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Ancient Monuments Laboratory
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Summary

This building has at its core two trusses and various other timbers from a medieval hall, thought on typological grounds to date from the late-fifteenth or early sixteenth-centuries. Tree-ring studies have shown that the timbers used in this phase came from very young trees with few rings. The series from two trees were combined to form a 79-year long sequence which failed to date. A beam from the cellar, which represents a later phase of construction, gave a ring-width series dated to the period AD 1461 - 1580, but with no sapwood evident, this only gives a date of use sometime after AD 1589.

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TREE-RING ANALYSIS OF TIMBERS FROM ESSEX LODGE, PLAISTOW, LONDON BOROUGH OF NEWHAM.

Introduction

This report details the dendrochronological investigation of the timbers at Essex Lodge, Greengate Street, Plaistow, London Borough of Newham (NGR TQ 406830), the location of which is shown in Figure 1. This report should complement a survey of the house which was being carried out at the same time by Baleen Associates. The work was carried out at the request of Richard Bond (English Heritage) with the cooperation of the present owners of the building, the London Borough of Newham. The building was empty and on the London Region Buildings-at-Risk Register. First impressions of the building suggest a largely eighteenth-century house with nineteenth- and twentieth-century additions, but the roof of the oldest part of the building appears to reveal the remains of a late fifteenth- or early sixteenth-century timber-framed hall. This represents a rare survival in the area and tree-ring analysis was sought to confirm the dating on stylistic evidence.

The timber remains of most interest comprise a two-bay structure, apparently jettied originally, and exhibiting a clasped-purlin roof. A sketch of the truss is shown in Figure 2 and a reconstruction drawing of the original structure in Figure 3. These and the other figures are based on drawings by Baleen Associates (1998). A number of old timbers from this early phase of the building are now thought to remain in place behind later walls, floors, and finishes. Any information the dendrochronology might yield would be useful in restoring the building.

Methodology

The site was visited in February 1998, at which time the building was unoccupied, and in the process of being recorded by Baleen Associates. Cores were taken from a number of first phase timbers (details in Table 1) as well as from two beams in the cellar (Figure 5) which contained more rings than any other timbers available. Although not part of the original brief, Richard Bond (English Heritage) felt that these two timbers might date a phase of construction after that of phase one and therefore at least give an upper limit to the date of the primary phase. The locations of all the timbers sampled are shown in Figures 3 and 5, and a ground floor plan of the extant building is shown in Figure 4.

Core samples were obtained using a 15mm auger attached to an electric drill. The samples were glued to wooden laths, labelled, and stored for subsequent analysis. They were prepared for measuring by sanding using an electric belt-sander with progressively finer grit papers down to 400 grit. Any further preparation necessary, eg where bands of narrow rings occurred, was done manually. The samples had their tree-ring sequences measured to an accuracy of 0.01 mm using a specially constructed system utilizing a binocular microscope with the sample mounted on a travelling stage with a linear transducer linked to an Atari desktop computer. The software used in measuring and subsequent analysis was written by Ian Tyers (pers comm 1992).

Ring sequences were plotted on translucent semi-log graph paper to allow visual comparisons to be made between sequences on a light table. This activity also acts as a measure of quality control in identifying any errors in the measurements. Statistical comparisons were made using Student's *t*-test (Baillie and Pilcher 1973; Munro 1984). Any internal site mean sequences produced are then compared with a number of reference chronologies (multi-site chronologies from a region) and dated individual site masters in an attempt to date them.. The *t*-values quoted below were derived from the original CROS program (Baillie and Pilcher 1973) in

