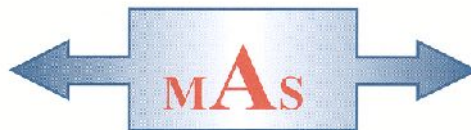


# GLASSHOUSE BRODIE CASTLE MORAY



**- Building Recording -**  
Carried out 13<sup>th</sup> May 2014  
by  
**Murray Archaeological Services Ltd**



**Report No: MAS 2014-27**  
by  
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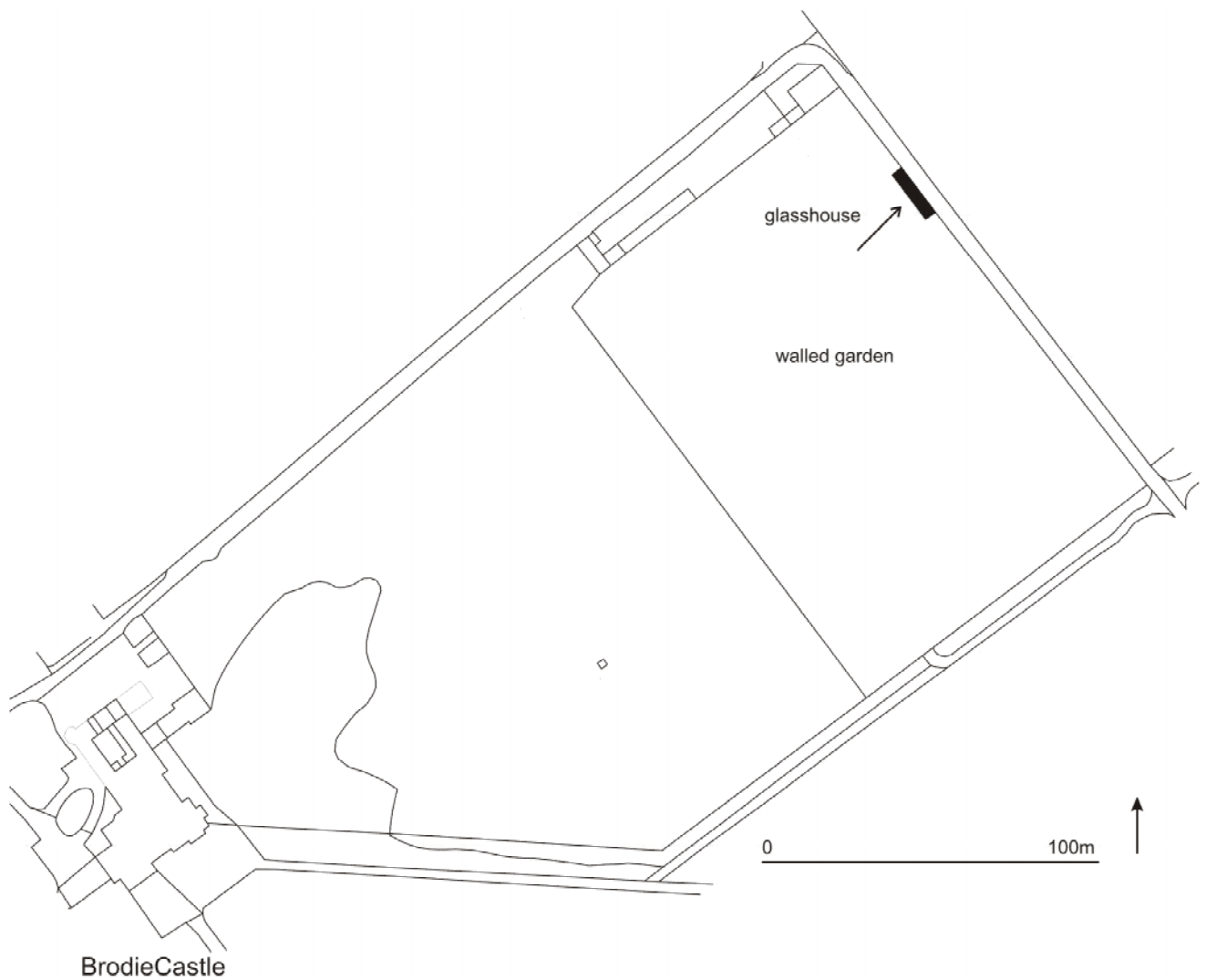
# **GLASSHOUSE BRODIE CASTLE MORAY**

