

*Orientation:* West/east, head to the west.

*Associated Skeleton/s:* -

*Associated Finds:* -

*Bones Present:* Fragment of right scapula, distal half of right humerus, distal third of left ulna. One left rib and one right rib, very incomplete fragments of lumbar vertebrae, incomplete left ilium and ischium, Incomplete proximal half of left femur.

*Dental Inventory:* -

*Dental Pathology:* -

*Skeletal Pathology:*

Joint Disease – Mild spinal DJD in lumbar spine and one left rib.

Trauma – Well-healed fracture on diaphysis of left ulna, 45mm superior to the distal epiphysis. Distal half of shaft has been displaced laterally and superiorly, due to lack of traction.

*Anomalies:* -

*Comments:* -

## SK5

Skeleton 5 was not lifted but was left *in situ*. The water services pipe was diverted at this point to avoid the skeletal remains.

## SK6

*Age:* Middle adult 30-45 years (epiphyseal fusion)

*Sex:* Male (skull and metrics)

*Stature:* 171.2+/-4.05cm (right femur)

*Skeletal Preservation:* Good. Incomplete but bones are very well preserved.

*Skeletal Position:* Supine.

*Skeletal Attitude:* Extended.

*Orientation:* Southwest/northeast, head to southwest.

*Associated Skeleton/s:* SK6 and SK7 were buried together.

*Associated Finds:* -

*Bones Present:* Cranium and mandible. Clavicles, scapulae, proximal two-thirds of left humerus, right humerus, superior tip of right ulna. Incomplete manubrium and sternum, twelve left and twelve right ribs, vertebra from C1 to T12.

*Dental Inventory:*

P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38
P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P

32 permanent teeth

*Dental Pathology:*

Calculus – 23/32 (all except 12, 11, 24-28, 36, 37), slight to moderate;

Hypoplastic Defects – all canines, single line on each, age of occurrence *circa* 3.5 years.

*Skeletal Pathology:*

Joint Disease – Mild DJD of medial right clavicle and spine. Latter includes Schmorl's nodes.

Developmental – Bilateral *os acromiale* in both scapulae.

*Anomalies:* -

*Comments:* -

## SK7

*Age:* Middle adult 25-30 years (skeletal fusion)

*Sex:* Possible male (cranium, metrics ambiguous)

*Stature:* 165.3+/-4.05cm (left humerus)

*Skeletal Preservation:* Good. Fairly incomplete and fragmented but bone is very well preserved.

*Skeletal Position:* Supine.

*Skeletal Attitude:* Extended.

*Orientation:* Southwest/northeast, head to southwest.

*Associated Skeleton/s:* SK6 and SK7 were buried together.

*Associated Finds:* -

*Bones Present:* Cranium and mandible. Left clavicle, scapula, and humerus. Eight left and three right ribs, vertebra including C1 and C2 and incomplete cervical and thoracic fragments.

*Dental Inventory:*

P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38
P	P	P	P	PM	P	P	P	P	P	P	P	R	P	P	P

30 permanent teeth plus one root only

*Dental Pathology:*

Calculus – 30/30, slight to severe, none on 35, 'root only';

Caries – 5/31 (17, 16, 28, 35, 36);

Hypoplastic Defects – all canines, up to four lines, occurrence of stresses between ages 2.5 and 5.2 years;

*Skeletal Pathology:*

Metabolic – Mild cribra orbitalia in left and right orbits.

*Anomalies:* The incisal edges of the upper left first and second incisors (21 and 22) were chipped.

*Comments:* -

**SK8**

*Age:* AA (specific age cannot be determined)

*Sex:* Possible male (metrics)

*Stature:* 163.0+/-3.27cm (left femur)

*Skeletal Preservation:* Very poor. Very incomplete but bones well preserved.

*Skeletal Position:* Supine.

*Skeletal Attitude:* Extended.

*Orientation:* Northeast/southwest, head to northeast.

*Associated Skeleton/s:* Truncated by SK11.

*Associated Finds:* -



Plate 4. Third trochanter on posterior femur of Sk8 (possible male adult)

*Bones Present:* Incomplete left and right carpals, left MC1-5, right MC2-3, incomplete hand phalanges. Femora, patellae

*Dental Inventory:* -

*Dental Pathology:* -

*Skeletal Pathology:* -

*Anomalies:* Third trochanter (non-metrics trait) present in left femur. Large, 31.37mm superior/inferior, 16.03mm medial/lateral, and rising to 8.95mm above the normal surface. None was on the right femur. The proximal halves of the femora are noticeably twisted anteriorly. May be related to mechanical stresses. See **Plate 4**.

*Comments:* -

### SK9

*Age:* Adult (specific age cannot be determined, although all cranial sutures are open)

*Sex:* -

*Stature:* -

*Skeletal Preservation:* Extremely poor. Very incomplete and fragmented but bone is well preserved.

*Skeletal Position:* ?

*Skeletal Attitude:* ?

*Orientation:* ?

*Associated Skeleton/s:* -

*Associated Finds:* -

*Bones Present:* Incomplete frontal and parietals of cranium (most of 'skull cap').

*Dental Inventory:* -

*Dental Pathology:* -

*Skeletal Pathology:* -

*Anomalies:* -

*Comments:* -

### SK10

This was initially recorded as an *in situ* skeleton comprising the frontal bone of the cranium and the upper right femur. However, examination of the preserved bones and of the on-site photographs indicates that these are actually a collection of disarticulated bones. The original bones identified on-site are now recorded in the disarticulated database as ID nos 1094, 1109, and 1110. Additional disarticulated bones associated with this skeleton number are ID nos 1072-1093.



**SK11**

*Age:* Adult (specific age cannot be determined)

*Sex:* Male (metrics)

*Stature:* 172.9+/-3.37cm (left tibia)

*Skeletal Preservation:* Poor. Very incomplete, bones are very well preserved.

*Skeletal Position:* Supine.

*Skeletal Attitude:* Extended.

*Orientation:* Southwest/northeast, head to southwest.

*Associated Skeleton/s:* Truncated SK8.

*Associated Finds:* -

*Bones Present:* Tibiae, fibulae, complete left and right carpals and metacarpals, incomplete left and right foot phalanges.

*Dental Inventory:* -

*Dental Pathology:* -

*Skeletal Pathology:*

Joint Disease – Mild DJD left knee and left and right foot.

*Anomalies:* -

*Comments:* -

**SK12**

*Age:* Adult (specific age cannot be determined)

*Sex:* Possible male (very robust)

*Stature:* -

*Skeletal Preservation:* Poor. Incomplete with significant fragmentation.

*Skeletal Position:* Supine.

*Skeletal Attitude:* Extended?

*Orientation:* Northeast/southwest, head to northeast

*Associated Skeleton/s:* -

*Associated Finds:* -

*Bones Present:* Incomplete clavicles, distal diaphysis of left humerus. Eight left and six right ribs. Vertebrae from T8 to L1 (plus other unidentified thoracic fragments).

*Dental Inventory:* -

*Dental Pathology:* -

*Skeletal Pathology:*

Joint Disease – mild spinal DJD with Schmorl's node on L1. The bodies of T8 and T9 are completely fused together, with post-mortem damage revealing that the trabecular sec-

tions of the two vertebra are now a single entity. The apophyseal facets of the two vertebra also appear to be completely phased through. Although there is post-mortem damage to the margins of the bodies, there does not appear to be any significant bone growth. The fusion has resulted in slight kyphosis or anterior bending of the spine. There is post-mortem damage to the costal facets of the vertebra. The left costal facet is clearly visible and appears unaffected. The right costal facet has suffered post-mortem damage. There is a raised platform of exposed (post-mortem) trabecular bone at the point of the right costal facet which suggests that the rib had fused to the vertebra at that point. Unfortunately it is not possible to determine if it is the eight or ninth rib. The differential diagnosis of this condition is problematic.

*Anomalies:* -

*Comments:* A fragment of a left scapula and the complete left humerus of a probably adolescent/young adult female were also recovered with this burial. These have been reassigned, during the present project, to Sk13, on the basis of age-at-death, sex and condition.

### SK13

*Age:* Late adolescent/very young adult? *Circa* 15-18 years (epiphyseal fusion)

*Sex:* Female (very slender and gracile)

*Stature:* 156.1+/-4.45cm

*Skeletal Preservation:* Very poor. Very incomplete and fragmented but bones well preserved.

*Skeletal Position:* Supine.

*Skeletal Attitude:* Extended.

*Orientation:* Northeast/southwest, head to northeast

*Associated Skeleton/s:* -

*Associated Finds:* -

*Bones Present:* Incomplete left scapula, left humerus (both bones were initially recovered with Sk12), distal half of right humerus. Six left ribs and one right rib, vertebra from C4 to T4 and T11 to L1, plus unidentified thoracic fragments.

*Dental Inventory:* -

*Dental Pathology:* -

*Skeletal Pathology:* -

*Anomalies:* -

*Comments:* -

**SK14**

*Age:* Adult (specific age cannot be determined)

*Sex:* Female (metrics)

*Stature:* -

*Skeletal Preservation:* Very poor. Very incomplete with some fragmentation. No erosion present.

