Archaeological Services & Consultancy Ltd

OBSERVATION & MONITORING:
WOBURN ABBEY
WOBURN
BEDFORDSHIRE

NGR: SP 9648 3258

on behalf of
The Bedford Estates

Carina Summerfield-Hill BA MSc AI*f*A

March 2014

ASC: 1661/WAG/2

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Site Data

ASC project code:	WAG	*ASC Project No:*	1624
OASIS ref:	archaeol2-155212	*Event/Accession no:*	N/a
County:	Bedfordshire		
Village/Town:	Woburn		
Civil Parish:	Woburn		
NGR (to 8 figs):	SP 9648 3258		
Extent of watching brief:	c.35 sq. m		
Present use:	Garden		
Planning proposal:	Installation of ground source heat pump and pipework		
Local Planning Authority:	Central Bedfordshire Council		
Planning application ref/date:	CB/13/03837/LB		
Date of fieldwork:	12/02/14-05/03/14		
Commissioned by:	The Bedford Estates Bedford Estate Office Woburn Bedfordshire MK17 9PQ		
Client:	As above		
Contact name:	Jackie Carr		

Internal Quality Check

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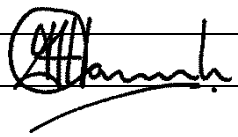
Edited/Checked By:		*Date:*	21st March 2014

CONTENTS

Appendices:

Figures:

Plates:

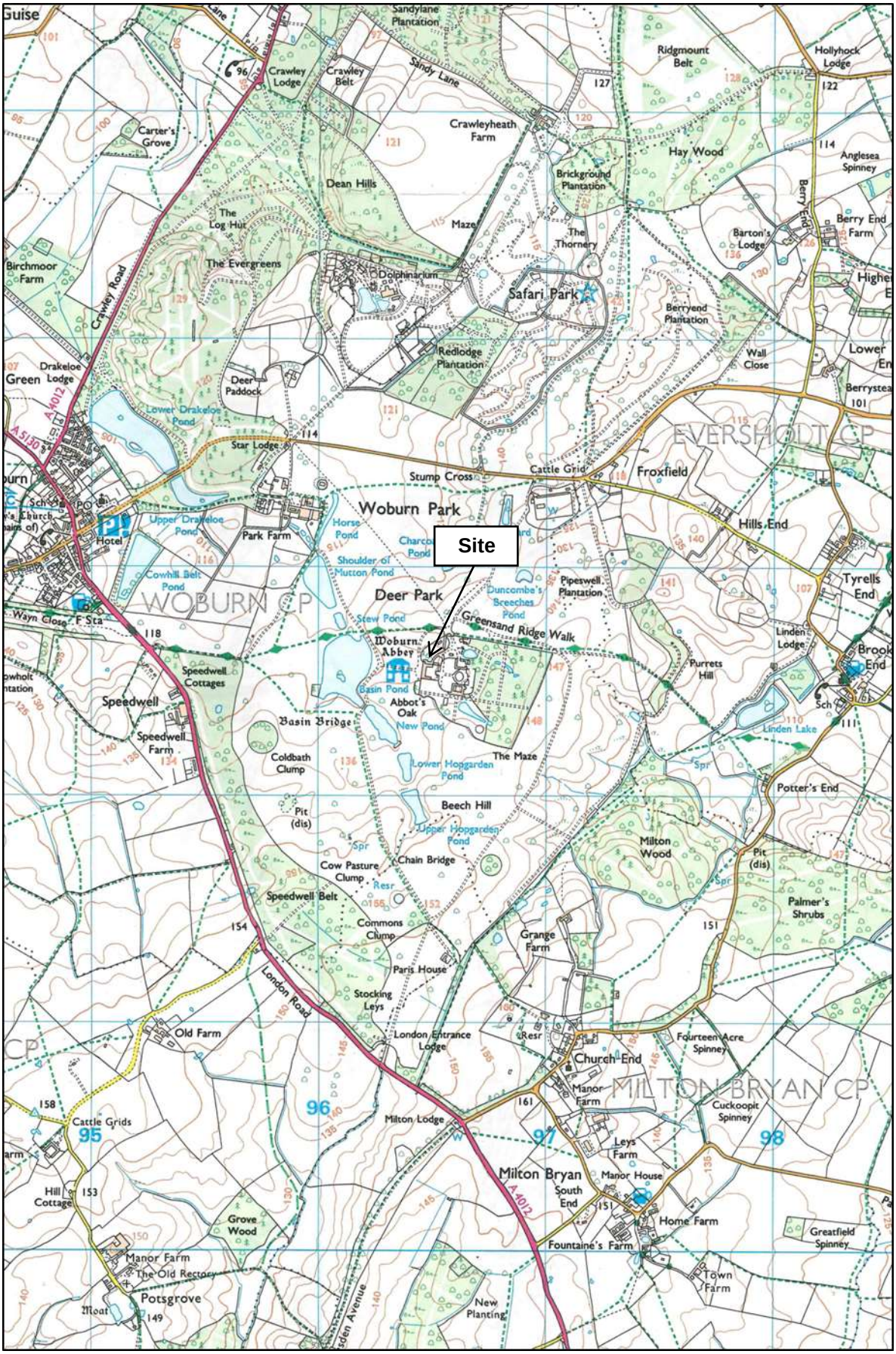


Figure 1: General location *(scale 1:25,000)*

Summary

During the months of February-March 2014 archaeological observation and monitoring was carried out at Woburn Abbey, Woburn, Bedfordshire within the Grotto Garden, due to the unexpected discovery of human remains whilst excavating a trench for pipework associated with a ground source heat pump. The trench revealed that the observed area has been extensively landscaped through truncation of the natural deposit and deposition of made-ground, activity probably associated with construction of the present 17th house. The project unearthed four partially articulated human skeleton and disarticulated human remains that are thought to be associated with the medieval Abbey, but little in the way of dating evidence was discovered, aside from a residual yellow and green glazed medieval floor tile.

1. Introduction

1.1 In February and March 2014 *Archaeological Services and Consultancy Ltd* (ASC) carried out observation and monitoring at Woburn Abbey, Woburn, Bedfordshire. The project was commissioned by *The Bedford Estates*, and was carried out according to a method statement prepared by ASC (Summerfield-Hill, 2014), which was approved by the *Central Bedfordshire Council Archaeologists*, archaeological advisors (AA) to the local planning authority (LPA), *Central Bedfordshire Council*.

1.2 ***Planning Background***

The observation and monitoring was required after the discovery of significant archaeology under the terms of the *National Planning Policy Framework* (NPPF). The development was carried out under listed building consent with no archaeological condition.

1.3 ***Archaeological Services & Consultancy Ltd***

ASC is an independent archaeological practice providing a full range of archaeological services including consultancy, field evaluation, mitigation and post-excavation studies, historic building recording and analysis. ASC is recognised as a *Registered Organisation* by the Institute for Archaeologists and is also accredited ISO 9001, in recognition of its high standards and working practices.

1.4 ***The Site***

1.4.1 *Location & Description*
The site is located within the district of Central Bedfordshire, the parish of Woburn, and comprises part of the Woburn Abbey estate. It is centred on NGR SP 9648 3258 (Fig. 1). The area of observation and recording was located at the northern side of Woburn Abbey within the Grotto Garden (Fig. 2).

1.4.2 *Geology & Topography*
The soils of the area belong to the *Evesham 3 Association*, which are described as *slowly permeable calcareous clayey, and fine loamy over clayey soils. Some slowly permeable seasonally waterlogged non-calcareous soils* (Soil Survey 1983, 411c). The underlying geology comprises *Quaternary Till* (BGS, Sheet 220) which overlies the *Woburn Sands Formation* of the

Greensand Ridge. The observed area sloped moderately downward from the north to the south and had an elevation of *c.*134m AOD towards the southern end.

1.4.3 *The Development*
Installation of ground source heat pump and associated pipework (Fig. 3)

1.4.4 *Recent Previous Works*
In August 2013 a geophysical survey was carried out at parkland located slightly to the northwest of Woburn Abbey prior to the insertion of pipework for the development (Hancock 2013). The survey results showed that large parts of the east of the surveyed area had been impacted by undated extraction; elsewhere the survey defined geology or recent services and drains. The surveyed area had not been included within the different phases of formal gardens located closer to the Abbey and structural features were absent.