## **-Building Recording-**

**HK Murray and J C Murray**

1. Background
  - 1.1 An early 20<sup>th</sup> century glasshouse in the walled garden at Brodie Castle, Moray was in a state of collapse and required to be taken down. In consequence it was decided by the National Trust for Scotland that a standing building survey of the structure should be undertaken.
  - 1.2 It was requested that special attention should be placed on joints and structural elements so that should a replica of the glasshouse ever be considered, the construction would be as accurate as possible.
  - 1.3 Murray Archaeological Services Ltd was commissioned to undertake the work by the National Trust for Scotland. The field work was undertaken on 13<sup>th</sup> May 2014.
  
- 2 The Location
  - 2.1 The glasshouse lies to the E of Brodie Castle, built against the NE wall of the walled garden.

Parish: Dyke and Moy  
GPS (midpoint) 298186,857956  
NMRS ref: NH95NE 10.00 (The castle)

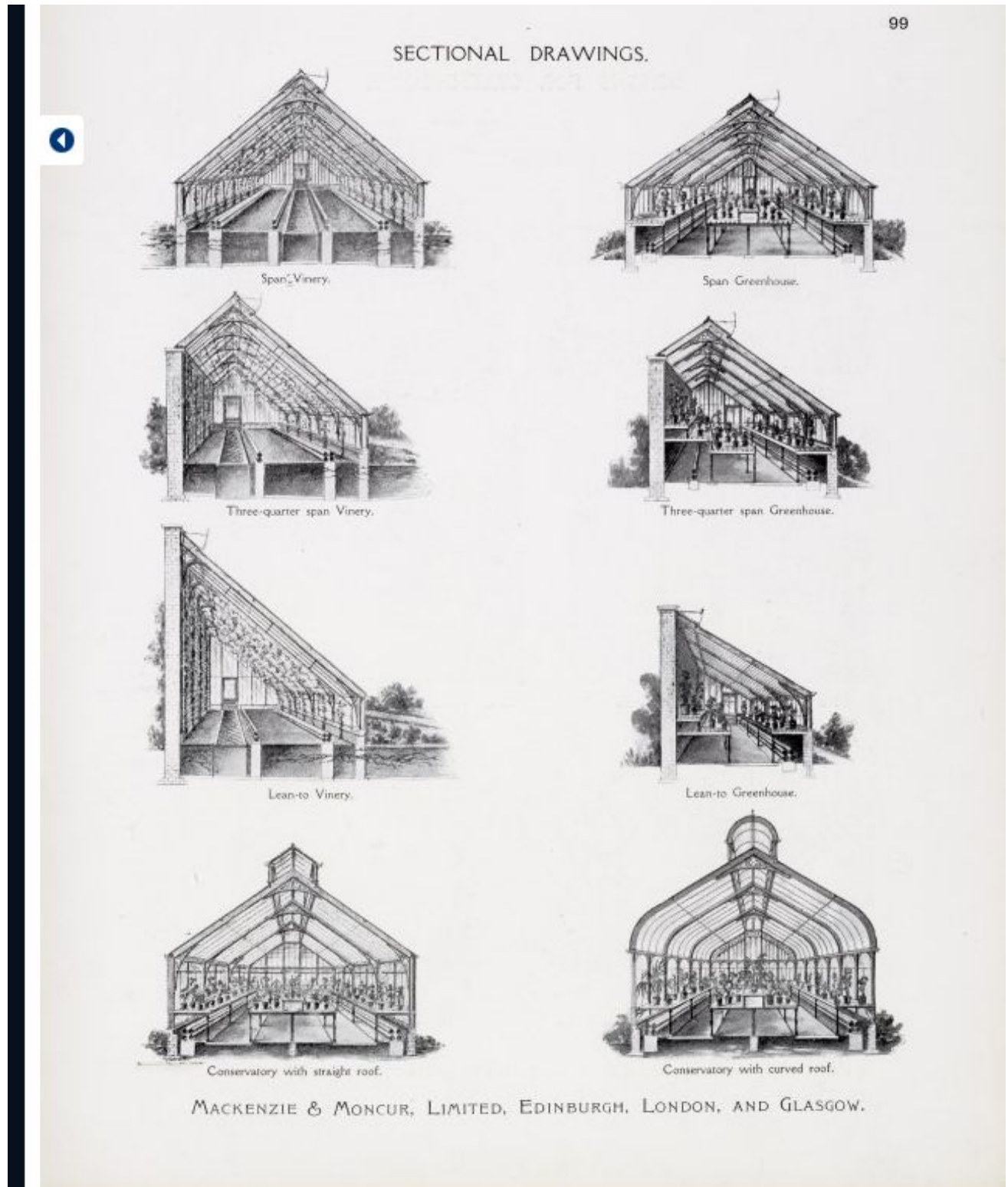