*Skeletal Position:* Supine.

*Skeletal Attitude:* Extended.

*Orientation:* Eastnortheast/westsouthwest, head to eastnortheast

*Associated Skeleton/s:* -

*Associated Finds:* -

*Bones Present:* Left patella, proximal halves of left tibia and fibula, incomplete right tibia and fibula.

*Dental Inventory:* -

*Dental Pathology:* -

*Skeletal Pathology:* -

*Anomalies:* -

*Comments:* -

**SK15**

*Age:* Middle adult 35-39 years (auricular ilium)

*Sex:* Female (pelvis, metrics)

*Stature:* 158.6+/-3.72cm (right femur)

*Skeletal Preservation:* Poor. Quite incomplete but bones are well preserved.

*Skeletal Position:* Supine.

*Skeletal Attitude:* Extended.

*Orientation:* Eastnortheast/westsouthwest, head to eastnortheast.

*Associated Skeleton/s:* -

*Associated Finds:* -

*Bones Present:* Incomplete cranium and mandible. Left humerus and distal half of left radius, incomplete right carpals, incomplete left and right metacarpals and hand phalanges. Five left and two right ribs, highly incomplete and fragmented thoracic and lumbar fragments and L4 to S1, incomplete left ilium and pubis, complete left ischium. Right femur and patella.

*Dental Inventory:*

	P	P	P	P											P
18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38
	P														

6 permanent teeth

*Dental Pathology:*

Calculus – 5/5, slight to moderate.

*Skeletal Pathology:* -*Anomalies:* -*Comments:* -**SK16***Age:* Young adult 17-25 years (epiphyseal fusion)*Sex:* Female (pelvis, skull, metrics)*Stature:* 154.7+/-4.45cm (left humerus)*Skeletal Preservation:* Very good. Partially incomplete but excellent preservation.*Skeletal Position:* Supine.*Skeletal Attitude:* Extended.*Orientation:* Northwest/southeast, head to northwest.*Associated Skeleton/s:* Foetal remains SK17 recovered in abdomen.*Associated Finds:* -

*Bones Present:* Cranium and mandible. Manubrium, sternum, clavicles, scapulae, humeri, right radius and ulna, complete right carpals and metacarpals, incomplete right hand phalanges. Twelve left and twelve right ribs, vertebra from C1 to S5, complete ilia, ischia, pubes. Proximal end of right femur.

*Dental Inventory:*

P	P	P	P	P	P	PM		PM	P	PM	P	P	P	P	P
18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38
P	P	P	P	P	P	P	P	PM	P	P	P	P	P	P	P

27 permanent teeth

*Dental Pathology:*

Calculus – 27/27, slight to moderate;

Caries – 1/27, small lesion in 37.

*Skeletal Pathology:*

Metabolic – mild cribra orbitalia in left and right orbit;

Joint Disease – Schmorl's nodes in T11, T12.

*Anomalies: -*

*Comments:* The foetus (SK17) that was recovered in the abdomen of SK16 was a full-term foetus. This suggests that SK16 may have died around the time of childbirth. Interestingly, the sciatic notch (in the pelvis) was quite narrow, which may indicate that her pelvis was slightly too small for birthing.

**SK17**

*Age:* Full-term foetus 39.8+/-1.87 foetal weeks (left femur and tibia)

*Sex:* -

*Stature:* 52.2cm (left tibia)

*Skeletal Preservation:* Excellent. Almost complete and very well preserved.

*Skeletal Position:* ?

*Skeletal Attitude:* ?

*Orientation:* ?

*Associated Skeleton/s:* Recovered in abdomen of SK16.

*Associated Finds:* -

*Bones Present:* Cranium and mandible. Sternal body fragment, left clavicle, incomplete scapulae, humeri, radi, right ulna, incomplete left ulna, incomplete left and right metacarpals and hand phalanges. Eight left ribs, nine right ribs, C1 and C2 plus incomplete cervical, thoracic, lumbar, and sacral vertebrae, left and right ilia, right ischium, left and right pubes. Femora, tibiae, one complete unsided fibula and one incomplete unsided fibula, left and right MTIs, and four unsided unidentified metatarsals.

*Dental Inventory:*

PM	PM	PM	PM	U					
55	54	53	52	51	61	62	63	64	65
85	84	83	82	81	71	72	73	74	75
PM	PM	PM	PM	PM	PM	PM	PM	PM	PM

1 unerupted deciduous tooth

*Dental Pathology:* -

*Skeletal Pathology:* -

*Anomalies:* -

*Comments:* -



## Metrics

### Adult Cranial Metrics (mm)

*Abbreviations based on Buikstra & Ubelaker (1994)*

Sk	1	2	4	6	7	8	9	12	13	14	15
g-op	-	-	-	-	-	-	-	-	-	-	-
eu-eu	-	-	-	-	-	-	-	-	-	-	-
ba-b	-	-	-	-	-	-	-	-	-	-	-
Ecm-ecm	-	-	-	-	-	-	-	-	-	-	-
pr-alv	-	-	-	-	-	-	-	-	-	-	-
au-au	-	-	-	66.81	-	-	-	-	-	-	-
ft-ft	-	-	-	-	-	-	-	-	-	-	-
n-pr	-	-	-	-	-	-	-	-	-	-	-
fmt-fmt	-	-	-	-	-	-	-	-	-	-	-
n-ns	-	-	-	-	-	-	-	-	-	-	-
al-al	-	-	-	-	-	-	-	-	-	-	-
Orb.H	-	-	-	-	-	-	-	-	-	-	-
d-ec	-	-	-	-	-	-	-	-	-	-	-
id-gn	-	-	-	37.08	-	-	-	-	-	-	-
go-go	-	-	-	101.72	-	-	-	-	-	-	-
Mand.L	-	-	-	79.34	-	-	-	-	-	-	-

Sk	16
g-op	179
eu-eu	-
ba-b	-
ecm-ecm	-
pr-alv	-
au-au	-
ft-ft	97.11
n-pr	-
fmt-fmt	100.46
n-ns	-
al-al	-
Orb.H	-
d-ec	-
id-gn	30.6
go-go	-
Mand.L	-

### Adult Post-Cranial Metrics (mm)

Sk	1		2		4		6		7		8	
	left	right	Left	right	Left	right	left	right	left	right	left	right
HuL <sub>1</sub>	-	-	-	-	-	-	-	327	-	-	-	-
RaL <sub>1</sub>	-	-	-	-	-	-	-	-	308	-	-	-
UIL <sub>1</sub>	-	-	-	-	-	-	-	-	-	-	-	-
FeL <sub>1</sub>	-	-	-	-	-	-	-	-	-	-	427	422
FeD <sub>1</sub>	25.51	-	-	23.81	-	-	-	-	-	-	26.33	24.99

Sk	1		2		4		6		7		8	
FeD <sub>2</sub>	37.77	-	-	36.9	-	-	-	-	-	-	37	36.32
FeE <sub>1</sub>	-	-	-	-	-	-	-	-	-	-	-	79.71
TiL <sub>1</sub>	-	-	-	-	-	-	-	-	-	-	-	-
TiD <sub>1</sub>	-	33.7	-	-	-	-	-	-	-	-	-	-
TiD <sub>2</sub>	-	20.92	-	-	-	-	-	-	-	-	-	-
TiE <sub>1</sub>	-	-	-	-	-	-	-	-	-	-	-	-
FiL <sub>1</sub>	-	-	-	-	-	-	-	-	-	-	-	-

Sk	9		11		12		13		14		15	
	left	right	left	right	left	right	left	right	left	right	left	right
HuL <sub>1</sub>	-	-	-	-	-	-	292	-	-	-	-	-
RaL <sub>1</sub>	-	-	-	-	-	-	-	-	-	-	-	-
UuL <sub>1</sub>	-	-	-	-	-	-	-	-	-	-	-	-
FeL <sub>1</sub>	-	-	-	-	-	-	-	-	-	-	-	423
FeD <sub>1</sub>	-	-	-	-	-	-	-	-	-	-	-	25.83
FeD <sub>2</sub>	-	-	-	-	-	-	-	-	-	-	-	31.43
FeE <sub>1</sub>	-	-	-	-	-	-	-	-	-	-	-	74.9
TiL <sub>1</sub>	-	-	374	-	-	-	-	-	-	-	-	-
TiD <sub>1</sub>	-	-	37.66	35.9	-	-	-	-	33.29	30.84	-	-
TiD <sub>2</sub>	-	-	23.95	23.43	-	-	-	-	22.02	21.98	-	-
TiE <sub>1</sub>	-	-	75.19	76.19	-	-	-	-	66.57	66.63	-	-
FiL <sub>1</sub>	-	-	364	-	-	-	-	-	-	-	-	-

Sk	16	
	left	right
HuL <sub>1</sub>	288	294
RaL <sub>1</sub>	-	214
UuL <sub>1</sub>	-	233
FeL <sub>1</sub>	-	-
FeD <sub>1</sub>	-	21.11
FeD <sub>2</sub>	-	30.68
FeE <sub>1</sub>	-	-
TiL <sub>1</sub>	-	-
TiD <sub>1</sub>	-	-
TiD <sub>2</sub>	-	-
TiE <sub>1</sub>	-	-
FiL <sub>1</sub>	-	-

### Juvenile Post-Cranial Metrics (mm)

Sk	3		17	
	left	right	Left	Right
HuL <sub>1</sub>	-	-	68.04	67.81
RaL <sub>1</sub>	-	-	-	53.12
UuL <sub>1</sub>	-	-	-	61.59
FeL <sub>1</sub>	-	-	78.27	77.03
TiL <sub>1</sub>	269	-	65.28	66.02
FiL <sub>1</sub>	-	-	63.95	-

## Catalogue of Disarticulated Human Skeletal Remains

Codes used in catalogue of disarticulated human skeletal remains  
(based on Chamberlain and Witkin 2000).