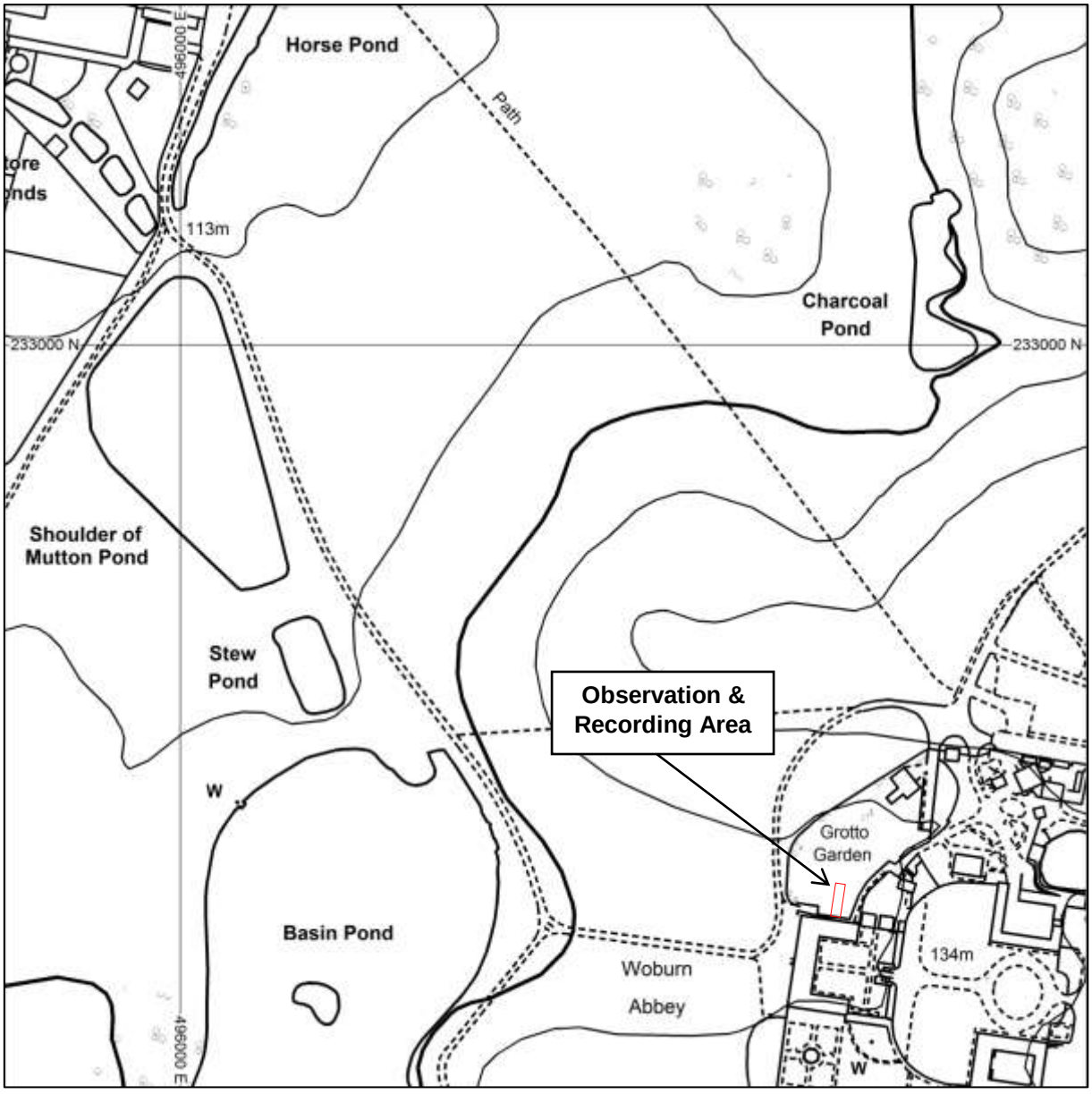


Figure 2: Site plan *(scale 1:5000)*

2. Aims & Methods

2.1 *Aims*

The aims of the project were:

- To observe intrusive groundwork at the designated area in order to mitigate impact of the development on any human remains or other archaeological features present.

2.2 *Methods*

The work was carried out according to the method statement, which required:

- The continuous presence of an experienced archaeologist during groundwork in close proximity to the Abbey.

2.3 *Standards*

- The work conformed to the method statement, to the relevant sections of the Institute for Archaeologists' *Code of Conduct* (IFA 2008a) and *Standard & Guidance Notes* (IFA 2010), to the Association of Local Government Archaeological Officers East of England Region *Standards for Field Archaeology in the East of England* (ALGAO 2003), and to the relevant sections of ASC's own *Operations Manual.*

2.4 *Constraints*

The works were carried out with full co-operation of the client and the groundworks contractor and no constraints were encountered.

3. Archaeological & Historical Background

3.1 The following section provides a summary of the readily available archaeological and historical background to the development site and its environs. This section has been compiled with information from the Central Bedfordshire Historic Environment Record (HER) and other readily available sources.

3.2 ***Prehistoric*** *(before 600BC-AD43)*

Currently there is no recorded evidence for Prehistoric activity within the immediate vicinity of Woburn Abbey.

3.3 ***Roman*** *(AD43-c.450)*

There is no definite evidence for Roman settlement in the immediate vicinity of Woburn Abbey, although Roman pottery was found in Woburn Park in the late 19th century (HER38). The Viatores have suggested that Leighton Street, the east-west aligned road passing through Woburn, follows the line of a Roman road, but this has not been proven (Viatores 1964).

3.4 ***Saxon*** *(c.450-1066)*

The earliest mention of Woburn is in the Saxon charter for 'Aspley', which dates to 969, where it is referred to as 'Woburninga Genaere' (EUS 2003), but there is no direct evidence that a settlement existed at this time.

3.5 ***Medieval*** *(1066-1500)*

Woburn is mentioned in the Domesday Survey of 1086, which records that prior to the conquest it was held by Alric, a thegn of King Edward, suggesting a settlement had been established by the end of the Saxon period Williams & Martin 2003).

The present house at Woburn Abbey (HER 4949) is built on the site of a Cistercian abbey founded in 1145 and dissolved in 1538. There is very little documentary evidence relating to the Abbey before its dissolution. The exact location of the buildings is not known, though it is believed that the present house is located on the site of the cloister. Small scale investigations and observations have located the remains of a medieval wall under the northwest corner of the present house, which may relate to the west end of the church. Skeletons are reported to have been found to the north of the present house (HER 40).

3.6 ***Post-Medieval*** *(1500-1900)*

The current Woburn Abbey is a 17th century Grade I listed building in the Neo-classical style with rustication. It is home to the Russell family, the Dukes of Bedford, to whom the land was granted in 1547. Originally built in 1630, it was extensively reworked between 1747 and 1790 (HER 4949).

An early estate map dated to 1661 shows a building with a footprint comparable to that of current abbey although the east wing is no longer present. The area of observation is shown as rectangular garden bounded by buildings to the east and south and pathways and other gardens to the west and north (Fig. 3).

The grounds surrounding the house comprise Woburn Park (HER 8762), a landscape park and pleasure grounds which include a number of other listed buildings. The park is Grade I Listed in the English Heritage Register of Historic Parks and Gardens and its development and some of the listed buildings within it are briefly described below.

The pleasure ground and park began to be established during the mid-17th century and by 1661 a series of enclosed gardens had been laid out to the west of the house within a park enclosing various areas of woodland with straight rides cut through. The park was extended and further formalised during the early part of the 18th century through creation of the circular Basin Pond (HER 8762) as part of a grand west approach to the house designed by George London. Charles Bridgeman was consulted in the 1730s and he was responsible for removal of much of the formal 17th century gardens surrounding the house. The fifth Duke employed Henry Holland (1745-1806) who, amongst other works, was responsible for construction of the Chinese Dairy (HER4955: Grade I), the Sculpture Gallery (HER4951: Grade I) and the London Entrance Lodge and Screen Walls (HER 5776: Grade II*). At the same time the informal gardens to the east and south were enclosed and developed.

The sixth Duke employed Humphry Repton (1752-1818) in 1804. Repton produced his Red Book for Woburn in January 1805, with suggestions covering both park and gardens. The *c.*12ha pleasure grounds were remodelled by Repton to largely comprise informal mature woodland and lawns enclosing extant features such as the Chinese Dairy and the circular hedged maze with its central Chinese Pavilion (HER 4954: Grade II*). Repton's work included naturalisation of Basin Pond and its inclusion as part of a chain of informal ponds culminating in Lower Drakeloe Pond, lying 1.5km north-west of the Abbey. Some of Repton's suggested features were not completed until after his death when the park was again extended. The pleasure grounds are enclosed by a ha-ha to the south and east, and an iron fence and gates to the north. The park is bounded by a high red brick wall along stretches which border roads.

3.7 ***Modern*** *(1900-present)*

The gardens were further developed by Percy Cane c 1930, and in 1955 the house and grounds were opened to the public. The safari park was established at the north of the park during the 1950's (although a collection of exotic animals has been kept since at least the 19th century). Other visitor facilities were constructed in the same period close to the house.

To the SW of Woburn Abbey is the site of a satellite landing ground from World War II. The area had a large L laid out in the landing area and the grass runway was used by single to 4 engine planes (HER 18006).

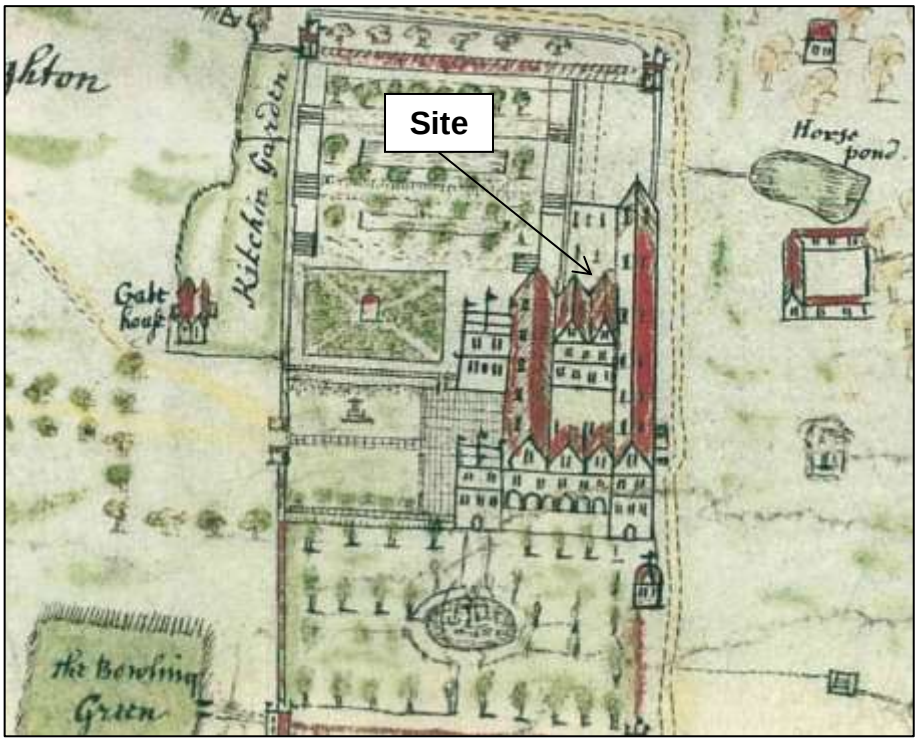


Figure 3: Estate Map 1661 *(not to scale)*

4. Results

4.1 During the mechanical excavation of a pipe trench in the Grotto Garden human remains and part of an N-S orientated brick built post medieval wall were discovered *c.*18m north of the north elevation of Woburn Abbey. A programme of archaeological observation and monitoring was subsequently required by the AA during excavation of the remainder of the pipe trench. A total of 5 day monitoring visits were carried out (Appendix 1). A plan of the discovered archaeology and section drawings are presented in Figures 4-6.

4.2 Observation of 22.5m of the pipe trench (Plate 1) showed recent service trenches and extensive deposits of made ground overlay the truncated natural deposit (Plate 2-3). The observed stratigraphy is summarised as:

- 0-0.25m: Topsoil (001).
- 0.25-1.3m: Two intercutting and deliberately backfilled vertical sided trenches, perhaps for relatively recent services, which cut through extensive deposits of made ground before truncating the natural.
- 0.25-1.3m: Made ground, comprising mottled orange/grey clay with tile inclusions (021) at the northern end of the trench and orange sand (020) deposited over a brick built culvert (009) at the southern end of trench. Made ground deposit (021) had truncated an earlier and shallower made ground deposit of clunch (019), beneath which lay a higher island of natural. Part of a medieval floor tile was recovered from the clunch (Plate 4).
- Four inhumation burials and one drain or garden feature cutting the natural deposit. All of the cuts were very shallow and had probably been truncated by construction and landscaping carried out prior to deposition of the made ground.
- Natural orange/yellow/brown clay (002)

The evidence is described below in proposed chronological order:

4.3 ***Medieval***

Three articulated partial human skeletons (SK004, SK014 and SK017) were present at the observed part of the base of the trench. All were interred in an extended, supine position oriented E-W (head). A fourth near complete skeleton (SK024) was disturbed during excavation of the pipe trench and lifted prior to the commission of ASC. A recent vertical sided cut had truncated the western side of all of the *in situ* burials and an assemblage of disarticulated human remains, including near complete skull SK006, was discovered at the base of its backfill close to SK004.