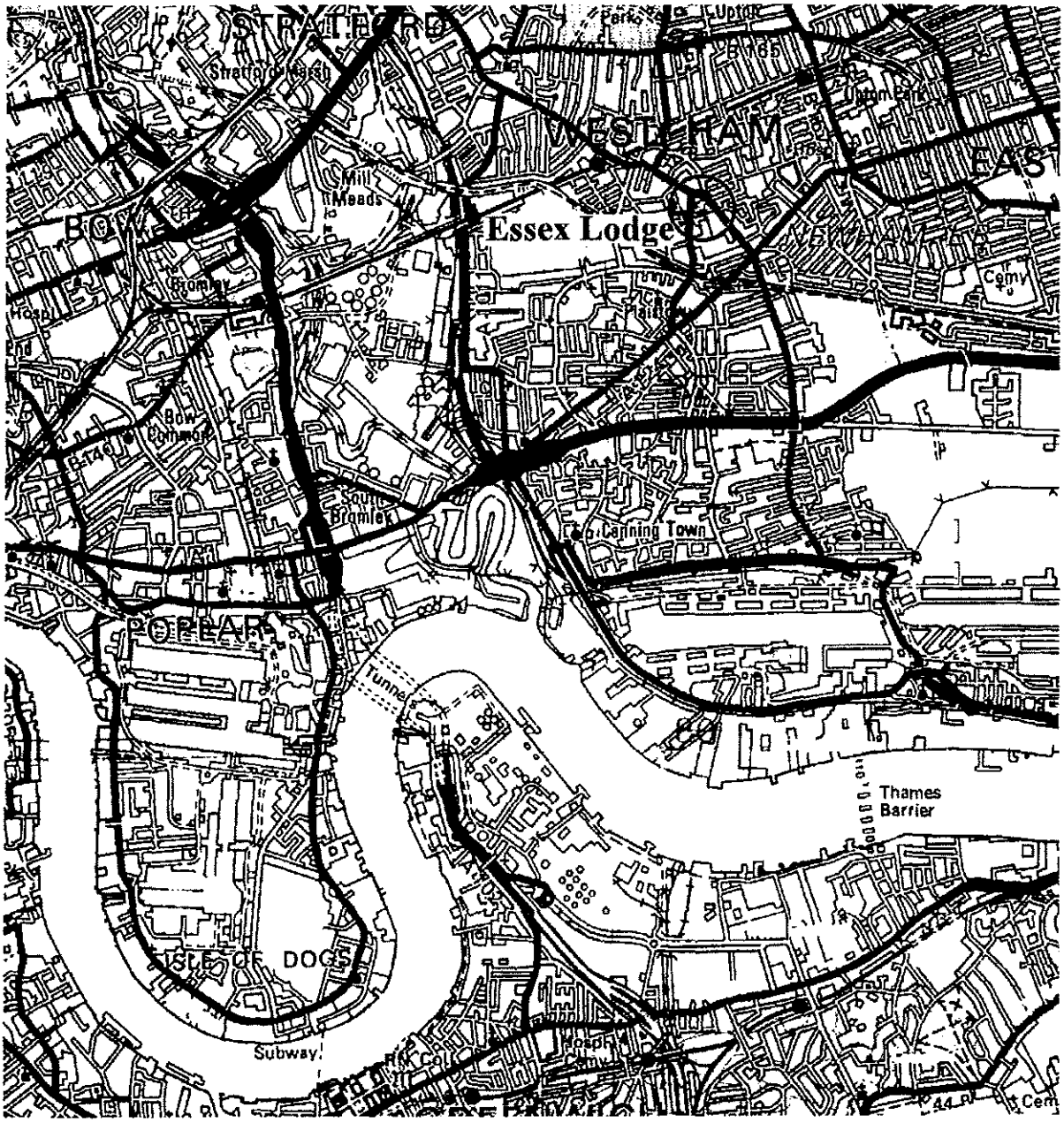

Figure 1: Map to show the general location of Essex Lodge, Plaistow, London Borough of Newham

which *t*-values in excess of 3.5 are taken to be indicative of acceptable matching positions provided that they are supported by satisfactory visual matches (Baillie 1982, 82-5). Any timbers not included in the site mean are tested against it to see if they crossmatch.