??	Unknown
GB	Burnt bone
GC	Calcified soft tissue
GT	Soft tissue
KK	Skeleton
WW	Unknown (faunal)
AI	Auditory: Incus
AM	Auditory: Malleus
AS	Auditory: Stapes
CC	Cranium
CE	Endocast
CF	Frontal
CH	Ethmoid
CL	Lacrimal
CN	Nasal
CO	Occipital
CP	Parietal
CS	Sphenoid
CT	Temporal
CV	Calvaria
CX	Vault Fragment
CZ	Zygomatic
QH	Hyoid
D1	Upper dI1
D2	Upper dI2
D3	Upper dC
D4	Upper dM1
D5	Upper dM2
E1	Lower dI1
E2	Lower dI2
E3	Lower dC
E4	Lower dM1
E5	Lower dM2
D?	? Deciduous tooth
DD	Deciduous tooth
DR	Decid. tooth root
DX	Decid. crown frag.
M1	Lower I1

M2 Lower I2  
M3 Lower C  
M4 Lower P1  
M5 Lower P2  
M6 Lower M1  
M7 Lower M2  
M8 Lower M3  
X1 Upper I1  
X2 Upper I2  
X3 Upper C  
X4 Upper P1  
X5 Upper P2  
X6 Upper M1  
X7 Upper M2  
X8 Upper M3  
MC Mandibular body  
MM Mandible  
MR Mandibular ramus  
MS Mandib. symphysis  
MY Mandibular condyle  
XD Demimaxilla  
XP Premaxilla  
XX Maxilla  
PP Permanent tooth  
PR Perm. tooth root  
PX Tooth crown frag.  
QM Manubrium  
QS Sternum  
QX Sternum frag.  
QC Clavicle  
S? ? Scapula  
SA Acromion  
SB Scapula blade  
SC Coracoid  
SG Scap. glenoid cavity  
SS Scapula  
SX Scapula frag.  
QR Rib  
VC Cervical vertebra  
VT Thoracic vertebra  
VL Lumbar vertebra  
VS Sacrum

VY	Coccyx
VV	Vertebra
VX	Vertebra fragment
I?	? Hip bone
IA	Acetabulum
II	Hip bone
IL	Ilium
IP	Pubis
IS	Ischium
IX	Hip bone frag.
H?	? Humerus
HH	Humerus
HP	Humerus-proximal
HM	Humerus-midshaft
HD	Humerus-distal
R?	? Radius
RR	Radius
RP	Radius-proximal
RM	Radius-midshaft
RD	Radius-distal
U?	? Ulna
UU	Ulna
UP	Ulna-proximal
UM	Ulna-midshaft
UD	Ulna-distal
YC	Carpal
YY	Handbone
YS	Scaphoid
YL	Lunate
YQ	Triquetral
YI	Pisiform
YZ	Trapezium
YD	Trapezoid
YA	Capitate
YH	Hamate
YM	Metacarpal
YP	Phalanx (hand)
LS	Sesamoid
F?	? Femur
FF	Femur
FP	Femur-proximal
FM	Femur-midshaft



FD Femur-distal  
LL Patella  
T? ? Tibia  
TT Tibia  
TP Tibia-prox  
TM Tibia-midshaft  
TD Tibia-distal  
B? ? Fibula  
BB Fibula  
BP Fibula-proximal  
BM Fibula-midshaft  
BD Fibula-distal  
ZT Tarsal bone  
ZZ Footbone  
ZA Talus  
ZC Calcaneus  
ZN Navicular  
ZE Medial cuneiform  
ZI Intermed. cuneiform  
ZL Lateral cuneiform  
ZU Cuboid  
ZM Metatarsal  
ZP Foot Phalanx

ID no	Assoc Skel	Context	Cut	Find No	Skel Elem	Code	Side	Age1	Age2	Sex	Dental path	Skel path	Notes	Frgs
1001	8	30	58		Tarsal	ZC	L	AA					calcaneus	1
1002	8	30	58		Fibula	BM		AA					shaft fragment	1
1003	8	30	58		Fibula	BD	L	AA					distal epiphysis fragment	1
1004	8	29	30		Metatarsal	ZM		AA					identified, unsided, minus distal end	1
1005	8	29	30		Hip	IX		AA					ischiopubic ramus fragment	1
1006	8	29	30		Unidentified	??		AA					x 4 long bone shaft fragments	4
1007	1, 2	5, 6			Tibia	TP		AA					unsided proximal epiphysis fragment	1
1008	1, 2	5, 6			Patella	LL	R	AA					patella	1
1009	1, 2	5, 6			Hand phalanx	YP		AA					x 4 proximal hand phalanges	4
1010	1, 2	5, 6			Hand phalanx	YP		AA					x 1 intermediate hand phalanx	1
1011	1, 2	5, 6			Rib	QR		AA					x 2 shaft fragments	2
1012	1, 2	5, 6			Vertebra	VX		AA					x 1 unidentified body fragment	1
1013	1, 2	5, 6			Tooth	X7	L	AA					upper permanent M2	1
1014	1, 2	5, 6			Tooth	X8	L	AA					upper permanent M3	1
1015	4	18			Carpal	YL		AA				mild ops	lunate	1
1016	4	18			Unidentified	??		AA					x 31 irregular fragments	31
1017	4	18			Hand phalanx	YP		AA					x 2 distal hand phalanges	2
1018	4	18			Hand phalanx	YP		AA					x 1 intermediate hand phalanx	1
1019	4	18			Hand phalanx	YP		AA					x 1 proximal hand phalanx	1
1020	13	43		32	Humerus	H?		AA					possible diaphysis fragment	1
1021	12	43			Rib	QR		AA					x 11 shaft fragments	11
1022	12	43			Vertebra	VS		AA					x 3 body fragments	3
1023	12	43			Unidentified	??		AA					x 5 irregular fragments	5
1024	12	43		31	Humerus	HP		AA					fragment of proximal epiphysis	1
1025	11	42			Metatarsal	ZM	R	AA				depression	right MT3	1
1026	11	42			Foot phalanx	ZP		AA					x 5 proximal foot phalanges	5
1027	11	42			Foot phalanx	ZP		AA				1 with ops	x 2 intermediate foot phalanges	2
1028	11	42			Foot phalanx	ZP		AA					x 2 distal foot phalanges	2
1029	7	28		23	Unidentified	??		AA					x 44 irregular fragments	44

ID no	Assoc Skel	Context	Cut	Find No	Skel Elem	Code	Side	Age1	Age2	Sex	Dental path	Skel path	Notes	Frgs
1030	15	60		39	Ulna	UD	R	AA					distal quarter	1
1031	15	60		39	Vertebra	VS	R	AA					right lateral auricular surface	1
1032	15	60		39	Humerus	HM		AA					x 1 shaft fragment	1
1033	15	60		39	Ulna	UM		AA					x 1 shaft fragment	1
1034	15	60		39	Vertebra	VC		AA					x 1 right inferior facet C2	1
1035	15	60		39	Vertebra	VC		AA					right half of C1	1
1036	15	60		39	Vertebra	VT		AA					x 2 thoracic fragments	2
1037	15	60		39	Unidentified	??		AA					x 21 irregular fragments	21
1038	15	60		39	Rib	QR		AA					x 6 shaft fragments	6
1039	15	60		39	Cranial	CX		AA					x 2 vault fragments	2
1040	15	60		39	Tooth	M8	L	AA			sl cal		lower permanent M3	1
1041	15	60		39	Carpal	YA	L	AA					capitate	1
1042	15	60		39	Carpal	YS	L	AA					scaphoid	1
1043	15	60		39	Carpal	YS	R	AA					scaphoid	1
1044	15	60		39	Carpal	YL	L	AA					lunate	1
1045	15	60		39	Carpal	YD	L	AA					trapezoid	1
1046	15	60		39	Metacarpal	YM		AA					x 1 shaft fragment	1
1047	15	60		39	Hand phalanx	YP		AA					x distal ends of 2 proximal hand phalanges	2
1048	15	60		39	Hand phalanx	YP		AA					x 1 intermediate hand phalanx	1
1049	15	60		39	Hand phalanx	YP		AA					x distal end of 1 distal hand phalanx	1
1050	15	60		39	Unidentified	??		AA					x 39 irregular fragments	39
1051	15	60		39	Femur	FD		AA					fragment of distal epiphysis	1
1052	15	60		39	Clavicle	QC	L	AA					lateral half	1
1053	15	60		39	Clavicle	QC		AA					x 2 shaft fragments	2
1054	15	60		39	Rib	QR	R	AA					x 3 medial ends	3
1055	15	60		39	Rib	QR	L	AA					x 3 medial ends	3
1056	15	60		39	Hip	IL		AA					x 1 iliac body fragment	1
1057	15	60		39	Vertebra	VC		AA					x 4 cervical arches	4
1058	15	60		39	Vertebra	VX		AA					x 10 irregular fragments	10