The sex of two of the *in situ* burials (SK004, SK017) could not be determined, but two (SK014, SK024) were mature adult males. No dating was recovered during excavation of the burials but they are probably associated with the cemetery of the Cistercian abbey, which was founded in AD1145 and dissolved in 1538. The disarticulated human bone consisted of the remains of at least four individuals and comprised the near complete skull of a young adult male (SK006), the fragmented skull of a young

adult possible female, the right ulna of an infant and fragments of a left and right femur and possible left tibia of a child.

A brief summary of the articulated remains is:

- *SK024:* a mature adult male found at the northern end of the trench at a depth of *c*.1.2m below ground level (BGL). This individual was disturbed by the groundwork and lifted prior to the commission of ASC.

- *SK004:* the lower legs and feet of an adult of unknown sex. A clear grave cut [003] was excavated *c*.0.2m into the natural stratum and the remains were *c*.1.28m BGL (Plate 5).

- *SK014:* the pelvis, legs and feet of a mature adult male. A clear grave cut was not visible and the remains ranged between *c*.0.37-0.7m BGL. A large, c.0.52m long and c.0.35m wide, irregular stone was found directly beneath the individual. It was unclear whether the stone was deliberately placed during the burial (Plates 6 and 7).

- *SK017:* the lower legs and a few bones from the feet of an adult of unknown sex. The remains were *c*.0.57m BGL and a grave cut [016] was visible at the north (Plate 8).

Detailed osteological analysis of the articulated and disarticulated human remains is presented in Appendix 4.

Immediately south of SK014 was an E-W aligned linear feature [010] with a shallow c.0.3m wide and c.0.18m deep vertical sided cut. Resting upon the mid-brown soft clay (012) fill of the cut were three large butted and unbonded limestone clasts (011) (Plate 6). The relationship of the linear feature with SK014 could not be determined as both were heavily truncated. One stone had chisel markings on its underside suggesting that it had been roughly faced and was possibly reused (Plate 9). The width of the cut would not appear to be sufficient to support the superstructure of a wall and its function remains uncertain although its depth and proximity to SK014, suggests that it may pre-date or be contemporary with the burial.

4.4 ***Post-Medieval***

The pipe trench revealed that landscaping had removed the natural soil profile at the Grotto Garden, and that the natural deposit had been significantly truncated before the ground level had been raised with a deposit of clay (021). The majority of the landscaping probably occurred during and shortly after construction of the extant house during the 18th century, but later service trenches had been inserted through the made ground and added to the relatively complex post medieval stratigraphy.

The results of investigation of some of the more significant features are presented below.

Service Trench [007]: was oriented N-S and ran along the majority of the western side of the trench. It contained a single c.1.35m deep fill (008) comprising a mid-brown

soft clay with occasional small sub-angular stones and moderate fragments of hard fired red tile, which lay directly below the topsoil. The feature cut through all of the *in situ* human remains (SK004, SK014, SK017 and SK024), linear feature [010] and another service trench [022]. A slot was excavated through the base of the fill of this feature adjacent to SK004 and disarticulated human remains including skull SK006, tile fragments, Fe nail, burnt material and one small fragment of heavily abraded un-diagnostic pottery were recovered (Plate 10).

Service Trench [022]: was orientated E-W with vertical sides. It contained a single fill (023), >0.9m deep, comprising mid orange loose sand with frequent medium to large ironstones and one sherd of white ceramic pottery (18^{th}/19^{th} century). The fill lay directly below the topsoil and was cut by possible service trench [007] (Plate 11).

Culvert [009]: was situated at the southern end of the trench, orientated SW-NE, and *c*.0.2m BGL. It measured *c*.1.2m wide, was exposed to a depth of *c*.0.56m, was constructed in red brick (95mm wide and 65mm deep) bonded with light grey lime mortar and was covered by a deposit of sand (020). Toward the base of the culvert was a ceramic service pipe thought to be a later addition (Plate 12).

Cellar Wall: of Woburn Abbey was exposed at the southern end of the trench and drilled through to allow pipework to enter into the Abbey. The cellar was constructed of red brick, 220 × 90 × 60mm (L×W×D), and was bonded with a whitish lime mortar (Plate 13).