The dates thus obtained represent the time of formation of the rings available on each sample. Interpretation of these dates then has to be undertaken to relate these findings to the construction date of the phase under investigation. An important aspect of this interpretation is the estimate of the number of sapwood rings missing. In this instance, the sapwood estimates are based on those proposed by Miles (1997).

The dates derived for the felling of the trees used in construction do not necessarily relate directly to the date of construction of the floor or trusses. However, evidence suggests that, except in the re-use of timbers, construction in most historical periods took place within a very few years after felling (Salzman 1952; Hollstein 1965).

Results

All the timbers sampled were of oak (*Quercus* spp.) and details of their origin within the building, rings, and sapwood are given in Table 1. In addition to the timbers listed here, the jowelled principal rafter in the south-west corner of the building failed to yield a satisfactory core. All the timbers of the primary phase contained very few rings, although in the dark and cramped conditions under which sampling took place, this could not be determined prior to the work being done.

The purlin (ESL03) and the principal rafter (ESL06) were made from boxed-heart timbers containing the pith and some sapwood rings. The stud (ESL 04 and 05), the jetty beam (ESL07), and the floor joist (ESL09), were made from quartered trees.

Samples ESL 04 and 05 matched each other with a value of $t = 20.8$ and were combined to form a new series ESL0405M of 70-years length, representing a single tree. Crossmatching was attempted between this new series and the other series over 50 years long. Sample ESL01 matched with its outer year at year 79 with $t = 4.0$ and a very good visual match. These two series were combined to form a 79-year long sequence ESL010405, from two trees (Table 3).

The new sequence ESL010405 was compared with an extensive database of reference series but failed to give any consistent matches. One position gave a high *t* - value, with $t = 6.7$ for the date of the outer ring being formed in AD 1522 when compared with the geographically nearest site, Eastbury Manor (Tyers 1997). A rather weak visual match and its failure to give any other consistent matches led to the rejection of this crossmatch at this stage.

Series ESL11 (Table 3) gave consistent matching with the date of the outside ring at AD 1580 against a number of chronologies, as shown in Table 2.