ID no	Assoc Skel	Context	Cut	Find No	Skel Elem	Code	Side	Age1	Age2	Sex	Dental path	Skel path	Notes	Frgs
1059	15	60		39	Vertebra	VT		AA					x 1 arch	1
1060	15	60		39	Vertebra	VL		AA					x 2 arch fragments	2
1061	15	60		39	Vertebra	VL		AA					x 1 body fragment	1
1062	15	60		39	Scapula	SS	L	AA					glenoid and blade minus acromion	2
1063	15	60		39	Scapula	S?		AA					x 2 body fragments	2
1064	6	26			Fibula	BM		AA					x 1 shaft fragment	1
1065	6	26			Radius	RP		AA					radial tuberosity	1
1066	6	26			Unidentified	??							x 12 irregular fragments	12
1067	16	63			Rib	QR	L	AA					x 1 first rib	1
1068	16	63			Hand phalanx	YP		AA					x 1 proximal hand phalanx	1
1069	16	63			Vertebra	VY		AA					first coccyx	1
1070	16	63			Rib	QR		AA					x 4 shaft fragments	4
1071	16	63			Unidentified	??		AA					x 7 irregular fragments	7
1072	10	39			Scapula	SB		AA					blade base	1
1073	10	39			Unidentified	??		AA					x 4 irregular fragments	4
1074	10	39			Cranial	CT	L	AA					mastoid only	1
1075	10	39			Mandible	MC	R	AA			M2 lost AM		body fragment w/socket for M3	1
1076	10	39			Cranial	CO		AA		M?			x 2 fragments	2
1077	10	39			Cranial	CX		AA					x 9 vault fragments	9
1078	10	39			Tooth	X6	L	AA			sl cal		upper permanent M1	1
1079	10	39			Tooth	M5	L	AA			mod cal		lower PM2	1
1080	10	39			Metacarpal	YM	R	AA					MC3, minus distal end	1
1081	10	39			Scapula	S?		AA					lateral body fragment	1
1082	10	39			Rib	QR		AA					x 11 shaft fragments	11
1083	10	39			Rib	QR	R	AA					x 3 medial ends	3
1084	10	39			Rib	QR	L	AA					x 1 medial end	1
1085	10	39			Vertebra	VC		AA					left lateral half of C1	1
1086	10	39			Vertebra	VC		AA					inferior body and right sup. facet C2	2

ID no	Assoc Skel	Context	Cut	Find No	Skel Elem	Code	Side	Age1	Age2	Sex	Dental path	Skel path	Notes	Frgs
1087	10	39			Vertebra	VC		AA				2 sup 1 inf DJD	x 4 left arches	4
1088	10	39			Vertebra	VC		AA				1 sup mod DJD	x 2 right arches	2
1089	10	39			Vertebra	VC		AA				3 sup 1 inf DJD	x 4 bodies	4
1090	10	39			Vertebra	VC		AA				apop mild DJD inf body mod DJD	complete	1
1091	10	39			Unidentified	??		AA					x 8 long bone shafts	8
1092	10	39			Humerus	HM		JUV	1-6yrs				x 1 diaphyseal fragment	1
1093	10	39			Femur	FD		AA					fragment of distal epiphysis	1
1094	10	39			Cranial	CF		AA		F?			complete frontal	1
1095		TM4			Tooth	X1	R	AA			sl cal		upper 1st permanent incisor, in 1101	1
1096		TM4			Tooth	X2	R	AA			sl cal		upper 2nd permanent incisor, in 1101	1
1097		TM4			Tooth	X3	R	AA			sl cal		upper permanent canine, in 1101	1
1098		TM4			Tooth	X4	R	AA			sl cal		upper 1st premolar, in 1101	1
1099		TM4			Tooth	X5	R	AA			sl cal		upper 2nd premolar, in 1101	1
1100		TM4			Tooth	X6	R	AA			sl cal		upper 1st permanent molar, in 1101	1
1101		TM4			Maxilla	XX	R	AA					contains 1095-1100	2
1102		TM4			Cranial	CO		AA					x 2 fragments	2
1103		TM4			Cranial	CT	R	AA					squamous incomplete	1
1104		TM4			Cranial	CS		AA					sphenoid fragment	1
1105		TM4			Cranial	CO		AA					pars basilaris and left lateral wing	1
1106		TM4			Cranial	CP		AA					x 6 fragments	6
1107		TM4			Mandible	MR	R	AA					gonial, condyle, coronoid, socket M3	1
1108		TM4			Cranial	CX		AA					x 25 vault fragments	25
1109	10				Femur	FP	L	AA		?			x 1 fragment, head 46.83mm	1
1110	10				Tibia	TP	R	AA		M?			x 1 fragment, circum. 90.2mm	1



## Appendix 2 Finds Register

ExcavNo	SiteNo	ContextNo	ItemNo	SimpleName	FullName	Material	Description	Dimensions
10E0117:3:1	10E0117	3	1	Coin	King George V penny 1908	Copper alloy		D 3.09.
10E0117:3:2	10E0117	3	2	Coin	King George V penny 1917	Copper alloy		D 3.07.
10E0117:3:3	10E0117	3	3	Button	Shank button	Copper alloy?	Front face of shank button decorated with floral motif surrounded by letters, the letters included..ORD.. above the motif and ..RIC.. below the motif. The shank on the back face is surrounded by letters which include RICH.	D 2.21; T 0.71; D shank 0.72.
10E0117:3:4	10E0117	3	4	Padlock	Miniature padlock	Copper alloy	20th century heart-shaped miniature padlock.	L 1.48; W 1.63; T 0.41. D of shackle 1.21
10E0117:3:5	10E0117	3	5	Marble	Marble	Ceramic	Ceramic marble. Light yellow colour.	D 1.36
10E0117:3:6	10E0117	3	6	Marble	Marble	Ceramic	Ceramic marble. Red earthenware colour.	D 1.45
10E0117:3:7	10E0117	3	7	Glass	Modern green and white glass fragments	Glass		
10E0117:3:8	10E0117	3	8	Pipe	Clay pipe stem fragment	Ceramic		L 3.21.
10E0117:12:1	10E0117	12	1	Pipe	Clay pipe stem fragment	Ceramic		L 2.44.
10E0117:13:1	10E0117	13	1	Pipe	Clay pipe stem fragment	Ceramic		L 3.30.
10E0117:14:1	10E0117	14	1	Pot	Body sherd	Ceramic	Sherd of 17th century North Devon ware	
10E0117:19:1	10E0117	19	1	Nail		Iron		L 7.5
10E0117:23:1	10E0117	23	1	Awl	Leather-working awl	Iron	Large slender pin-like tool, point damaged with small lateral adhesions, not integral to object. One half is roughly round in section, then becomes rectangular, flattened out towards terminal.	L 15.3; W 0.57.

10E0117:23:2	10E0117	23	2	Flint	Flake	Stone	Late Neolithic or Early Bronze Age in date	L 4.16
10E0117:32:1	10E0117	32	1	Pipe	Clay pipe stem fragment	Ceramic		
10E0117:32:1	10E0117	32	1	Pot	Body sherd	Ceramic	Modern earthenware	
10E0117:40:1	10E0117	40	1	Pot	Body sherd	Ceramic	Sherd of 17th century North Devon ware	
10E0117:40:2	10E0117	40	2	Nail		Iron		L 4
10E0117:49:1	10E0117	49	1	Bone	Motif piece	Bone	Portion of cow mandible, inscribed on two faces with trial motif decoration	L 14.5
10E0117:59:1	10E0117	59	1	Pot	Body sherd	Ceramic	Body sherd of 18th/19th century black ware.	
10E0117:59:2	10E0117	59	2	Quern	Rotary quernstone	Stone	Fragments of the upper stone of a rotary quern stone. The working surface is flat and worn. The sides and top are dressed. A portion of the central perforation survives.	L 36; W 23; T 10; D 40

## Appendix 3 Lithic Finds Report

By Dr. Farina Sternke

### Introduction

One lithic find from the archaeological excavation of a medieval site at Tuam, Co. Galway was presented for analysis (Table 1).

Find Number	Context	Material	Type	Cortex	Condition	Length (mm)	Width (mm)	Thickn. (mm)	Complete	Period	Reliability
10E117:23:2	23	Flint	Flake	No	Lustred	22	15	7	No	Late Neolithic or Early Bronze Age	High

Table 1 Composition of lithic assemblage from Tuam (10E117)

### Methodology

The artefact was examined visually and catalogued using Microsoft Excel. The following details were recorded: context information, raw material type, artefact type, the presence of cortex, artefact condition, length, width and thickness measurements and fragmentation. The technological criteria are based on the terminology and technology presented in Inizan *et al.* 1999. The general typological and morphological classifications are based on Woodman *et al.* 2006.