**Illus 1 Location map** Reproduce from Ordnance Survey digital map data, © Crown Copyright, All rights reserved. 2014. Licence No 100041040

### 3 Historical background

3.1 The glasshouse can be identified with one bought as a new three-quarter-span peach house from MacKenzie & Moncur in 1912 as noted in the household accounts (McGowan et al 2014 (draft), 38).

MacKenzie & Moncur (1869-1998), based in Edinburgh, Glasgow and London, were a major manufacturer of hothouses, glasshouse and conservatories. Many of the smaller structures were made to a standard pattern and appear to have been basically prefabricated before they were assembled on site. Similar glasshouses have been recorded by AOC Archaeology at Newhailes, Edinburgh, also a National Trust for Scotland property (Sproat, 2012).



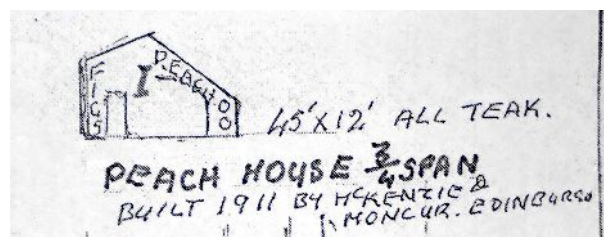
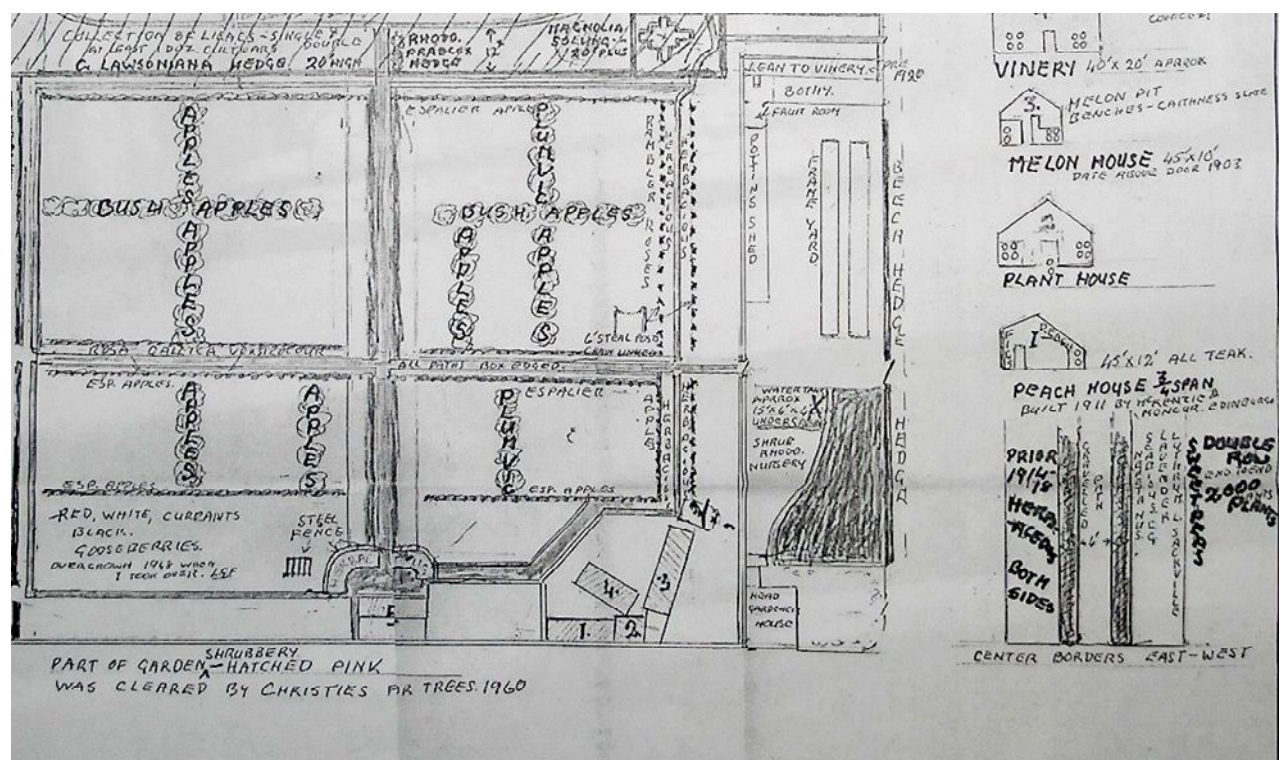
General Collection Catalogue of Horticultural Buildings by MacKenzie and Moncur Sectional Drawings showing Vineries (Vinery), Greenhouses and Conservatories available DP040542 Copyright RCAHMS