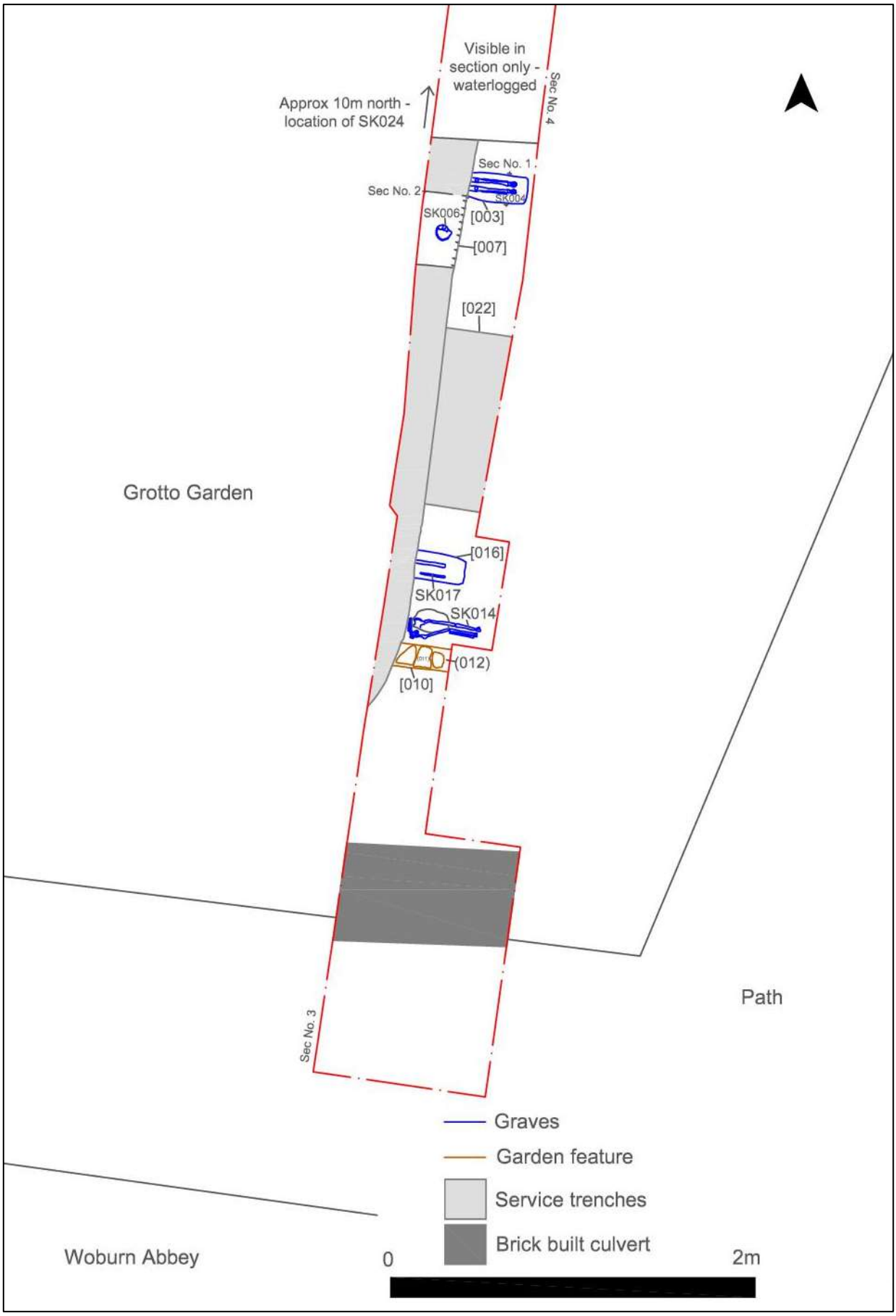


Figure 4: Archaeology plan *(scale 1:75)*

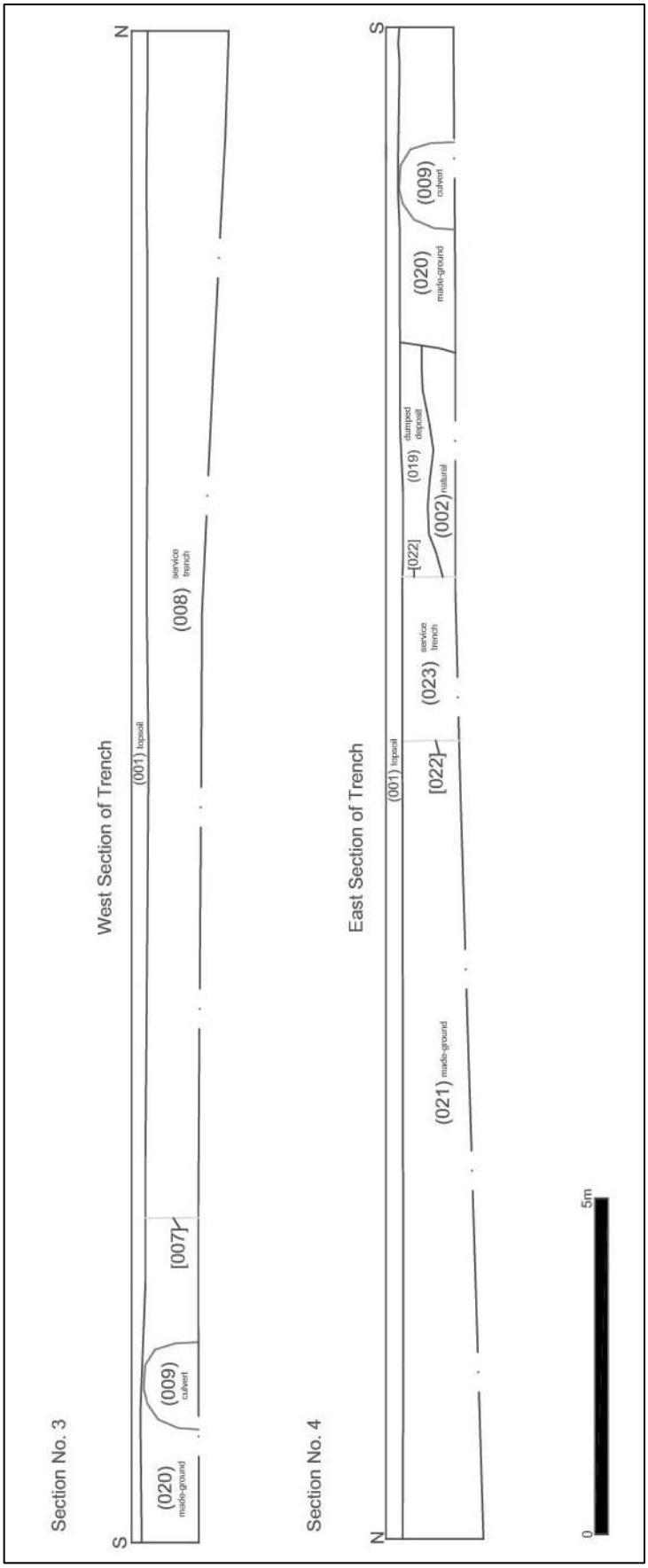


Figure 5: The east and west faces of pipe trench *(scale 1:100)*

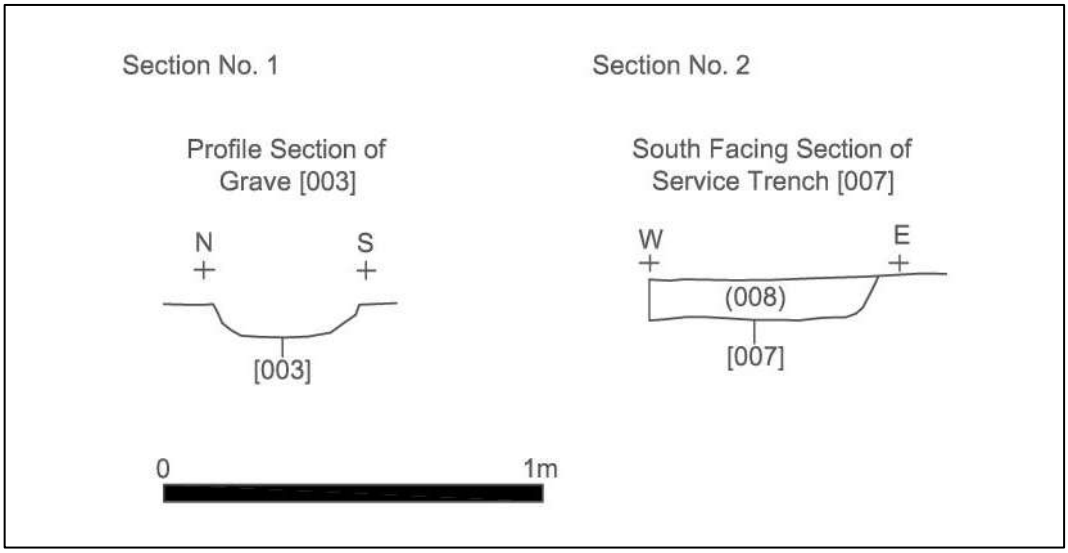


Figure 6: Section drawings *(scale 1:20)*

Plate 1: General shot of trench, looking N

Plate 2: East face of trench, looking SE *(scale 1m)*

Plate 3: West face of trench, looking SE

Plate 4: Yellow and green glazed medieval tile found within deposit (019) *(scale 100mm)*

Plate 5: Legs of SK004 and disarticulated skull SK006, looking E *(scale 1m)*

Plate 6: SK014 and garden feature [010], looking S *(scale 500mm)*

Plate 7: Large stone underlying SK014, looking N *(scale 500mm)*

Plate 8: Legs of SK017, looking W *(scale 500mm)*

Plate 9: Limestone with tool marks from garden feature [010] *(scale 100mm)*

Plate 10: South facing section of base of service trench? [007], looking N *(scale 500mm)*

Plate 11: West facing section of service trench? [022], looking E (scale 1m)

Plate 12: Walls of culvert, looking N *(scale 1m)*

Plate 13: Cellar wall prior to drilling, looking S *(scale 800mm)*

5. Conclusions

5.1 The discovered human remains are most likely associated with the medieval abbey which was established in 1145 and dissolved in 1538. The HER records previous investigations at Woburn Abbey having uncovered human remains within the Grotto Garden (HER40) and it is now clear that this area formed part of the abbey cemetery.

5.2 The disarticulated remains included parts of a possible female skull, infant and child bones suggesting that this part of the abbey cemetery was not used exclusively for monastic burials or alternatively that the cemetery saw more general use for a short time after the dissolution.

5.3 The majority of the investigated features were not securely dated by finds and many finds were residual, e.g. part of a medieval yellow and green glazed floor tile recovered from dumped clunch deposit (019), or were relatively recent

5.4 The area of the Grotto Garden has undergone significant episodes of landscaping which have removed the natural soil profile, truncated the natural stratum and archaeological features pre-dating the post medieval period. The presence of numerous relatively recent services has also adversely impacted the survival of the earliest archaeological features.

5.5 ***Confidence Rating***
The works were carried out in line with the method statement, with full co-operation of the client and in good site conditions. The results are therefore given a high confidence rating.

6. Acknowledgements

The project was commissioned by *The Bedford Estates*. The writer is grateful to Jackie Carr and Rob Brewer of the Estate for their assistance. The project was monitored by *Central Bedfordshire Council Archaeologists* on behalf of the local planning authority. Thanks are also due to site contractors and Woburn Abbey conservator Chris Gravett.

The project was managed for ASC by Alastair Hancock BSc PGDip MI*f*A. Fieldwork was carried out by Carina Summerfield-Hill BA MSc AI*f*A. The report was prepared by Carina Summerfield-Hill and edited by Alastair Hancock.

7. Archive

7.1 The project archive will comprise:

1. Method Statement
2. Initial Report
3. Clients site plans
4. Site Monitoring Sheets
5. Finds records
6. Finds
7. Site record drawings
8. List of photographs
9. B/W prints & negatives
10. Original specialist reports and supporting information
11. CDROM with copies of all digital files.

7.2 The archive will be deposited with The Bedford Estate (Woburn Abbey).

8. References

Standards & Specifications

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Appendix 1: Monitoring Table

Date/Time	Observations
12/02/14 08:00-14:30	Arrive to site and had a meeting with Rob Brewer to discuss plan of action. Sides of trench will need stabilising. Last week workers disturbed human remains at the north end of trench (Hannah – Central Beds Planning Archaeologist) made an initial site visit. Further skull also found by workers left in situ for me to excavate, record and lift. Upon cleaning area found to be disarticulated (SK006) within a post-medieval service trench orientated N-S [007]. A second burial was also found comprising legs and feet only SK004 and also cut by [007].
13/02/14 08:00-14:00	Excavated, recorded and lifted human remains SK004 and disarticulated skull SK006. Excavated a slot through N-S service trench [007] that contained further disarticulated human remains and ceramic building material. Human remains taken back to ASC office for analysis.
03/03/14 08:00-16:30	Monitored the further mechanical excavation of trench, moving northwards from the Abbey. At the southern end of the trench a high concentration of services that included a culvert. Hannah (planning archaeologist) made a site visit bringing with her human remains from her initial site visit. These remains were taken back to ASC office for analysis.
04/03/14 07:30-17:00	Continued observation of mechanical excavation of trench. Uncovered two partially articulated human skeletons SK014 & SK017, possible limestone garden feature [010].
05/03/14 07:30-17:00	Excavated, recorded and lifted SK014 & SK017 and garden feature [010]. Continued to observe mechanical excavation of trench and monitor drilling through cellar wall. No further archaeology revealed and excavation of pipe trench completed. No more site visits required.

Appendix 2: List of Photographs

SITE NAME: Woburn Abbey, Woburn, Bedfordshire			**SITE NO/CODE: 1661/WAH**
Shot	B&W	Digital	Subject
1		√	Planning archaeologists initial visit – trench excavation
2		√	Planning archaeologists initial visit – trench, looking N
3		√	Planning archaeologists initial visit – trench stratigraphy, looking NE
4		√	Planning archaeologists initial visit – trench, looking N
5		√	Planning archaeologists initial visit – trench, looking NW
6		√	Planning archaeologists initial visit – trench stratigraphy and post-med wall, looking NW
7		√	Planning archaeologists initial visit – trench excavation
8		√	Planning archaeologist initial visit – trench excavation
9	√	√	General shot of trench with SK006, SK004, and service trench [007], looking N (scale 1m) 13/02/14
10	√	√	SK006, SK004, and service trench [007], looking E (scale 1m) 13/02/14
11	√	√	SK006, SK004, and service trench [007], looking W (scale 1m) 13/02/14
12		√	Detail of SK006, and further disarticulated bone, looking W (scale 500mm) 13/02/14
13		√	Detail of SK004 and service trench [007], looking N (scale 1m) 13/02/14
14		√	Grave cut [003] associated with SK004, looking N (scale 500mm) 13/02/14
15	√	√	Excavated slot of service trench [007], looking W (scale 500mm) 13/02/14
16		√	South facing section of service trench [007], looking N (scale 500mm) 13/02/14
17		√	South facing section of service trench [007], looking N (scale 500mm) 13/02/14
18	√	√	Culvert [009], looking N (scale 1m) 03/03/14
19		√	Culvert [009], looking N (scale 1m) 03/03/14
20		√	Culvert [009], looking NW (scale 1m) 03/03/14
21		√	Culvert [009], looking SE (scale 1m) 03/03/14
22		√	Culvert [009], looking N (scale 1m) 03/03/14
23		√	General working shot 03/03/14
24		√	General working shot 03/03/14
25	√	√	Garden feature [010] & SK014, looking N (scale 500mm) 05/03/14
26		√	Garden feature [010], looking N (scale 500mm) 05/03/14
27	√	√	Garden feature [010] & SK014, looking S (scale 500mm) 05/03/14
28		√	Garden feature [010] & SK014, looking S (scale 500mm) 05/03/14
29		√	Garden feature [010] & SK014, looking S (scale 500mm) 05/03/14
30	√	√	Garden feature [010] & SK014, looking W (scale 500mm) 05/03/14
31		√	General working shot 05/03/14
32		√	Cellar wall prior to drilling, looking S (scale 1m) 05/03/14
33		√	Cellar wall prior to drilling, looking S (scale 1m) 05/03/14
34		√	Cellar wall prior to drilling, looking S 05/03/14
35		√	SK017, looking W (scale 500mm) 05/03/14
36		√	Garden feature [010] & large stone, looking N (scale 500mm) 05/03/14
37		√	Garden feature[010] & large stone, looking S (scale 500mm) 05/03/14
38		√	Limestone pieces (011) (scale 500mm) 05/03/14
39	√	√	General shot of trench, looking N 05/03/14
40		√	General shot of trench, looking S 05/03/14
41		√	Service trench [022] in trench section, looking E (scale 1m) 05/03/14
42		√	Trench stratigraphy, looking NE 05/03/14
43		√	Trench stratigraphy, looking SE (scale 1m) 05/03/14
44		√	Trench stratigraphy, looking SE (scale 1m) 05/03/14