### Quantification

The find (10E117:23:2) is a flaked piece of flint.

### Provenance

The artefact was recovered from ?

### Condition:

The lithic survives in lustred and incomplete condition.

### Technology/Morphology:

The artefact is a small flint flake. It is missing its proximal and distal end. The flake measures 22mm long, 15mm wide and 7mm thick. It was possibly used like a natural end scraper, as it appears to have use-wear and polish on its distal break surface. The flake also shows post-depositional edge damage.

## Dating:

The flake is residual at this site and most likely dates to the late Neolithic period or early Bronze Age on the basis of its morphology.

## Conservation

Lithics do not require specific conservation, but should be stored in a dry, stable environment. Preferably, each artefact should be bagged separately and contact with other lithics should be avoided, so as to prevent damage and breakage, in particular edge damage which could later be misinterpreted as retouch. Larger and heavier items are best kept in individual boxes to avoid crushing of smaller assemblage pieces.

## Summary

The lithic find from the archaeological excavation at Tuam (10E117), Co. Galway is a small flint flake. The artefact probably dates to the late Neolithic period or early Bronze Age and possibly represents domestic waste.

This artefact makes a minor contribution to the evidence for prehistoric settlement in Co. Galway.

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## Appendix 4 Metallurgical Residues

By Paul Rondelez

### Introduction

During excavations in the historic centre of Tuam, Co. Galway, a limited amount of metal working residues were recovered (Bower and Delaney 2011). All the material is likely to have been produced during iron smithing.

### Methodology

The metallurgical material was examined macroscopically and using a binocular microscope, after which the assemblage was described and weighed (see Catalogue).

### The material

In Trench 2 at Church Lane three small pieces of slag were found in fill (C.14) of ditch (C.13) and another in fill (C.16) of its recut (C.15). All pieces are rather undiagnostic, but fit well into the range of types of slag which are the result of blacksmithing. Fill (C.14) also produced a sherd of 17<sup>th</sup> century pottery.

In Trench 3 at Saw Pit Lane, an additional piece of metal working debris was found in the upper fill (C.49) of a large ditch (C.48) (Pl. 1). This piece is identifiable as the central part of a Smithing Hearth Cake, which is the typical result of early iron smithing (Crew 1996). The ditch itself seems to have been overlain by the boundary wall (C.59) of St. Jarlath graveyard and radiocarbon analysis on animal bone from a lower fill (C.57) of the same ditch returned a date of cal AD 652-766 (UB-17156).

### Conclusions

The assemblage from the Saw Pit Lane area in Tuam indicates that iron smithing was taking place here, both in the Early Medieval period and at a later date in the post-medieval period.

### References

- Bower N. and Delaney F. 2011 *Preliminary Excavation Report – Sawpit Lane, Tuam, Co. Galway. Excavation Licence Number 10E0117*. Unpublished Preliminary Report, Eachtra Archaeological Projects Ltd.
- Crew P. 1996 *Bloom refining and smithing slags and other residues*. (=Historical Metallurgy Society. Archaeology, Datasheet 6). London, Historical Metallurgy Society.



## Catalogue

Context No.	Sample No.	Find No.	Feature	Weight (g)	Description
14	2		Fill of ditch c.13	7	Three small pieces of light, vesicular slag. Two drippy pieces
16		18	Fill of recut c.15	29	Small slag fragment with multiple charcoal inclusions
49		36	Fill of ditch c.48	121	Fragment of dense SHC. Charcoal impressions on the base and a vitrified creamy green upper surface

## Plates

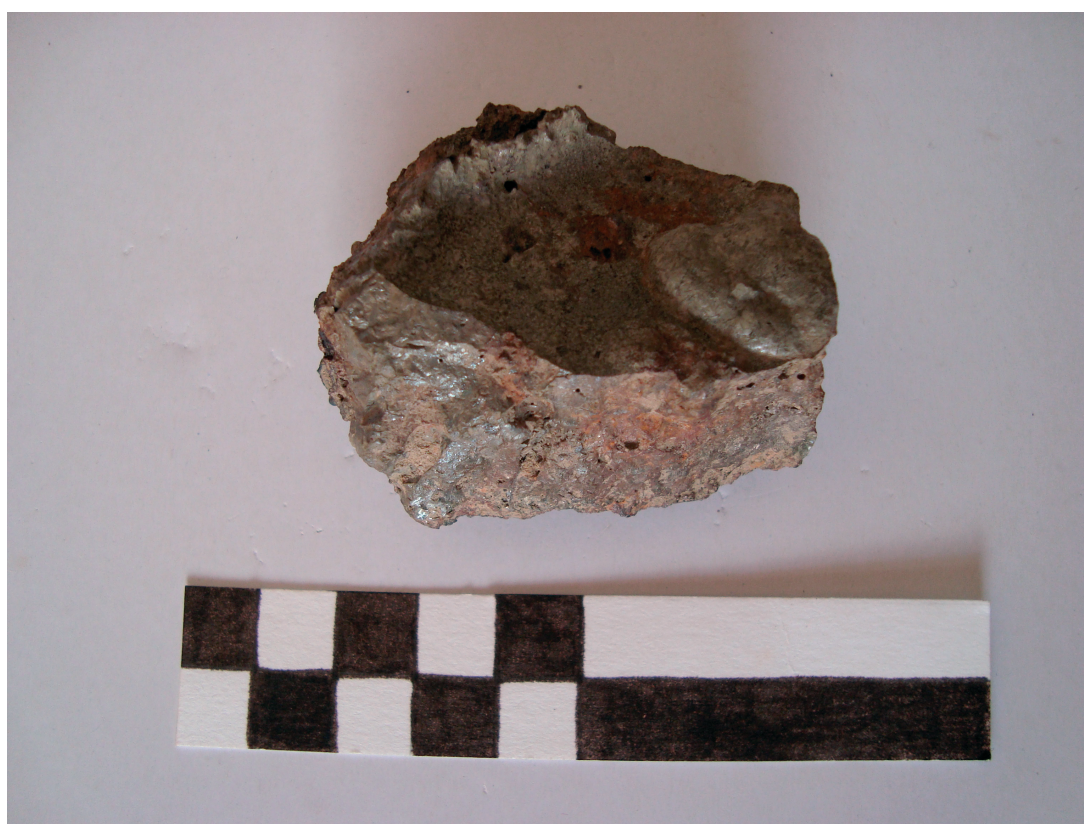


Plate 1: Fragment of a Smithing Hearth Cake from (C.49), Saw Pit Lane, showing a fracture face and the vitrified upper surface.

## Appendix 5 The Faunal Remains

By Margaret McCarthy

### Introduction

Excavations at three locations outside the Temple Jarlath enclosure encountered features and deposits dated from the early medieval period to the medieval period. Animal bones were recovered from a narrow range of features and from their overall composition can be regarded as the food remains and craft-working waste of previous occupants of the area. The largest samples of bones were recovered during excavations along Sawpit Lane and radiocarbon dates obtained from human remains revealed the graveyard here to be early medieval in date. Two ditches in this area produced relatively large amounts of animal bone and these were also dated to the early medieval period. The animal bones from Church Lane were recovered from a truncated ditch and two refuse pits and these are medieval in date. Limited excavations on The Mall produced just eight fragments of bone.

### Methods

The bone material was recorded by individual context and area and sorted into identifiable and non-identifiable specimens. Due to the extremely fragmented condition of the material, many bones could not be positively identified to species and these were sorted into higher taxonomic categories. When a specimen could not be assigned to sheep, goat or pig, the category 'medium-sized mammal' (MM) was used. In the same way, specimens that could not be positively identified as cattle and may also have belonged to horse or red deer were assigned to the category 'large-sized mammal' (LM). All ribs and many skull and vertebra fragments were classified as large and medium mammal remains only. A relatively high proportion of the assemblage could not be assigned to a size grouping and these had to remain indeterminate. The ageing of domestic animals was established using the epiphyseal fusion rates quoted by Silver (1971) for limb bones. All mandibles were recorded using Grant's (1975) method, which involves the recording of eruption and wear stages on the molars and the assigning of a numerical value (nv) to the mandibles. The relative frequencies of the animals represented were estimated by the percentage of bones for each species identified and by the minimum number of individuals present. The latter figure was estimated for each context and was based on longbones only. Sheep were distinguished from goat by close examination of suitable bones as outlined by Boessneck (1969) and Prummel and Frisch (1986) and by comparison with modern skeletal material. The ovicaprid bones are all referred to as 'sheep' in the text as many of them were definitely identified to this species by morphological traits and just a few bones were positively identified as belonging to goat.

## Condition

In contrast to most urban faunal assemblages, the condition of the bones from all three areas was quite poor with high values for erosion and weathering. While the material was mostly recovered from cut features such as pits and ditches, the extremely fragmented and eroded condition of the bones indicates that they were lying in a secondary, if not tertiary position, when excavated. High rates of fragmentation are indicative of a slow build up of deposits where bone specimens were left exposed on the occupation surface to be subjected to weathering, gnawing and trampling before eventually being discarded into the ditches and pits. The various categories of unidentified material formed a comparatively high proportion of the total sample including tiny fragments that could not even be placed into a size category (Table 1). Less than 2% of the bones were burnt and there was no evidence for gnawing.