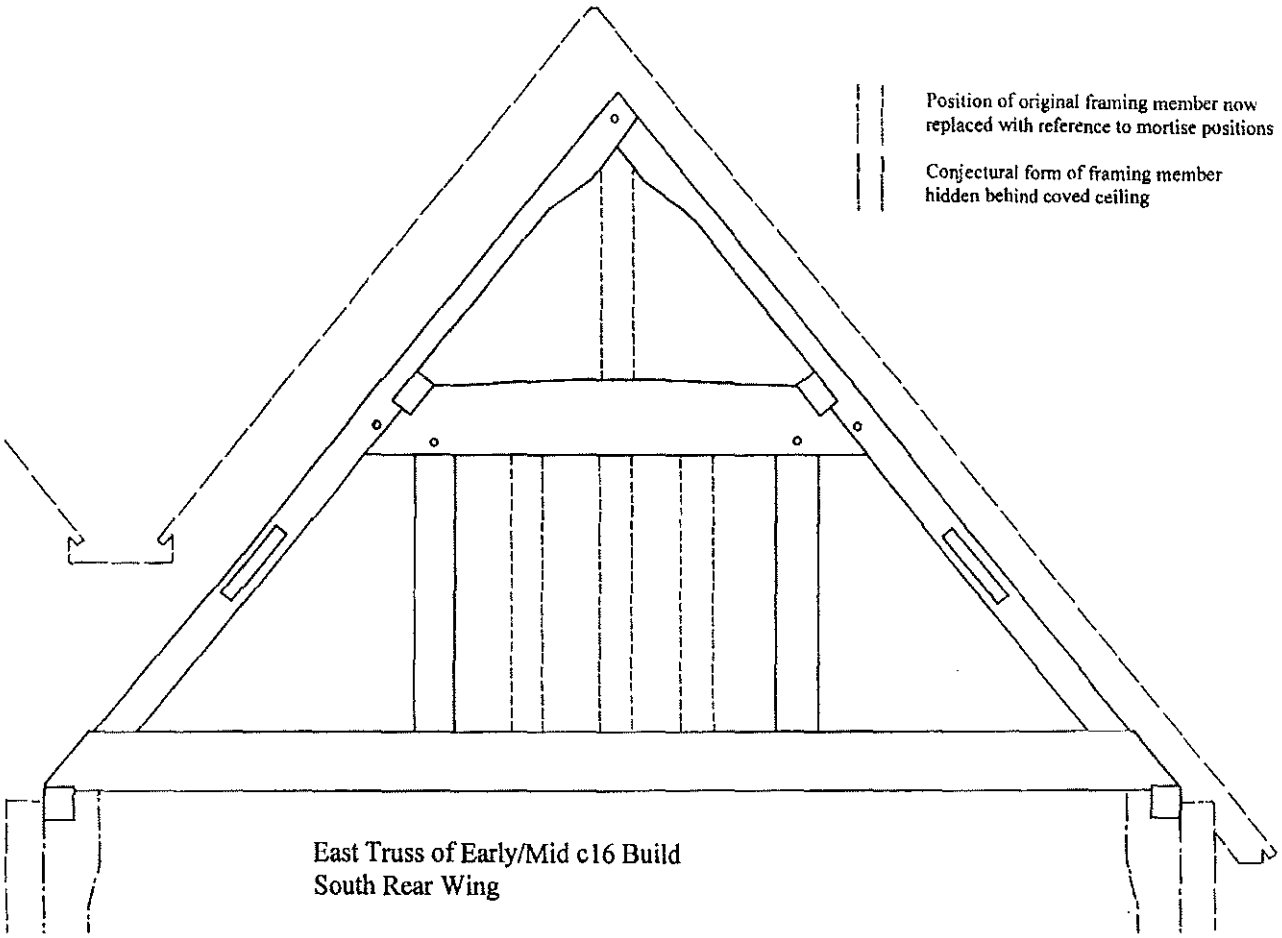

Figure 2: Sketch of the truss form of the two remaining trusses of the primary phase of Essex Lodge, Plaistow, London Borough of Newham