45		√	Chalk deposit (019), looking E (scale 1m) 05/03/14
46		√	Trench stratigraphy, looking SE (scale 1m) 05/03/14
47		√	Trench stratigraphy, looking SW 05/03/14
48		√	Trench stratigraphy, looking SW 05/03/14
49		√	Trench stratigraphy, looking SW 05/03/14
50		√	Trench stratigraphy, looking W (scale 1m) 05/03/14
51		√	Trench stratigraphy, looking SW (scale 1m) 05/03/14
52		√	Large stone underlying SK014 (scale 500mm) 05/03/14
53		√	Large stone underlying SK014 (scale 500mm) 05/03/14
54		√	SK006: pathology – periostitis on palatine (scale 100mm) 12/03/14
55		√	SK006: pathology – periostitis on palatine (scale 100mm) 12/03/14
56		√	SK006: pathology – abscess on maxilla (scale 100mm) 12/03/14
57		√	SK006: pathology – abscess on maxilla (scale 100mm) 12/03/14
58		√	SK006: pathology – abscess on maxilla (scale 100mm) 12/03/14
59		√	SK006: pathology – periostitis on palatine (scale 100mm) 12/03/14
60		√	SK006: pathology – periostitis on palatine 12/03/14
61		√	SK024: pathology – osteophytes on left clavicle (scale 100mm) 12/03/14
62		√	SK024: pathology – osteophytes on left clavicle (scale 100mm) 12/03/14
63		√	SK024: pathology – osteophytes on left clavicle (scale 100mm) 12/03/14
64		√	SK024: pathology – schmorl's nodes on thoracic and lumbar vertebra (scale 100mm) 12/03/14
65		√	SK024: pathology – schmorl's nodes on thoracic and lumbar vertebra (scale 100mm) 12/03/14
66		√	SK024: pathology – schmorl's nodes on thoracic and lumbar vertebra (scale 100mm) 12/03/14
67		√	SK024: pathology – AMTL left lower 1st molar (scale 100mm) 12/03/14
68		√	SK024: pathology – AMTL left lower 1st molar (scale 100mm) 12/03/14
69		√	SK024: pathology – AMTL left lower 1st molar (scale 100mm) 12/03/14
70		√	SK014: pathology – non-specific bone infection periostitis on metacarpals (scale 100mm) 12/03/14
71		√	SK014: pathology – non-specific bone infection periostitis on metacarpals (scale 100mm) 12/03/14
72		√	SK014: pathology – non-specific bone infection periostitis on metacarpals (scale 100mm) 12/03/14
73		√	SK014: pathology – non-specific bone infection periostitis on metacarpals (scale 100mm) 12/03/14
74		√	SK014: pathology – non-specific bone infection periostitis on metacarpals (scale 100mm) 12/03/14
75		√	SK014: pathology – non-specific bone infection periostitis on metacarpals (scale 100mm) 12/03/14
76		√	SK014: pathology – non-specific bone infection periostitis on metacarpals (scale 100mm) 12/03/14
77		√	SK014: pathology – non-specific bone infection periostitis on metacarpals (scale 100mm) 12/03/14
78		√	Worked limestone (011) (scale 100mm) 12/03/14
79		√	Worked limestone (011) (scale 100mm) 12/03/14
80		√	Worked limestone (011) (scale 100mm) 12/03/14
81		√	Worked limestone (011) (scale 100mm) 12/03/14
82		√	Worked limestone (011) (scale 100mm) 12/03/14
83		√	Worked limestone (011) (scale 100mm) 12/03/14
84		√	Yellow and green glazed medieval tile found in deposit (019) (scale 100mm) 12/03/14
85		√	Yellow and green glazed medieval tile found in deposit (019) (scale 100mm) 12/03/14
86		√	Yellow and green glazed medieval tile found in deposit (019) (scale 100mm) 12/03/14
87		√	Yellow and green glazed medieval tile found in deposit (019) (scale 100mm) 12/03/14

Appendix 3: Finds Concordance

Context	Pottery		Animal Bone	CBM		Other Finds	
	(no)	(g)	(no)	(no)	(g)	Type	(no)
001	2	73					
008	1	1				CBM Fe nail Hearth material charcoal	>15 1 10
011						Limestone (worked)	1
019						Tile – yellow & green glaze	2
023	1	13					

CBM and hearth material/charcoal was not retained. The human remains will be reburied at Woburn Abbey and the remainder of the finds included with the archive, which will be held at Woburn Abbey.

Appendix 4: Human Osteology

Introduction

One near complete articulated skeleton (SK024), which had been disturbed and lifted during the groundwork, three *in situ* articulated partial skeletons (SK004, SK014, SK017) and disarticulated human remains, including near complete skull SK006, were recovered from the Grotto Garden at Woburn Abbey, Woburn, Bedfordshire. The three *in situ* inhumations were truncated at the west by N-S aligned a late post-medieval or recent service trench [007] and the disarticulated human remains were recovered from its fill (008).

The four articulated burials comprised two adults of unknown sex (SK004, SK017) and two mature adult males (SK014, SK024). The disarticulated skull was a young adult male (SK006), other disarticulated human bone comprised the fragmented skull of a young, possible adult female, the right ulna of an infant and fragments of a left and right femur and possible left tibia of a child. In total the disarticulated human remains comprised 4 MNI (minimum number of individuals).

Complete skeletal details are present below in the Skeletal Catalogue and Disarticulated Remains Catalogue below.

The *in situ* burials appear to have been interred in an extended, supine position and were aligned E-W with the head to the west. SK004 and SK017 lay within shallow grave cuts, but no grave cut was visible for SK017. The depth of the burials below ground level ranged between 0.37m at the south to 1.28m at the north. Coffin and shroud evidence was absent although a single heavily corroded iron nail was found in close association with the disarticulated remains.

Methods

The skeletal remains were analysed and recorded following the recommendations set out by Brickley & McKinley (2004).

Completeness of the burials:

- 0-25% (less than a quarter of the skeleton present)
- 25-50% (quarter to half of the skeleton present)
- 50-75% (half to three quarters of the skeleton present)
- 75-100% (three quarters to the entire skeleton present)

Bone surface preservation:

Poor: (bone surface damage, cracked, flaking, very fragmented, distal and/or proximal ends of long bones damaged or missing, unable to record bone changes related to age, pathology or trauma)
Fair: (moderate condition, distal and/or proximal ends of bone bones damaged or missing)
Good: (bone surface in good condition, able to record most osteological data)

Sex:

Assessment of the sex of the individuals was based, where possible, on the morphological characteristics of the skull and pelvic regions (Schwartz 1995, 280-281; Buikstra & Ubelaker

1994). Individuals with indicative dimorphic traits, but who could not be confidently sexed due to a lack of preservation is qualified by 'possibly'.

Age:

The assessment of the age of the individuals was based primarily on epiphyseal fusion of the long bones (Schwartz 1995, 185-222), and where possible the auricular surface (Lovejoy *et al.* 1985), pubic symphysis (Brooks and Suchey 1990), and dental development and attrition (Ubelaker 1978, Brothwell 1981). The age categories are as follows:

- Infant (birth to 3 years)
- Child (4 to 12 years)
- Adolescent (13 to 17 years)
- Young adult (18-25 years)
- Prime adult (26-35 years)
- Mature adult (36-45 years)
- Older adult (46+ years)

*NB***:** the term adult is used when bones are fully fused and preservation does not allow a more precise age range to be assigned.

Stature:

Measurements were taken, where possible, to determine stature, the femur/stature ratio using the following formula: length of femur × 3.74mm was used (Fieldsman *et al*, 1990). Non-metric traits (Berry & Berry 1967; Finnegan 1978) were recorded to show variations in the morphological characteristics of the skeleton. The traits were categorised as: visibly present, visibly absent or not recordable. Muscular pronounced skeletal markings were also noted where preservation allowed, that are linked to the lifestyle of the individual (Roberts & Manchester 2005). Any bone/tooth changes due to palaeopathology were also recorded. Dental pathology was recorded and in particular calculus (plaque) was scored as slight-heavy (Brothwell 1981).

Disarticulated bone:

The disarticulated human remains were examined by context and described under the following headings (Buiskstra and Ubelaker 1994):

- Bone
- Side
- Completeness
- Count
- Age
- Sex
- Pathology

The MNI (minimum number of individuals) was calculated by determining the most frequently represented skeletal element for each age/sex class.

Results

Completeness and bone surface preservation:

The articulated inhumations are lacking in completeness due to being truncated by a service trench [007]. The skeletons range between <10-50% completeness, and poor-good for bone surface preservation (Table 1). One of the skeletons SK014 had a black staining on the

surface of the majority of the bones. This variation in colour is thought to be associated with the burial environment.

Skeleton No.	*Completeness*	*Bone Surface Preservation*
SK004	<25%	Good
SK014	<50%	Fair
SK017	<10%	Poor
SK024	<45%	Good

Table 1: Skeletal completeness and preservation

Age and Sex:

The articulated assemblage comprised two mature adult males and two adults of unknown sex (Table 2).

Skeleton No.	*Age*	*Sex*
SK004	Adult	Unknown
SK014	Mature Adult	Male
SK017	Adult	Unknown
SK024	Mature Adult	Male

Table 2: Skeletal age and sex

Stature:

The stature of an individual is linked to genetics and nutrition. By measuring the femur it was possible to determine a stature for one of the individuals (SK014). SK014 a mature adult male had a height of 163cm, based from the left femur only due to a lack of preservation (Table 3; see Skeletal Catalogue for metric data). The remainder of the individuals were lacking in completeness and preservation and therefore could not be measured.