## Analysis

The entire assemblage of 1315 stratified animal bones was examined. The material was grouped into the three main areas of investigation and was analysed according to each individual context. The results are summarised in Table 1 in terms of fragment numbers for each species and each area of investigation.

	Cattle	S/G*	Pig	Red Deer	Dog	Rabbit	LM*	MM*	Indet*	Total
Church Lane										
Pit - C12	13	4/1	-	-	-	-	20	20	-	58
Pit - C20	49	15/1	16	2	1	1	107	96	138	426
Ditch	22	11	2	6	-	-	32	44	18	135
Total	84	32	18	8	1	1	159	160	156	619
Sawpit Lane										
Grave Sk 6	-	-	-	-	-	-	-	-	10	10
Pit - C47	43	4	11	2	-	-	60	82	188	390
Ditch C48	60	6/1	8	2	-	-	74	35	25	211
Ditch C50	10	3	4	3	-	-	25	32	-	77
Total	113	14	23	7	-	-	159	149	223	688
The Mall										
C94	2	1	-	-	-	-	4	1	-	8
TOTAL	199	47	41	15	1	1	322	310	379	1315

Table 1: Representation of species in main areas of investigation

## Church Lane

### Trench 2

A total of 619 bones was analysed from four contexts from three features, comprising two pits (C11, C20) and a ditch (C13). Identification rates were low due to the extremely fragmented nature of the collection and just 30% of the total assemblage could be taken to species level. The material is described below by individual feature.

#### *Pit – C11*

The fill (C12) of this possible medieval pit contained 58 animal bones of which 17 were identifiable to species. Cattle, sheep and goat were all identified. There were 13 cattle bones consisting of six loose teeth, two fragments of a humerus along with single finds of ulna, femur, vertebra, scapula and tibia. The bones were from an individual that was over three and a half years of age at slaughter. The four sheep bones included humerus, radius, navicular cuboid and vertebra, all from an adult individual. The single goat bone was identified as a fragment of a horn core from an adult female.

#### *Pit – C20*

Two fills (C21, C23) of this pit contained a total sample of 426 bones which were either specific to domestic mammals or to small fragments derived from them. The bones from the primary fill (C21) were retrieved entirely from the residue of a sieved soil sample and none of the recovered 19 fragments were identifiable to species. The upper fill (C23) produced the largest sample of animal bones from the excavations on Church Lane but most of these were either indeterminate (32%) or could only be sorted into large and medium mammal size categories (48%). The identifiable sample of 82 bones contained the remains of cattle, sheep, goat, pig, red deer, dog and rabbit. Cattle were predominant accounting for 60% of the identified bones and while almost all parts of the skeleton were present, skull fragments, loose teeth and vertebra were most common. At least two individuals were present, an adult over three years of age and a younger individual that was slaughtered between 15-18 months of age. Butchery marks associated with dismemberment and filleting of meat were noted on some of the limb bones particularly scapula and pelvis.

The only other species identified in this large pit were sheep, goat and pig. Sheep was represented by 15 bones including humerus, radius, ulna, mandible, vertebra, pelvis and isolated teeth, all from an individual less than three years of age at death. A complete horn core from a male goat was also identified. The sample of 16 pig bones mostly consisted of peripheral elements such as teeth, phalanges and skull fragments but the recovered sample is too small to comment meaningful on disposal patterns. Epiphyseal fusion evidence indicated that the identified specimens belonged to an individual slaughtered between 1-3 years of age. One of the teeth belonged to an adult male boar.

The only other domestic animal present was dog, identified from the cranial portion of an axis from an adult individual similar in size to a modern sheepdog. The wild mammal component consisted of red deer and rabbit. Red deer was present as two small pieces of antler tines which had been sawn through and represent off cuts from craft manufacture. Rabbit was identified from a single mandible fragment. This pit also contained a few limb bones of domestic fowl and domestic goose.

#### *Ditch – C13*

A total of 135 animal bones were recovered from this ditch. Of these, 41 could be taken to species level and the identified sample included the remains of cattle, sheep, pig and red deer. Cattle dominated the assemblage accounting for 54% of the identified sample and elements present included loose teeth, skull, metapodials, vertebrae, scapula, mandible, horn core, radius, pelvis, femur, tibia, calcaneus and astragalus. Ageing data was scarce but there were sufficient bones with fused epiphyses to show that the individual was over 2.5 years of age and probably older at slaughter.

The two other livestock species, sheep and pig, were present in very small amounts. There were 11 sheep bones representing one individual and the presence of both meat-bearing and peripheral elements suggests local slaughter of animals. Epiphyseal fusion evidence indicates that this particular individual was over two years of age at slaughter. There were just two pig bones, small pieces of a pelvis from an adult individual. Red deer was present as six antler fragments; two shed rosettes, three beam fragments and a small piece of a tine. All fragments were sawn through and clearly represent waste from artefact manufacture. The presence of two rosettes indicates that shed antler was collected in nearby areas of woodland during the spring time specifically for the craft industry.

## Sawpit Lane

### Trench 2

Bone was analysed from four features comprising a grave fill, a pit and two ditches. The remains were found in association with human skeletons that have been radiocarbon dated to the early medieval period. A cattle humerus from the lower fill of one of the ditches (C48) returned an early medieval date for this feature.

#### *Grave – Skeleton 6*

Ten indeterminate fragments of animal bone were recovered from the sorted residue of a soil sample taken from the fill (C27) of this grave.

#### *Pit - C46*

The fill (C47) of this refuse pit produced a large sample of 390 animal bones but most of these could not be taken to species level. Over 48% of the sample was indeterminate and another 36% could only be classified as medium and large mammal remains. The identified sample of 60 bones was dominated by the remains of cattle (72%) representing at least

three individuals including two adults between two and a half to three years of age and a juvenile animal. Identified bones included femur, radius, tibia, metatarsus, vertebrae, phalanges, skull, pelvis, calcaneus and loose teeth. Butchery evidence was scarce and the only chop marks noted were on a pelvis, which had been chopped across the acetabulum during the separation of the femur from the hip joint.

All other species were represented by fewer than 15 bones. Eleven pig bones included a selection of meat-bearing and peripheral elements from a single adult individual, over two years of age at slaughter. Just four sheep bones were present identified as fragments of two vertebrae, a skull fragment and a single tooth. Red deer was represented by two antler fragments, the sawn tips of tines.

#### *Ditch C48*

Two fills (C49, C57) of this early medieval ditch yielded a total sample of 211 bones, the majority of which came from the upper fill (C49). The primary fill (C57) contained just three diagnostic bones, all identified as cattle. The remainder of the bones from this fill consisted of small amounts of large and medium mammal remains some of which were totally calcined from being in contact with intense heat for a considerable amount of time. A total of 180 bones were recovered from the upper fill. Identification rates were once again poor and the proportion of indeterminate fragments was high (64%). The sample was dominated by the remains of cattle, this species alone accounting for 77% of the identified assemblage. A minimum of three individuals was estimated from surviving limb bones including a juvenile slaughtered at around one year of age, an individual between two to two and a half years old and a considerably older and more robust individual, probably a bull although no greatest length measurements could be taken to establish a withers height. Although almost all parts of the body were represented, loose teeth, skull and vertebra fragments were the most common elements with notable absences being metacarpal and ulna. Vertebrae were chopped laterally and transversely and fine knife marks associated with skinning were noted on the distal end of a metatarsal and two skull fragments. A pelvis showed signs of butchery on the cranial area of the bone, an area that is often chopped through when removing the hind limbs. The most noteworthy aspect of the sample of cattle bones was the recognition of very fine incision lines on the horizontal ramus and ascending ramus of a mandible. These markings are clearly decorative in nature and the bone had been deliberately selected to be used as a trial piece for artwork.

All other species were very poorly represented in the ditch. Just six sheep bones were recovered with identified elements including humerus, scapula, tibia and vertebrae. At least two adult individuals were present and traces of chop marks associated with the separation of the shoulder joint from the rest of the carcass were noted on the proximal articulation of the humerus. Ageing data was minimal but the results indicated that the sheep had reached adulthood before slaughter. Eight pig bones were identified including scapula, humerus, femur, pelvis and two isolated teeth, one a canine from a female. The distal end of the femur was unfused proximally and came from an individual less than three years of age at slaughter. Another individual was less than one year old at death. The



only wild animal present in the ditch was red deer, identified from two sawn portions of an antler tine and beam.

#### *Ditch - C51*

The fill (C50) of this ditch produced a total sample of 77 animal bones with the identifiable sample including the remains of cattle, sheep and red deer. Ten cattle bones were identified including humerus, tibia, metacarpal, teeth, skull, pelvis and phalange. The bones represented those of an individual that was between two to two and a half years old at slaughter. Pig was attested from two fragments of a radius, an ulna and a scapula from an individual less than one year of age at death. The three sheep bones included fragments of a metacarpal, a tibia and an isolated molar. Three red deer bones were present in the ditch, all identified as sawn portions of antler and representing waste from craft manufacture during the early medieval period.