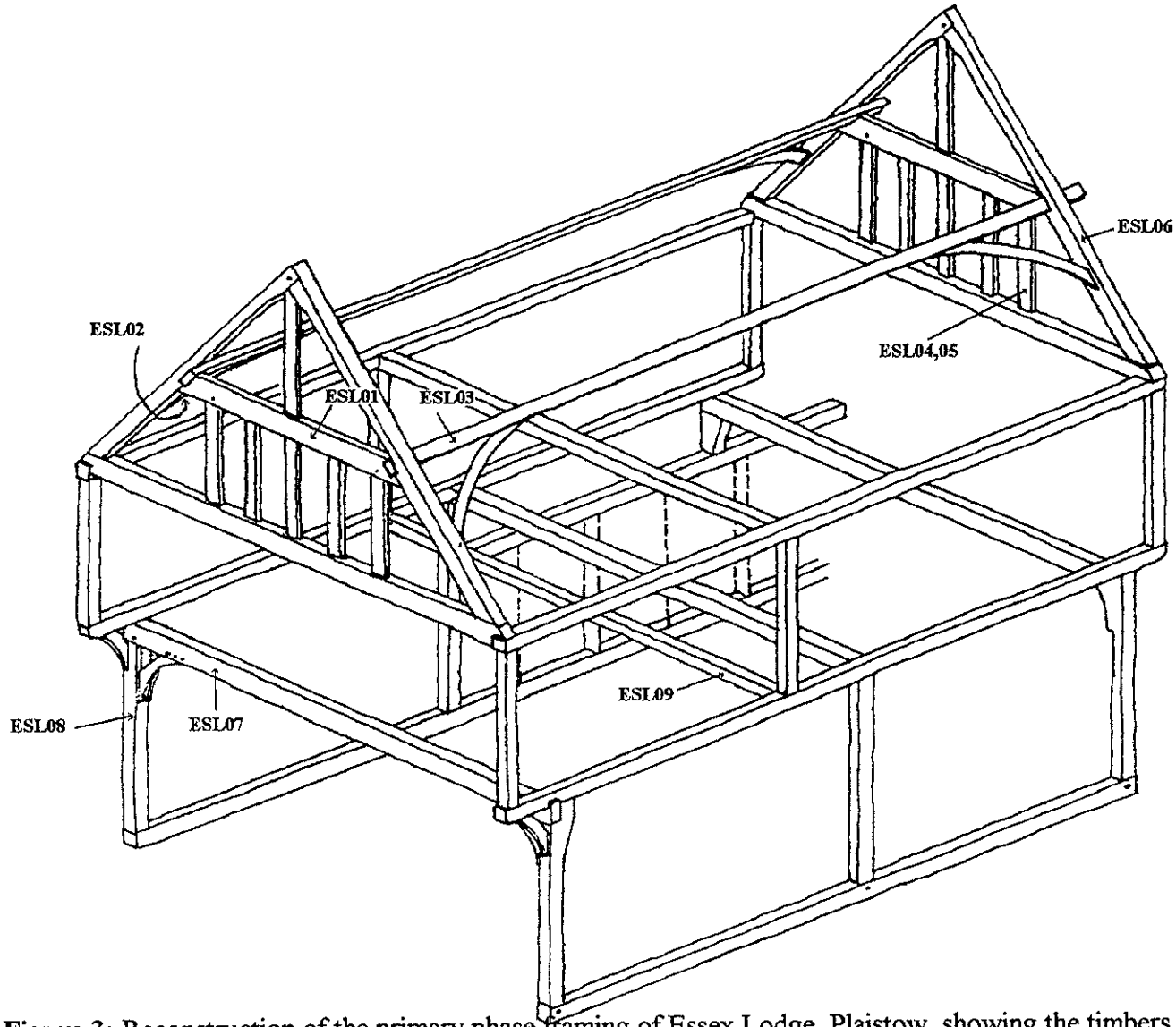

Figure 3: Reconstruction of the primary phase framing of Essex Lodge, Plaistow, showing the timbers sampled for dendrochronology