Illus 2 Detail from 1900 catalogue of MacKenzie and Moncur (RCAHMS NT27SW 2790). The three-quarter span Greenhouse on RHS appears similar to the structure recorded at Brodie Castle. [www.rcahms.co.uk](http://www.rcahms.co.uk)



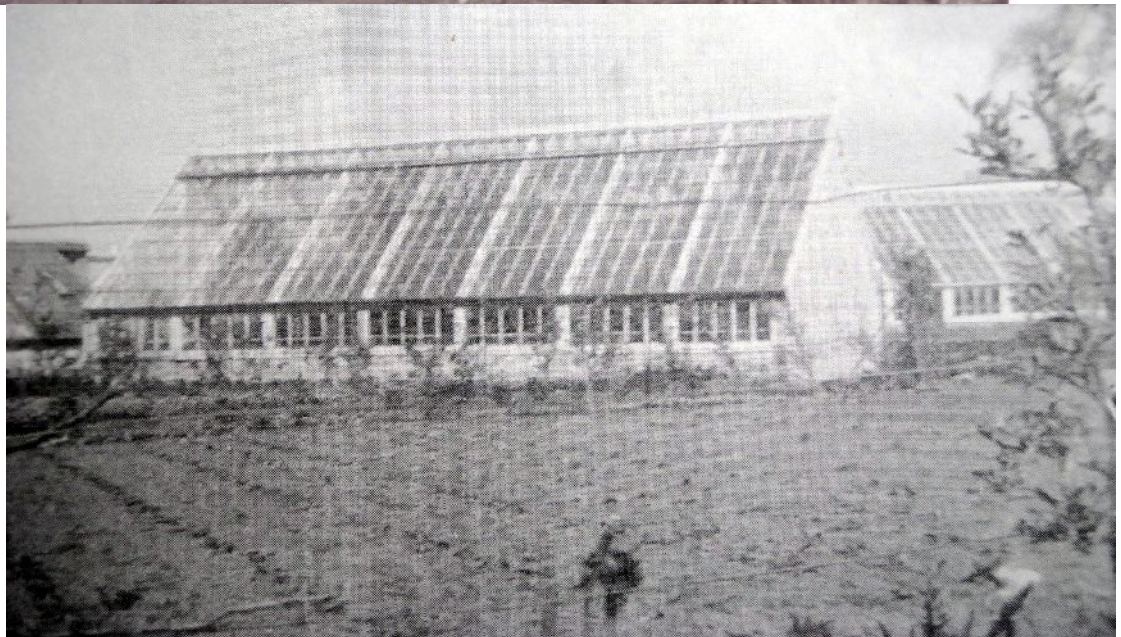
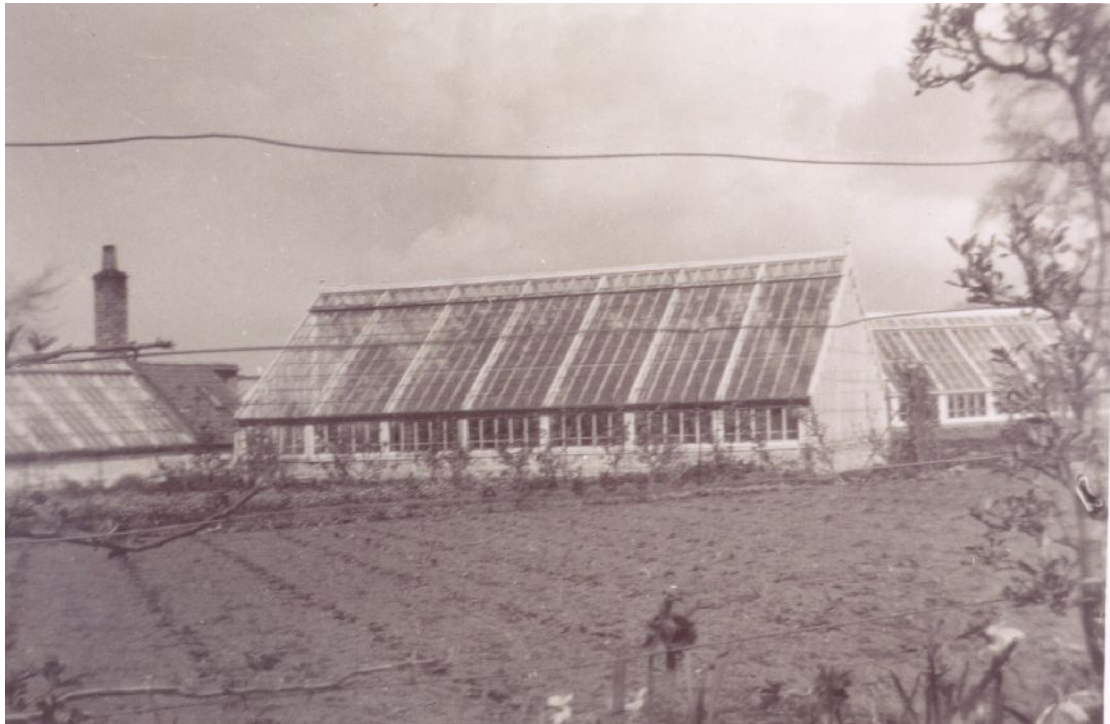
A plan of the garden as it was before WW1, but drawn in the 1960s, shows the location of this peach house- on the footprint of the present structure. However, a marginal note, showing the correct elevation, refers to the peach house as 45 feet (13.7m) by 12 feet (3.65m) wide. The width agrees with the present survey but the length (17m) of the existing structure is 3.3m– 4m (c 11-13 feet) longer than that recorded in the 1960s drawing.

The drawing shows figs growing against the wall and peaches along the front side. A peach and a fig survived within the frame of the glasshouse until a hard frost some years ago (pers.comm. Peter Mitchell).



Illus 3 Part of Plan of Kitchen Garden and Shrubby pre WWI drawn in 1960s with detail of section of the Peach House. (Photos Brodie archive, supplied by Robert Grant).

Photographs taken in the 1920s show this as one of a group of glasshouses (Illus 4).



**Illus 4 Two photographs of glasshouses at Brodie- the top one is undated but the lower one, clearly taken on same occasion is dated to 1920s. By comparison with the layout shown in illus 3, it is probable that the glasshouse of this survey is the one at back RHS. (Photos Brodie archive, supplied by Robert Grant).**

## 4 Methodology

- 4.1 Prior to the survey the structure was overgrown and the brick foundation of the long side covered by soil. After several record photographs were taken, the soil was excavated off the wall foundation and the higher vegetation cut back.
- 4.2 A ground plan was drawn (Illus 27). The SE end elevation, which was fairly intact, was drawn (Illus 12) but the NW end elevation, which had been greatly

disturbed was not drawn. The long SW elevation was drawn (Illus 15). A section (Illus 10) was drawn on the line of one of the least disturbed parts of the framework.