Skeleton No.	*Height in cm*	*Height in feet/inches*
SK004	-	-
SK014	163cm	5 foot 4 11/64
SK017	-	-
SK024	-	-

Table 3: Stature

Non-Metric Traits:

Non-metric traits are variations in the morphological characteristic of the skeleton. The significance of such traits in contemporary studies is based on the knowledge that such variants show familial inheritance in humans. Analysis showed that a cranial non-metric trait metopic suture and left double anterior condylar canal was present on SK006, and post cranial non-metric trait left and right double anterior calcaneal facet was present on SK014 (see Skeletal Catalogue for details).

Muscular Skeletal Markings:

Muscular skeletal markings are analysed to understand what sort of lifestyle and vocation the individual may have had. SK024 showed pronounced muscular skeletal markers along the linea aspira of the right femur. This suggests pronounced physical activity leading to increased musculature and associated development of the bones at the muscle attachment area.

Pathology:

The identification of any abnormalities present on the bones and teeth of the individuals was assessed in order to assess their health. Two of the individuals showed signs of pathology, as follows:

SK014: Mature adult male. Concentrations of a plaque-like striated new bone formation with areas of porous and woven bone on the original cortical surface was present on the left and right 1st metacarpal bones and the 2nd left metacarpal bone. This condition is a non-specific inflammation of the bone known as periostitis usually associated with infection or trauma (Roberts & Manchester 2005, 172; Plate 16 &17). A number of bones also felt rather light and brittle with a reduced level of trabeculae (inner) bone perhaps linked to osteoporosis; a clinical syndrome entailing the reduction of bone mass commonly linked with age (Roberts & Manchester 2005, 242).

SK024: Mature adult male. Slight bony spurs (osteophytes) were present at the medial end, of the left clavicle on the inferior side surrounding a muscle attachment area; this is likely associated with mechanical stress and a physical lifestyle (Plate 18). Schmorl's nodes, small depressions that occur as a result of herniation from intervertebral discs, were visible on the superior and inferior body face on a number of thoracic and lumbar vertebras. This pathology is linked to the stresses placed by physical activity on the spine and with advancing age (Roberts & Manchester 2005, 140-141; Plate 19). Ante-mortem tooth loss (AMTL), which is the loss of a tooth during life, was also found on the lower left 1st molar with advanced bone healing showing that the loss had occurred a considerable time before death (Plate 20). The dentition also displayed slight traces of calculus (mineralised plaque). These dental conditions are very common and are linked to the age, diet and oral hygiene of the individual.

Disarticulated Skeletal Remains:

The disarticulated skeletal remains consisted of skull SK006. Other disarticulated bone was present and comprised a minimum number of individuals (MNI) of 4.

SK006 was a young adult male <15% complete with fair-good bone condition. A darker brown colouration was observed on the inside of the skull likely associated with the burial environment. SK006 displayed a number of dental pathologies on the maxilla; AMTL to the upper left PM^2, M^{1-3}, and upper right PM^{1-2} and M^{1-3}, and a circular abscess was also found above the left PM^1 (Plate 21). On the surface of the palatine an area measuring 20.19mm × 15.52mm of lighter bone colouration and new bone growth was observed which may have resulted from non-specific bone infection, periostitis (Plate 22).

Age related sutures on the majority of the other disarticulated remains were fully fused indicating adult individuals, but more definitive age and sex could not be assigned.

The assemblage did include an incomplete skull of an adult possible female, the right ulna of infant, pelvis fragments of a mature possible male adult, and a left and right femur and possible left tibia of a child. A number of these bones displayed pathology; slight osteophytes around the radial tuberosity of an adult right radius and slight osteophytes around the inferior joint margin of a vertebra. This growth indicates the beginnings of a proliferative deposit of new bone in order for the joint to cope with stress by spreading the load (Roberts & Manchester 2005, 135). The extra bone growth indicates the degenerative joint disease, osteoarthritis, and can be associated with physical activity and advancing age. Full details are presented in the Disarticulated Skeletal Catalogue below.

Conclusions

The remains were typically Christian laid out in an extended, supine position orientated E-W and are thought to be part of a larger cemetery associated with the medieval Abbey which once stood on the site. The presence of a possible adult female, infant and child suggests that this part of the cemetery was not reserved for monastic use, or possibly that people continued to be interred here after the abbey was dissolved.

Little can be inferred regarding population demography, health and statistical analysis from such a small assemblage. The assemblage included individuals living to a mature age, an example of average height with sufficient diet during bone growth, and evidence of an active lifestyle with an example of pronounced muscular markings and pathology linked to physical exertion which is to be expected from a self-sufficient living community.

Recommendations

Taking C14 samples to determine the date of death of the individuals and whether they are associated with the medieval Abbey.

Plate 14: SK014, non- specific bone infection periostitis present on metacarpals *(scale 100mm)*

Plate 15: SK014, detail of non-specific bone infection periostitis *(scale 100mm)*

Plate 16: SK024, osteophytes present on at the medial end of the left clavicle on the inferior side surrounding a muscle attachment *(scale 800mm)*

Plate 17: SK024, schmorl's nodes present on the superior and inferior body face of thoracic and lumbar vertebra *(scale 100mm)*

Plate 18: SK024, AMTL to the lower left 1st molar *(scale 100mm)*

Plate 19: SK006, maxilla, circular abscess present above the LPM[1] *(scale 100mm)*

Plate 20: SK006, palatine non-specific bone infection, periostitis *(scale 100mm)*

Skeletal Catalogue

Dental abbreviations

√ Present
X Ante-mortem tooth loss
/ Post-mortem tooth loss
H Hypoplasias
CA Carie
CL Calculus
P Periodontal disease
NP Not present (lack of preservation)
L Loose tooth out of socket

SK004
Age: adult
Sex: unknown
Preservation: <25%, good
Grave Orientation: E-W
Pathology: non observed
Stature: lack of bone preservation stature undetermined
Non-Metric Traits:

Cranial: (Berry & Berry 1967)

Non-Metric Trait	Left	Right
Highest nuchal line	Not Recordable	Not Recordable
Ossicle at lambda	Not Recordable	Not Recordable
Ossicle(s) in lambdoid suture	Not Recordable	Not Recordable
Parietal foramen	Not Recordable	Not Recordable
Ossicle at bregma	Not Recordable	Not Recordable
Metopic suture	Not Recordable	Not Recordable
Ossicle(s) in coronal suture	Not Recordable	Not Recordable
Ossicle at pterion	Not Recordable	Not Recordable
Fronto-temporal articulation	Not Recordable	Not Recordable
Ossicle at parietal notch	Not Recordable	Not Recordable
Ossicle at asterion	Not Recordable	Not Recordable
Auditory torus	Not Recordable	Not Recordable
Foramen of Huschke	Not Recordable	Not Recordable
Mastoid foramen extrasutural	Not Recordable	Not Recordable
Posterior condylar canal open	Not Recordable	Not Recordable
Double condylar facet	Not Recordable	Not Recordable
Precondylar tubercle	Not Recordable	Not Recordable
Double anterior condylar canal	Not Recordable	Not Recordable
Incomplete foramen ovale	Not Recordable	Not Recordable
Open foramen spinosum	Not Recordable	Not Recordable
Accessory lesser palatine foramen	Not Recordable	Not Recordable
Palatine torus	Not Recordable	Not Recordable
Maxillary torus	Not Recordable	Not Recordable
Absent zygomaticofacial foramen	Not Recordable	Not Recordable

Bridging of supraorbital foramen	Not Recordable	Not Recordable
Accessory supraorbital foramen	Not Recordable	Not Recordable
Anterior ethmoid foramen extrasutural	Not Recordable	Not Recordable
Posterior ethmoid foramen absent	Not Recordable	Not Recordable
Accessory infraorbital foramen	Not Recordable	Not Recordable

Post-Cranial: (Finnegan 1978)

Non-Metric Trait	Left	Right
Allen's fossa	Not Recordable	Not Recordable
Poirier's facet	Not Recordable	Not Recordable
Plaque	Not Recordable	Not Recordable
Hypotrochanteric fossa	Not Recordable	Not Recordable
Exostosis in trochanteric fossa	Not Recordable	Not Recordable
Third trochanter	Not Recordable	Not Recordable
Medial tibial squatting facet	Not Recordable	Not Recordable
Lateral tibial squatting facet	Not Recordable	Not Recordable
Supracondyloid process	Not Recordable	Not Recordable
Septal aperture	Not Recordable	Not Recordable
Acetabular crease	Not Recordable	Not Recordable
Sternal foramen	Not Recordable	Not Recordable
Accessory sacral facet(s)	Not Recordable	Not Recordable
Acromial articular facet	Not Recordable	Not Recordable
Bridging of suprascapular notch	Not Recordable	Not Recordable
Circumflex sulcus	Not Recordable	Not Recordable
Vastus notch	Not Recordable	Not Recordable
Vastus fossa	Not Recordable	Not Recordable
Emarginate patella	Not Recordable	Not Recordable
Os trigonum	Absent	Absent
Medial talar facet	Absent	Absent
Lateral talar extension	Absent	Absent
Double inferior anterior talar facet	Absent	Absent
Double anterior calcaneal facet	Not Recordable	Not Recordable
Absent anterior calcaneal facet	Not Recordable	Not Recordable
Peroneal tubercle	Not Recordable	Not Recordable
Double atlas facet	Not Recordable	Not Recordable
Posterior atlas bridging	Not Recordable	Not Recordable
Lateral atlas bridging	Not Recordable	Not Recordable
Transverse foramen bipartite	Not Recordable	Not Recordable

Metric Data: (Buikstra and Ubelaker, 1994)

Bone	Measurement Left Side (mm)	Measurement Right Side (mm)
Tibia: max dia at foremen	27.89	26.30
Tibia: transverse dia at formen	35.4	35.06
Fibula: max midshaft dia	17.25	19.51
Calcaneus: maximum length	84	-

SK014
Age: mature adult
Sex: male
Preservation: <50%, fair
Grave Orientation: E-W
Pathology: Periostitis present on the right and left 1st metacarpals and the 2nd left metacarpal.
Stature metric data:

Femur/Stature Ratio (Fieldesman et al., 1990)

	Left	**Stature (cm)**	**Right**	**Stature (cm)**
Femur/Stature Ratio (Femur x 3.74)	**435mm x 3.74**	**163cm**	**-**	**-**

Non-Metric Traits:

Cranial: (Berry & Berry 1967)