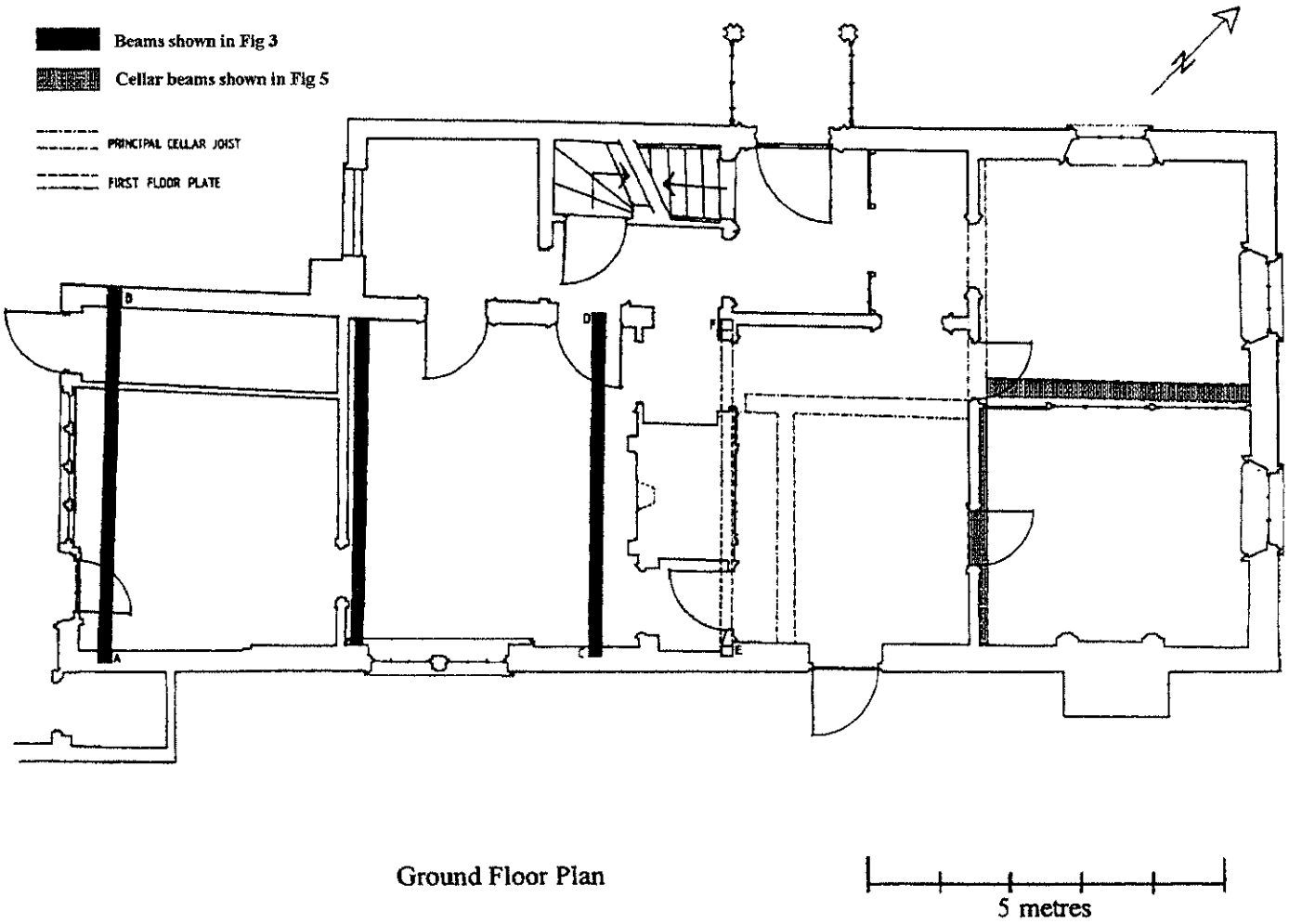

Figure 4: Ground floor plan of Essex Lodge, Plaistow, showing the relative positions of the primary phase shown in Figure 3, and the cellar beams shown in Figure 5