## The Mall

### Trench 1

Excavations on The Mall produced a small sample of eight animal bones all of which were recovered from a single deposit (C94). The two cattle bones were identified as the distal fused portion of a humerus and a fragment of a horn-core. A complete sheep astragalus was identified and the remainder of the sample consisted of four fragments of bone from a large-sized mammal and one fragment from a medium-sized mammal.

## Conclusions

The overall impression from analysing the animal bones is that the assemblages from both the early medieval and medieval periods represent typical domestic samples consisting of bones from the slaughter, preparation and consumption of animals in this area of the town. With the exception of a small collection of sawn waste red deer antler and single occurrences of rabbit and dog, all of the bones were either specific to domestic animals or to small fragments derived from them. While the recovered samples are too small to be conclusive, the results indicate that the meat diet for both periods of activity was based mainly on cattle with a lesser sheep and pig component. Cattle husbandry seems to have been focused on the rearing of animals to at least three years of age as very few bones from young individuals were found. Ageing data for sheep indicated that they were slaughtered at a stage when they had reached their maximum size for meat production and in common with other contemporary sites, pigs were slaughtered between one to two years of age. Apart from the main livestock animals, no other species were present in significant numbers. Just one dog bone was identified, a vertebra from a medieval pit. The samples are too small to comment meaningfully on the local economy but the results confirm those obtained from other contemporary sites suggesting a husbandry based mainly on

cattle with sheep and pigs playing a less significant role. The recovery of numerous waste antler fragments from craft manufacture and a cattle mandible that had been used as a trial piece for artwork highlights the importance that was placed on bone as a secondary product during these periods.

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## Appendix 6 Radiocarbon dates

Radiocarbon analysis was carried out by the  $^{14}\text{C}$  Chrono Centre in Queen's University Belfast. Dates were calibrated using Calib Rev5.0.2 (©1986-2005 M.Stuiver & P.J. Reimer) and in conjunction with Stuiver & Reimer 1993 and Reimer et al. 2004.

Lab code	Context	Material	Un-calibrated date	$\delta^{13}\text{C}$	2 sigma calibration	Period
17156	57	Cow humerus from ditch C48	1330 +/- 22	-22.3	cal AD 652–766	early medieval
17157	SK 6	Human cranium	1377 +/- 41	-22.8	cal AD 591–766	early medieval
17158	SK 16	Human right radius	1343 +/- 35	-22	cal AD 637–771	early medieval

## Appendix 7 Context Register

Con-text #	Context type	Short description	Initials	Date
1	Non archaeological	Road surface (tarmacaddam)	NB	22/07/2010
2	Non archaeological	Older road surface, underlying tarmacaddam	NB	22/07/2010
3	Layer	Mottled dark brown-black, loose, silty-clay, large stone inclusions. Archaeological deposit disturbed during the construction of later road surface.	NB	12/07/2010
4	Layer	Compact, orange-brown, silty-clay, occasional stones and charcoal. Old ground surface into which SK 1&2 (C:5&6) were interred. Graves backfilled with same material. No cut visible	DOR	12/07/2010
5	Skeleton	Context issued for skeleton 2	BK,AB	
6	Skeleton	Skeleton 2	AB	06/07/2010
7	Cut	Services trench, filled with loose gravel. Truncates SK 1&2 (C:5&6)	DOR	12/07/2010
8	Fill	Services trench, filled with loose gravel. Truncates SK 1&2 (C:5&6)	DOR	06/07/2010
9	Grave Fill	Orange-brown, compact, silty-clay, occasional small stones and charcoal.	DOR	06/07/2010
10	Skeleton	Skeleton 3	DOR	06/07/2010
11	Pit Cut	Sub-oval, sharp break of slope North, gradual break of slope South, steep sides, flat base.	BK	08/07/2010
12	Pit Fill	Loose, brownish-black, silty-clay. Contains butchered bone, burnt bone, cut horn, charcoal, oyster shells. Finds of clay and glass.	BK	08/07/2010
13	Cut of ditch	Linear, vertical break of slope top, vertical sides, moderate break of slope base, smooth concave base.	NB	09/07/2010
14	Fill of ditch	Dark brown clayey-silt, compact with frequent stone inclusions, butchered bone, horn, burnt bone, charcoal. Finds of pottery	NB	09/07/2010
15	Cut of ditch	Linear, gradual break of slope top,concave, rounded sides, no perceptible break of slope base, concave, rounded base.	NB	09/07/2010
16	Fill of ditch	Mixed orange-light brown, compact, clay-silt, stones 30-150mm, charcoal and moderate bone inclusions.	NB	09/07/2010
17	Deposit	Bright orange, compact silt, small angular pebbles, occasional charcoal.	NB	12/07/2010
18	Skeleton	Disarticulated remains	DOR	08/07/2010
19	Subsoil	Greenish-yellow boulder clay, sandy, so not as compact as it often is. Angular gravel and occasional large rounded stones 0.10m-0.40m. Subsoil in all areas	NB	22/07/2010
20	Pit Cut	Rounded, almost vertical sides, sharp break of slope top, rounded base. Contains charcoal and animal bone rich fills	NB	09/07/2010
21	Pit Fill	Grey gravel. Occasional charcoal and butchered bone	NB	09/07/2010
22	Pit Fill	Soft yellow, greasy deposit. Decayed bone, no soil	NB	09/07/2010
23	Pit Fill	Dark brown, compact, sticky silty-clay. Frequent bone and charcoal inclusions. Main fill.	NB	09/07/2010
24	Skeleton	Unexcavated. Planned and photographed only. Then covered over with plastic and backfilled		08/07/2010

Con-text #	Context type	Short description	Initials	Date
25	Grave Fill	Soil deposited around Skeleton 4 within grave cut context 18	NB	22/07/2010
26	Skeleton	Skeleton 6. Truncated by ESB services trench. Associated with Skeleton 7 (C:28). Both appear to be interred together.	AB	09/07/2010
27	Grave Fill	Dark brown, loose, humic soil. Occasional small bones.	AB	13/07/2010
28	Skeleton	Skeleton 7	AB	16/07/2010
29	Skeleton	Skeleton 8	BK	13/07/2010
30	Grave Fill	Mottled greyish-brown, with flecks of orange, loose, silt, occasional small angular stones and charcoal flecks	AB	13/07/2010
31	Grave Fill	Orange-brown, moderately compact, silty-clay	BK	13/07/2010
32	Skeleton	Grave cut for Skeleton 9	BK	14/07/2010
33	Grave Cut	Irregular, rounded, gradual break of slope at top, gently sloping sides, irregular base. Contained SK 6 and 7.	AB	13/07/2010
34	Void	VOID		
35	Deposit	Dark brown fill, containing animal bone and charcoal	NB	22/07/2010
36	Cut of ditch	Linear, not perceptible break of slope top, smooth flat sides at 45 degree angle, depth unknown	NB	14/07/2010
37	Fill of ditch	Gravel and large boulders.	NB	14/07/2010
38	Fill of ditch	Brown moderately compact, silty clay. Bone and charcoal inclusions. Is similar to fills of Ditch cut 13 and pits 11 and 20.	NB	13/07/2010
39	Skeleton	Fragmented remains of Skeleton 10	BK	14/07/2010
40	Layer	Mixed orange-brown, moderately compact silt. Contains brown organic material, charcoal and bone.	BK	14/07/2010
41	Void	VOID		
42	Skeleton	Cut containing legs of Skeleton 11, the rest of the skeleton remains under the unexcavated road surface.	AB	14/07/2010
43	Skeleton	Skeleton 12. Disturbed juvenile.	BK	14/07/2010
44	Void	void		
45	Skeleton	Badly disturbed Skeleton 12	DOR	14/07/2010
46	Pit Cut	Oval, break of slope at top sharp, sides steep, break of slope at base sharp, flat bottom.	AB	15/07/2010
47	Pit Fill	Dark brown, loose, sandy soil. Occasional large angular boulders and stones. Frequent charcoal and animal bone (some butchered) and occasional burnt bone.	AB	15/07/2010
48	Cut of ditch	Linear, sharp break of slope top, flat side sloping at 45 degrees. Probably V-shaped profile	NB	15/07/2010
49	Fill of ditch	Dark brown silty-clay. Frequent bone and charcoal. Bone pin recovered and fragment of iron bloom.	NB	16/07/2010
50	Pit Fill	Dark brown silty-clay, loose gravel and small stones. Frequent butchered animal bone and charcoal.	BK	15/07/2010
51	Cut of ditch	Linear, east side gentle break of slope, west side vertical, sharp break of slope at base, flat base.	BK	16/07/2010