Non-Metric Trait	**Left**	**Right**
Highest nuchal line	Not Recordable	Not Recordable
Ossicle at lambda	Not Recordable	Not Recordable
Ossicle(s) in lambdoid suture	Not Recordable	Not Recordable
Parietal foramen	Not Recordable	Not Recordable
Ossicle at bregma	Not Recordable	Not Recordable
Metopic suture	Not Recordable	Not Recordable
Ossicle(s) in coronal suture	Not Recordable	Not Recordable
Ossicle at pterion	Not Recordable	Not Recordable
Fronto-temporal articulation	Not Recordable	Not Recordable
Ossicle at parietal notch	Not Recordable	Not Recordable
Ossicle at asterion	Not Recordable	Not Recordable
Auditory torus	Not Recordable	Not Recordable
Foramen of Huschke	Not Recordable	Not Recordable
Mastoid foramen extrasutural	Not Recordable	Not Recordable
Posterior condylar canal open	Not Recordable	Not Recordable
Double condylar facet	Not Recordable	Not Recordable
Precondylar tubercle	Not Recordable	Not Recordable
Double anterior condylar canal	Not Recordable	Not Recordable
Incomplete foramen ovale	Not Recordable	Not Recordable
Open foramen spinosum	Not Recordable	Not Recordable
Accessory lesser palatine foramen	Not Recordable	Not Recordable
Palatine torus	Not Recordable	Not Recordable
Maxillary torus	Not Recordable	Not Recordable
Absent zygomaticofacial foramen	Not Recordable	Not Recordable
Bridging of supraorbital foramen	Not Recordable	Not Recordable
Accessory supraorbital foramen	Not Recordable	Not Recordable
Anterior ethmoid foramen extrasutural	Not Recordable	Not Recordable
Posterior ethmoid foramen absent	Not Recordable	Not Recordable
Accessory infraorbital foramen	Not Recordable	Not Recordable

Post-Cranial: (Finnegan 1978)

Non-Metric Trait	Left	Right
Allen's fossa	Absent	Absent
Poirier's facet	Absent	Absent
Plaque	Absent	Absent
Hypotrochanteric fossa	Absent	Absent
Exostosis in trochanteric fossa	Absent	Absent
Third trochanter	Absent	Absent
Medial tibial squatting facet	Absent	Absent
Lateral tibial squatting facet	Absent	Absent
Supracondyloid process	Not Recordable	Not Recordable
Septal aperture	Not Recordable	Not Recordable
Acetabular crease	Absent	Absent
Sternal foramen	Not Recordable	Not Recordable
Accessory sacral facet(s)	Not Recordable	Not Recordable
Acromial articular facet	Not Recordable	Not Recordable
Bridging of suprascapular notch	Not Recordable	Not Recordable
Circumflex sulcus	Not Recordable	Not Recordable
Vastus notch	Not Recordable	Absent
Vastus fossa	Not Recordable	Absent
Emarginate patella	Not Recordable	Absent
Os trigonum	Absent	Absent
Medial talar facet	Absent	Absent
Lateral talar extension	Absent	Absent
Double inferior anterior talar facet	Absent	Absent
Double anterior calcaneal facet	Present	Present
Absent anterior calcaneal facet	Absent	Not Recordable
Peroneal tubercle	Absent	Absent
Double atlas facet	Not Recordable	Not Recordable
Posterior atlas bridging	Not Recordable	Not Recordable
Lateral atlas bridging	Not Recordable	Not Recordable
Transverse foramen bipartite	Not Recordable	Not Recordable

Metric Data: (Buikstra and Ubelaker, 1994)

Bone	Measurement Left Side (mm)	Measurement Right Side (mm)
Ula: maximum length	255	-
Ula: A-P diameter	13.18	-
Ula: M-L diameter	14.65	-
Femur: maximum length	435	-
Femur: epicondylar breadth	81.44	-
Femur: max dia of head	47.48	49.40
Femur: A-P midshaft dia	26.96	26.4
Femur: M-L midshaft dia	27.25	27.8
Tibia: length	348	-
Tibia: max prox epi breadth	69.11	-
Tibia: max dia at foremen	34.43	-
Tibia: min dia at foreman	22.66	-

Fibula: max midshaft dia	-	11.03
Calcaneus: maximum length	72.8	-
Calcaneus: middle breadth	-	41.85

SK017
Age: adult
Sex: unknown
Preservation: <10%, poor
Grave Orientation: E-W
Pathology: non observed
Stature: lack of bone preservation stature undetermined
Non-Metric Traits:

Cranial: (Berry & Berry 1967)

Non-Metric Trait	Left	Right
Highest nuchal line	Not Recordable	Not Recordable
Ossicle at lambda	Not Recordable	Not Recordable
Ossicle(s) in lambdoid suture	Not Recordable	Not Recordable
Parietal foramen	Not Recordable	Not Recordable
Ossicle at bregma	Not Recordable	Not Recordable
Metopic suture	Not Recordable	Not Recordable
Ossicle(s) in coronal suture	Not Recordable	Not Recordable
Ossicle at pterion	Not Recordable	Not Recordable
Fronto-temporal articulation	Not Recordable	Not Recordable
Ossicle at parietal notch	Not Recordable	Not Recordable
Ossicle at asterion	Not Recordable	Not Recordable
Auditory torus	Not Recordable	Not Recordable
Foramen of Huschke	Not Recordable	Not Recordable
Mastoid foramen extrasutural	Not Recordable	Not Recordable
Posterior condylar canal open	Not Recordable	Not Recordable
Double condylar facet	Not Recordable	Not Recordable
Precondylar tubercle	Not Recordable	Not Recordable
Double anterior condylar canal	Not Recordable	Not Recordable
Incomplete foramen ovale	Not Recordable	Not Recordable
Open foramen spinosum	Not Recordable	Not Recordable
Accessory lesser palatine foramen	Not Recordable	Not Recordable
Palatine torus	Not Recordable	Not Recordable
Maxillary torus	Not Recordable	Not Recordable
Absent zygomaticofacial foramen	Not Recordable	Not Recordable
Bridging of supraorbital foramen	Not Recordable	Not Recordable
Accessory supraorbital foramen	Not Recordable	Not Recordable
Anterior ethmoid foramen extrasutural	Not Recordable	Not Recordable
Posterior ethmoid foramen absent	Not Recordable	Not Recordable
Accessory infraorbital foramen	Not Recordable	Not Recordable

Post-Cranial: (Finnegan 1978)

Non-Metric Trait	Left	Right
Allen's fossa	Not Recordable	Not Recordable
Poirier's facet	Not Recordable	Not Recordable
Plaque	Not Recordable	Not Recordable
Hypotrochanteric fossa	Not Recordable	Not Recordable
Exostosis in trochanteric fossa	Not Recordable	Not Recordable
Third trochanter	Not Recordable	Not Recordable
Medial tibial squatting facet	Not Recordable	Not Recordable
Lateral tibial squatting facet	Not Recordable	Not Recordable
Supracondyloid process	Not Recordable	Not Recordable
Septal aperture	Not Recordable	Not Recordable
Acetabular crease	Not Recordable	Not Recordable
Sternal foramen	Not Recordable	Not Recordable
Accessory sacral facet(s)	Not Recordable	Not Recordable
Acromial articular facet	Not Recordable	Not Recordable
Bridging of suprascapular notch	Not Recordable	Not Recordable
Circumflex sulcus	Not Recordable	Not Recordable
Vastus notch	Not Recordable	Not Recordable
Vastus fossa	Not Recordable	Not Recordable
Emarginate patella	Not Recordable	Not Recordable
Os trigonum	Not Recordable	Not Recordable
Medial talar facet	Not Recordable	Not Recordable
Lateral talar extension	Not Recordable	Not Recordable
Double inferior anterior talar facet	Not Recordable	Not Recordable
Double anterior calcaneal facet	Not Recordable	Not Recordable
Absent anterior calcaneal facet	Not Recordable	Not Recordable
Peroneal tubercle	Not Recordable	Not Recordable
Double atlas facet	Not Recordable	Not Recordable
Posterior atlas bridging	Not Recordable	Not Recordable
Lateral atlas bridging	Not Recordable	Not Recordable
Transverse foramen bipartite	Not Recordable	Not Recordable

Metric Data: (Buikstra and Ubelaker, 1994)

Bone	Measurement Left Side (mm)	Measurement Right Side (mm)
Fibula: max midshaft dia	-	13.82

SK024
Age: mature adult
Sex: male
Preservation: <45%, good
Grave Orientation: E-W
Pathology: Bony spurs at the proximal end of the left clavicle inferior side result of muscular stress. Schmorl's nodes present on the superior and inferior body face on thoracic and lumbar vertebra a result of disc herniation linked to physical activity. AMTL and slight traces of calculus linked to age, diet and oral hygiene.
Stature: lack of bone preservation stature undetermined
Non-Metric Traits:

Cranial: (Berry & Berry 1967)

Non-Metric Trait	Left	Right
Highest nuchal line	Not Recordable	Not Recordable
Ossicle at lambda	Not Recordable	Not Recordable
Ossicle(s) in lambdoid suture	Not Recordable	Not Recordable
Parietal foramen	Not Recordable	Not Recordable
Ossicle at bregma	Not Recordable	Not Recordable
Metopic suture	Not Recordable	Not Recordable
Ossicle(s) in coronal suture	Not Recordable	Not Recordable
Ossicle at pterion	Not Recordable	Not Recordable
Fronto-temporal articulation	Not Recordable	Not Recordable
Ossicle at parietal notch	Not Recordable	Not Recordable
Ossicle at asterion	Not Recordable	Not Recordable
Auditory torus	Not Recordable	Not Recordable
Foramen of Huschke	Not Recordable	Not Recordable
Mastoid foramen extrasutural	Not Recordable	Not Recordable
Posterior condylar canal open	Not Recordable	Not Recordable
Double condylar facet	Not Recordable	Not Recordable
Precondylar tubercle	Not Recordable	Not Recordable
Double anterior condylar canal	Not Recordable	Not Recordable
Incomplete foramen ovale	Not Recordable	Not Recordable
Open foramen spinosum	Not Recordable	Not Recordable
Accessory lesser palatine foramen	Not Recordable	Not Recordable
Palatine torus	Not Recordable	Not Recordable
Maxillary torus	Not Recordable	Not Recordable
Absent zygomaticofacial foramen	Not Recordable	Not Recordable
Bridging of supraorbital foramen	Not Recordable	Not Recordable
Accessory supraorbital foramen	Not Recordable	Not Recordable
Anterior ethmoid foramen extrasutural	Not Recordable	Not Recordable
Posterior ethmoid foramen absent	Not Recordable	Not Recordable
Accessory infraorbital foramen	Not Recordable	Not Recordable