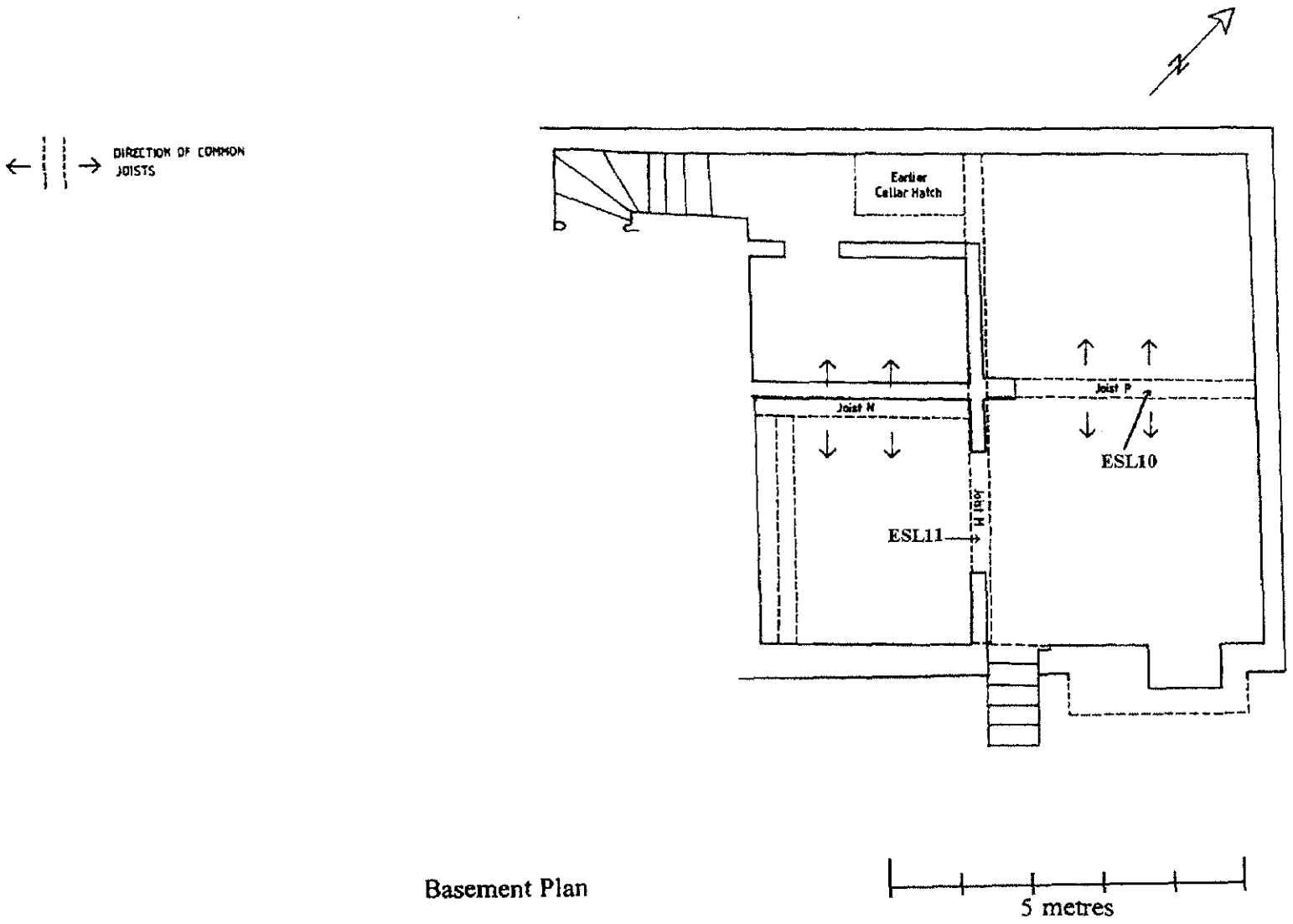

Figure 5: Plan of the basement of Essex Lodge, Plaistow, showing the timbers sampled for dendrochronology

Table 1: Details of the samples taken from Essex Lodge, Plaistow. h/s = heartwood - sapwood boundary.

Sample no	Origin of core	Total no of years	Average growth rate (mm yr^{-1})	Sapwood details	Date of sequence AD	Felling date of timber AD
ESL01	Collar to west truss	50	1.82	h/s	unknown	unknown
ESL02	Wind brace, NW corner	36	not measured	7	unknown	unknown
ESL03	Purlin, SW corner	52	1.64	6	unknown	unknown
ESL04	Stud, SE corner	51	1.42	19	unknown	unknown
ESL05	Same timber as 04	70	1.29	22 bark	unknown	unknown
ESL06	Principal rafter, NE corner	35	not measured	4	unknown	unknown
ESL07	Jetty beam	27	not measured	h/s	unknown	unknown
ESL08	North west corner post	21	not measured	-	unknown	unknown
ESL09	Floor joist	39	not measured	h/s	unknown	unknown
ESL10	Cellar beam E-W	34	*c*4.0	1	unknown	unknown
ESL11	Cellar beam N-S	120	1.39	-	1461 - 1580	after 1589

Table 2: Dating of sequence ESL11 from Essex Lodge, Plaistow, London.

	ESL11	
	AD 1461 - 1580	
Dated reference or site master chronology	***t*-value**	**overlap (yrs)**
London1175 (Tyers pers comm)	7.2	120
Oxon93 (Miles pers comm)	6.9	120
Hereford and Worcester (Siebenlist-Kerner 1978)	6.5	120
East Midlands (Laxton and Litton 1988)	6.3	120
Windsor Castle Kitchen (Hillam and Groves 1996)	8.1	113
Old Basing Barn (Bridge unpubl)	7.9	75
Eastbury (Tyers 1997)	5.0	105

Interpretation

One of the most surprising things about this study was that it revealed just how young most of the trees felled for the construction of the primary phase were. Several different structural timbers were sampled. Many ring sequences went from very near the pith to sapwood rings in under 50 years. This may mean that good timber was in short supply in this area at the time of construction of the primary phase.