Con-text #	Context type	Short description	Initials	Date
52	Cobble	Pebbled surface, impacted into orange clay. Pebbles are 15-30mm, water rolled. This surface overlays Skeleton 15, but also underlays the old boundary wall (C:59).	NB	16/07/2010
53	Skeleton	Remains of Skeleton 14, cut by culvert C 62.	BK	16/07/2010
54	Cut of ditch	Same as cut 48	NB	16/07/2010
55	Fill of ditch	Soft orange silt. Bone, burnt bone and some charcoal.	NB	19/07/2010
56	Void	VOID	NB	
57	Fill of ditch	Orange silt, moderately compact. Bone, burnt bone and some charcoal.	NB	16/07/2010
58	Grave Cut	Linear, irregular, steep side on sw side, break of slope steep on SW side, base flat. Contained SK 8 (C:29 and C:42) and 11.	BK	16/07/2010
59	Wall	Mortared rectangular blocks 200-400mm wide x 200-400mm depth x 800mm length. Some rounded stones used at the corner of the wall for strength on the inside edge. Fragments of quernstone have been mortared into the wall.	NB	19/07/2010
60	Skeleton	Skeleton 15 orientated E-W alongside boundary wall 59. However, pebble surface overlay skeleton and underlay wall, so alignments seem coincidental.	BK	19/07/2010
61	Grave Fill	Darkish brown, compact, silty-clay. Gravel and small stones, some charcoal.	NB	16/09/2010
62	Stone Lining	A stone culvert running WNW to ESE. Internal width 0.42m x 0.75m height. Stones used for construction 110-150mm in thickness. Cobblestone base, culvert is still open and possibly working. Finds of clay pipe, iron fragments, pottery and glass.	NB	19/07/2010
63	Skeleton	Skeleton 16. half of the body is under unexcavated road surface and was left in situ.	BK	19/07/2010
64	Grave Fill	Mid brown, moderately compact fine silty-clay. Some pebbles and charcoal.	BK	19/07/2010



## Appendix 8 Metal Artefacts

By Orla Scully

The large iron pin, 10E117:23:1, was found in proximity to skeletons dated to the early medieval period. This is a large robust shaft, with a blunt point, roughly circular in section at the upper half of the shaft, which then changes to be rectangular in section below the centre, where it is flattened towards the terminal. The point itself is damaged, with some un-diagnostic adhesions projecting from it. The object is more than likely to be a leather-worker's awl. It would have been used to pierce leather in preparation for stitching.

## Appendix 9 Plant Remains

By Penny Johnston

### Introduction

This report details the results of plant remains analysis from samples taken during excavation at Sawpit Lane and Church Lane in Tuam, Co. Galway (licence no. 10E0117).

Small amounts of plant remains were found in the flots from all the samples, mostly cereals along with some weed seeds and hazelnut shell fragments.

### Methodology

The samples were collected on site as bulk soil and were processed using a simple flotation method; the soil was saturated in water and the floating material was poured through sieves (mesh sizes 1 mm and 250 µm) until all the small sediment was washed away. The flots were dried in paper-lined trays and were then stored in sealable plastic bags. All the flots were sorted and identified under magnification (X 10 to X 40). The results of identification are presented in Table 1 at the end of this report. Nomenclature and taxonomic order follows Stace (1997). To facilitate easy reading of this report the plant material is listed using the common English names in the body of the text, scientific names are only included in the results table.

### Results

The flots were taken from six separate deposits C.12, C.14, C.21, C.27, C.47 and C.57. In general the plant remains from these samples were relatively poor (Table 1). Most of the remains were identified as hazelnut shell fragments. Cereals were also found, most of these were not identifiable to type (*Ceralia*). Where identification of the grain was possible oat and barley were the most common types (Figure 1). A small portion of the assemblage was made up of weed seeds.

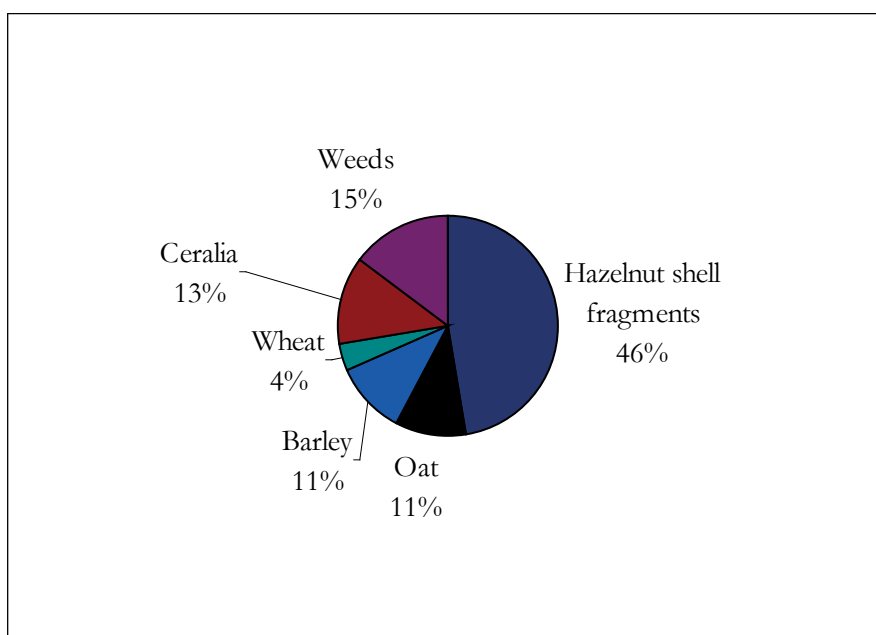


Figure 1: Percentage seed composition from Sawpit and Church Lanes, Tuam, Co. Galway (10E0117)

**C.12:** This sample was taken from the fill of pit C.11. The plant remains from this sample were very limited, comprising a single grain of barley.

**C.14:** This sample was taken from a wide ditch (C.13) that included butchered bone and charcoal. The plant remains assemblage was relatively small, with four cereal grains and two weed seeds. Most of the cereals were not identifiable to type and preservation was quite poor in this sample.

**C.21:** This sample was taken from the primary fill of a pit (C.20). This was one of the largest plant remains from the site and it included some cereals (mostly oat and barley) as well as some weed seeds (Grasses, Knotgrasses, Goosefoots and blackberry seeds).

**C.27:** This sample was taken from a grave fill and a small amount of plant remains were recovered. Most of these were cereals, mostly barley. A few hazelnut shell fragments were also found.

**C.47:** This sample was taken from a pit fill. This was one of the richest plant remains samples, most of the remains were hazelnut shell fragments. Cereal grains were also found including wheat, oat and barley. There was no clear indication of which of these was the most economically important.

**C.57:** This sample was taken from the fill of a ditch. The only plant remains from this sample were hazelnut shell fragments.

## Non-technical Summary

Samples from Sawpit Lane and Church Lane in Tuam contained small amounts of plant remains, mostly hazelnut shell fragments, oat, barley and wheat. There was no indication of the relative economic importance of each type of plant material, although hazelnut shell fragments were very common in some samples.

## References

Stace, C. (1997) *New Flora of the British Isles* (2<sup>nd</sup> edition) Cambridge, Cambridge University Press.

Context	21	14	12	47	57	27
Sample	1	2	5	8	12	?
Hazelnut shell fragments ( <i>Corylus avellana</i> L.)	2			38	2	3
Indeterminate seeds from the goosefoot family (Chenopodiaceae)	1					
Black bindweed ( <i>Fallopia convolvulus</i> (L.) Á. Löve)	2					
Indeterminate seeds from the Knotgrass family (Polygonaceae)	1	1				
Bramble: blackberry drupes ( <i>Rubus fruticosus</i> L.)	1					
Oat grains ( <i>Avena</i> L. species)	3	1		4		
Possible oat grains (cf <i>Avena</i> species)	2					
Oat floret bases, cultivated species ( <i>Avena sativa</i> L. species)	1					
Hulled barley grains ( <i>Hordeum vulgare</i> L.)	2			2		1
Barley rachis internodes fragment (indeterminate type)	1					
Barley grains of indeterminate species ( <i>Hordeum</i> species)	1		1	1		2
Probable naked wheat ( <i>Triticum</i> cf <i>aestivum</i> L./ <i>turgidum</i> Desf./ <i>durum</i> L.)				2		
Possible wheat grains (cf <i>Triticum</i> species)				2		
Barley/Wheat grains ( <i>Hordeum</i> / <i>Triticum</i> )		1		2		
Indeterminate cereal grains (Ceralia)	1	2		5		2
Indeterminate grass seeds (Poaceae)	2	1		3		
Indeterminate weed seeds	2					

Table 1: Identified plant remains from Sawpit Lane and Church Lane, Tuam, Co. Galway (10E0117)

## Recommendations for storage and retention

All the seeds and easily identifiable plant material from this site have been extracted from flots of the selected samples, identified, and stored in airtight tubes. It is recommended that these are submitted to the National Museum of Ireland (NMI) along with the artefacts from this site.

In order to comply in general with NMI guidelines, the Irish Archaeobotanical Discussion Group (IADG) recommends that glass tubes of plant remains are stored in plastic bags with labels loose within the bags. This means that there is no possibility for the labels to cause chemical contamination of the plant material (thereby ensuring that they are available for future radiocarbon dating or other analyses). The plant material from Sawpit and Church Lane has been stored in a manner that meets these recommendations, with glass tubes stored within one plastic bag with a loose label. It is recommended that all flots from this site are retained for potential study in the future.