Post-Cranial: (Finnegan 1978)

Non-Metric Trait	Left	Right
Allen's fossa	Not Recordable	Absent
Poirier's facet	Not Recordable	Absent
Plaque	Not Recordable	Absent
Hypotrochanteric fossa	Not Recordable	Absent
Exostosis in trochanteric fossa	Not Recordable	Absent
Third trochanter	Not Recordable	Absent
Medial tibial squatting facet	Not Recordable	Not Recordable
Lateral tibial squatting facet	Not Recordable	Not Recordable
Supracondyloid process	Absent	Absent
Septal aperture	Absent	Absent
Acetabular crease	Not Recordable	Not Recordable
Sternal foramen	Not Recordable	Not Recordable
Accessory sacral facet(s)	Absent	Absent
Acromial articular facet	Not Recordable	Not Recordable
Bridging of suprascapular notch	Not Recordable	Not Recordable
Circumflex sulcus	Not Recordable	Not Recordable
Vastus notch	Not Recordable	Not Recordable
Vastus fossa	Not Recordable	Not Recordable
Emarginate patella	Not Recordable	Not Recordable
Os trigonum	Not Recordable	Not Recordable
Medial talar facet	Not Recordable	Not Recordable
Lateral talar extension	Not Recordable	Not Recordable
Double inferior anterior talar facet	Not Recordable	Not Recordable
Double anterior calcaneal facet	Not Recordable	Not Recordable
Absent anterior calcaneal facet	Not Recordable	Not Recordable
Peroneal tubercle	Not Recordable	Not Recordable
Double atlas facet	Not Recordable	Not Recordable
Posterior atlas bridging	Not Recordable	Not Recordable
Lateral atlas bridging	Not Recordable	Not Recordable
Transverse foramen bipartite	Not Recordable	Not Recordable

Dentition:

Left Right

Mandible	M_3	M_2	M_1	P_2	P_1	C	I_2	I_1	I_1	I_2	C	P_1	P_2	M_1	M_2	M_3
	-	√ CL	X	√	√	√ CL	√	-	-	√ CL	√ CL	√	√	√ CL	√ CL	√

Metric Data: (Buikstra and Ubelaker, 1994)

Bone	Measurement Left Side (mm)	Measurement Right Side (mm)
Clavicle: sup-inf dia at midshaft	15.33	-
Humerus: maximum length	-	31.02
Humerus: epicondylar breadth	61.75	60.37

Humerus: vertical dia of head	44.31	-
Humerus: max dia at midshaft	23.40	24.08
Radius: maximum length	-	23.80
Radius: A-P dia at midshaft	-	13.01
Radius: M-L dia at midshaft	-	15.3
Femur: max dia of head	50.01	-

Disarticulated Human Remains Catalogue

SK006
Age: young adult
Sex: male
Preservation: <15%, fair-good
Grave Orientation: disarticulated skull only
Pathology: AMTL, abscess and non-specific bone infection on the cortical surface of the palatine.
Stature: disarticulated skull only
Non-Metric Traits:

Cranial: (Berry & Berry 1967)

Non-Metric Trait	Left	Right
Highest nuchal line	Not Recordable	Not Recordable
Ossicle at lambda	Not Recordable	Not Recordable
Ossicle(s) in lambdoid suture	Not Recordable	Not Recordable
Parietal foramen	Not Recordable	Not Recordable
Ossicle at bregma	Not Recordable	Not Recordable
Metopic suture	Present	Present
Ossicle(s) in coronal suture	Not Recordable	Not Recordable
Ossicle at pterion	Not Recordable	Not Recordable
Fronto-temporal articulation	Not Recordable	Not Recordable
Ossicle at parietal notch	Not Recordable	Not Recordable
Ossicle at asterion	Not Recordable	Not Recordable
Auditory torus	Not Recordable	Not Recordable
Foramen of Huschke	Not Recordable	Not Recordable
Mastoid foramen extrasutural	Not Recordable	Not Recordable
Posterior condylar canal open	Absent	Absent
Double condylar facet	Not Recordable	Not Recordable
Precondylar tubercle	Not Recordable	Not Recordable
Double anterior condylar canal	Present	Not Recordable
Incomplete foramen ovale	Not Recordable	Not Recordable
Open foramen spinosum	Not Recordable	Not Recordable
Accessory lesser palatine foramen	Not Recordable	Not Recordable
Palatine torus	Absent	Absent
Maxillary torus	Not Recordable	Not Recordable
Absent zygomaticofacial foramen	Absent	Absent

Bridging of supraorbital foramen	Absent	Absent
Accessory supraorbital foramen	Absent	Absent
Anterior ethmoid foramen extrasutural	Absent	Absent
Posterior ethmoid foramen absent	Not Recordable	Not Recordable
Accessory infraorbital foramen	Not Recordable	Not Recordable

Dentition:

	Left								**Right**							
Maxillary	M^3	M^2	M^1	P^2	P^1	C	I^2	I^1	I^1	I^2	C	P^1	P^2	M^1	M^2	M^3
	X	X	X	X	√ AB	√	√	√	√	√	√	X	X	X	X	X

Further disarticulated remains:

Cxt No.	Bone	Side	Completeness	Ct	Age	Sex	Pathology
(008)	Skull frags	-	<75%	21	A	F?	-
	Humerus	L	<80%	1	A	?	-
	Humerus	R	<90%	1	A	?	-
	Rib	L	<80%	1	A	?	-
	Ulna	R	<70%	1	Infant	?	-
	Humerus	R	<20%	1	A	?	-
	Femur	R	<40%	1	A	?	-
	Femur	L	<40%	1	A	?	-
	Radius	R	<30%	1	A	?	Slight bony lipping around the radial tuberosity
	Radius	?	<40%	1	A	?	-
	Rib	?	<50%	1	A	?	-
	Femur	R	<50%	1	A	?	-
	Tibia	R	<15%	1	A	?	-
	Femur	?	<10%	1	A	?	-
	Pelvis (illium)	L	<50%	1	Mature Adult	M?	-
	Femur	L	<10%	1	A	?	-
	Tibia	L	<20%	1	A	?	-
	Humerus	L	<20%	1	A	?	-
	Tibia	R	<20%	2	A	?	-
	Femur Femur Tibia	L R L?	<20% <20% <20%	1 1 1	Child	?	-
	Rib	R	<15%	1	A	?	-
	Rib	L	<90%	1	A	?	-
	Rib	R	<10%	1	A	?	-
	Vertebra	-	<80%	1	A	?	-
	Vertebra	-	<80%	1	A	?	Slight bony lipping around the inferior joint margin of the body

	Scapula	?	<50%	1	A	?	-
	Pelvis (illium)	?	<5%	1	A	?	-
	Femur	?	<5%	1	A	?	-
	Pelvis	L	<5%	1	A	?	-
	Ulna	R	<20%	1	A	?	-
	Humerus	L	<15%	1	A	?	-
	Mandible	R	<15%	1	A	?	Tooth loss post-mortem M_{1-3}
	Humerus	?	<15%	1	A	?	-
	Ulna	L	<20%	1	A	?	-
	4^{th} Metacarpal	R	100%	1	A	?	-
	4^{th} Metacarpal	R	<80%	1	A	?	-
	Vertebra	-	<80%	1	A	?	-
	C2 Vertebra	-	<80%	1	A	?	-
	Metacarpal	?	<40%	1	A	?	-
	4 Vertebra frags	-	<20%	1	A	?	-
	Skull frags	-	<5%	2	A	?	-
	Rib frags	-	<10%	11	A	?	-
	Loose teeth: Incisors Premolar Molar Canine	?	100%	5	A	?	-
MNI (minimum number of individuals) = 4 + SK006							

Appendix 5: ASC OASIS Form

PROJECT DETAILS			
Project Name:	Woburn Abbey, Woburn, Beds	OASIS reference:	archaeol2-155212
Short Description:	During the months of February-March 2014 archaeological observation and monitoring was carried out at Woburn Abbey, Woburn, Bedfordshire within the Grotto Garden, due to the unexpected discovery of human remains whilst excavating a trench for pipework associated with a ground source heat pump. The trench revealed that the observed area has been extensively landscaped through truncation of the natural deposit and deposition of made-ground, activity probably associated with construction of the present 17th house. The project unearthed four partially articulated human skeleton and disarticulated human remains that are thought to be associated with the medieval Abbey, but little in the way of dating evidence was discovered, aside from a residual yellow and green glazed medieval floor tile.		
Project Type:	Watching Brief		
Previous work: (eg. SMR refs)	ASC: 1624/WAG/2	Site status: (eg. none, SAM, listed)	Listed
Current land use:	Garden	Future work: (yes/no/unknown)	Unknown
Monument type:	Human Burials Limestone garden feature Service trenches Culvert	Monument period:	Medieval? Post-Med? Medieval? Post-Med? Post-Medieval/Modern Post-Medieval/Modern
Significant finds: (artefact type & period)	Yellow and green glazed tile, post-med pottery, fe nail		

PROJECT LOCATION			
County:	Bedfordshire	OS reference: (8 figs min)	SP 9648 3258
Site address: (+ postcode if known)	Woburn Abbey, Woburn, Bedfordshire		
Study area: (sq. m. / ha)	*c.*35 sq. m	Height OD: (metres)	*c.*134m AOD

PROJECT CREATORS			
Organisation:	Archaeological Services & Consultancy Ltd		
Project brief originator:	Central Beds Council	Method Statement originator:	ASC Ltd
Project Manager:	Alastair Hancock BSc PGDip MIfA	Director/Supervisor:	Carina Summerfield-Hill BA MSc AIFA
Sponsor / funding body:	The Bedford Estates		

PROJECT DATE			
Start date:	12/02/14	End date:	05/03/14

PROJECT ARCHIVES		
	Location (Accession no.)	Content (eg. pottery, animal bone, files/sheets)
Physical:	The Bedford Estate (Woburn Abbey)	Medieval tile, post-med pottery, fe nail (human remains reinterred)
Paper:		Method Statement, report, site records, drawings, b&w prints and negatives
Digital:		CD with all digital files

BIBLIOGRAPHY (Journal/monograph, published or forthcoming, or unpublished client report)			
Title:	Observation & Monitoring: Woburn Abbey, Woburn, Bedfordshire		
Serial title & volume:	ASC Ltd Report ref. 1624/WAG/4		
Author(s):	Carina Summerfield-Hill BA MSc AIFA		
Page nos	49	Date:	17th March 2014