It is not surprising that the short sequence failed to date, part of its short length being made up of only one tree with some early growth rings included; these often display atypical growth. The single good crossmatch against a very nearby site at about the expected date may prove in the future to be the real date for these timbers, but with present methodology this crossmatch can not be accepted as dating the material. The jowelled principal rafters are similar to those seen at Gosfield Hall, Essex, which was dated dendrochronologically to AD1547 - 1583 (Bridge 1998).

Although not part of the original brief, the beams in the cellar of a later phase were sampled because they were substantial timbers, easily accessible, which would potentially give some useful information about the evolution of the building. As it turned out, the only timber to be dated at the site was the main north-south beam of the cellar. The ring-width sequence dated easily, but no evidence of sapwood was seen in its very narrow outer rings. Applying the sapwood estimate of Miles (1997), the earliest this timber was likely to have been felled would be AD 1589. Given the appearance of the beam and the care with which it was sampled to give the maximum ring sequence, it is felt likely that the timber had not lost many rings from the outside. The nature of the building is such that this cellar almost certainly represents a later phase than the primary phase of the roof trusses and jettied floor. The dating does at least suggest that the primary phase was built before the end of the sixteenth century.

Acknowledgements

I would like to thank Mr Richard Bond (English Heritage) for providing background information, helping during the fieldwork, and making the arrangements to visit the site. This work was funded by English Heritage. The building is in the care of the London Borough of Newham. I would like to thank Sue and Stephen Gabrielsen (Baleen Associates) for their assistance during the fieldwork, useful discussion, and the figures used as a basis for illustrations in this report.

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Table 3: Details of the oak ring-width series for the dated and undated series from Essex Lodge, Plaistow, London

Year	ring widths (0. 01mm)										No. of trees									
ESL11																				
AD1461	354	350	451	187	272	294	317	412	486	545										
	377	435	323	255	261	225	193	286	380	376										
	429	357	344	256	118	243	297	238	181	211										
	122	121	128	115	108	167	96	62	85	99										
AD1501	143	100	136	109	109	104	103	80	100	84										
	96	89	86	89	103	114	76	92	84	69										
	95	140	54	84	86	81	87	99	82	46										
	92	47	49	40	64	33	43	43	46	41										
	50	41	56	35	69	69	61	66	66	70										
AD1551	60	57	62	58	82	60	62	61	76	78										
	67	85	70	72	69	56	76	94	99	102										
	80	104	82	77	68	61	66	51	70	77										
ESL010405																				
1	399	334	239	325	334	426	392	323	174	166	1	1	1	1	1	1	1	1	1	1
	233	121	79	70	63	70	47	53	84	133	1	1	1	1	1	1	1	1	1	1
	124	153	161	146	95	124	143	157	148	111	1	1	1	1	1	1	1	1	1	2
	141	155	119	78	114	176	153	190	230	251	2	2	2	2	2	2	2	2	2	2
	219	216	181	194	182	188	181	118	130	105	2	2	2	2	2	2	2	2	2	2
51	115	203	222	131	147	170	102	85	69	116	2	2	2	2	2	2	2	2	2	2
	149	115	168	118	99	115	101	118	109	159	2	2	2	2	2	2	2	2	2	2
	170	132	114	105	117	131	126	130	78		1	1	1	1	1	1	1	1	1	
ESL03																				
1	117	202	252	251	448	652	508	371	456	330										
	239	291	252	179	169	234	202	243	146	132										
	135	131	171	164	119	107	93	52	64	50										
	55	58	138	118	113	105	104	79	85	95										
	77	64	84	73	121	97	77	49	56	51										
51	40	35																		