- 4.3 The structural details were photographed. The full set of photographs will be supplied for the archive.

## 5 The Structure

### 5.1 *Condition prior to survey*

- Most of the glass panes had been removed for re-use elsewhere. This is thought to have occurred before the Trust acquired the property (pers.comm Peter Mitchell).
- The brick walls along the long SW side and at the NW gable end had been dismantled at some stage and the bricks removed for re-use elsewhere. When this was done the horizontal wall plate between the upright elements of the long wall had been cut between each vertical. Then each vertical had been taken off the brick wall and placed down lower, inside the line of the remaining wall foundation. As a result, the roof couples were angled inwards and in some areas twisted. The only elements holding the structure together were the cast iron brackets at the ridge and at the junction between the vertical wall posts and the rafters.
- The iron rod and winding mechanism for the upper windows for the N six bays of the glasshouse had been removed for re-use at Pitmedden. This resulted in further skewing of the NW gable end and the N two bays. At some point a fence post was used as a replacement support at the NW corner. Prior to the removal of the window mechanism the structure had been photographed in detail in 2009 and some of these photographs are included to illustrate features no longer extant (Illus 22-26).

### 5.2 *Dimensions*

This is basically a 12 by 1 bay structure, but the bay at the N end is truncated by the asymmetric line of the N wall and is essentially a half-bay, having only two panes in the top opening windows, not four as in the full bays. This shows most clearly on the 2009 photographs, prior to the further dilapidation of the building (Illus 22-24).



The glasshouse is 17m long on the front wall foundation and 17.7m long along the garden wall (to the vertical raggle of the end wall at the N end). The width is 3.7m (to the brick foundation wall). Each full bay was originally c. 1.5m wide (5 feet). The height at the apex was c. 3.5m.

### *5.3 Plan.*

This is a three-quarter plan glasshouse, with a shortened back rafter resting on the enclosing wall of the walled garden, which is c. 2.55m high at this point with a flat cope c 70mm wide. While the SE end of the glasshouse was rectangular, at the NW gable the wall line was oblique (Illus 27). This was clearly shown by a vertical raggle in the face of the garden wall and by the line of the brick foundation (Illus 5, 6). The reason for this angled wall may lie in the plethora of concrete and brick foundations to the NW which suggest the former presence of other structures in this direction, as appears on the 1960s drawing (Illus 3) and in the 1920s photographs (Illus 4). There had been a door at each end.



**Illus 5 NW gable, looking E to the garden wall. The raggle of the original wall line of the glasshouse is visible to the RHS of the ranging rod, with an angled slot in the wall face where the wall plate of the gable wall would have been set.**





**Illus 6 NW end, looking E, showing the line of the original wall foundation (below horizontal ranging rod). The raggle of the original wall and the slot for the wall plate can be seen in the garden wall to the RHS of the vertical ranging rod. The displaced door jambs can be seen to the RHS of the foundation. To the LHS of the wall foundation can be seen the brick and concrete foundations of a path and other possible structures.**

#### *5.4 Brick foundations and wall*

Originally there would have been a low brick wall around all sides. This only survives at the SE gable, where it is 380mm high comprising 4 courses set as stretchers, set on a foundation of bricks set as headers (Illus 12). The bricks were 225 x 105 x 85mm. Elsewhere, only the foundation course survived (Illus 9).



**Illus 7 Looking N along side wall showing brick foundation and displaced wall timbers**

### 5.5 Main structural elements

The timber has not been identified. On visual inspection it looked like pine although the marginal note on the 1960s sketch says that it was teak. As can be seen in the SE elevation, apart from the door jambs, the vertical timbers (each 100 x 52mm) were set into a wall plate that ran along the top of the low brick wall. In the long side wall, these vertical timbers have been displaced and now rest on the ground. A horizontal timber (105 x 60mm) ran along the top of these vertical timbers. Along the top of it was an almost triangular-sectioned horizontal timber (115 x 30mm) which projected slightly and had a groove, possibly to hold the upper edge of a gutter resting on small wooden brackets on the outer face of the vertical wall timbers (Illus 8).



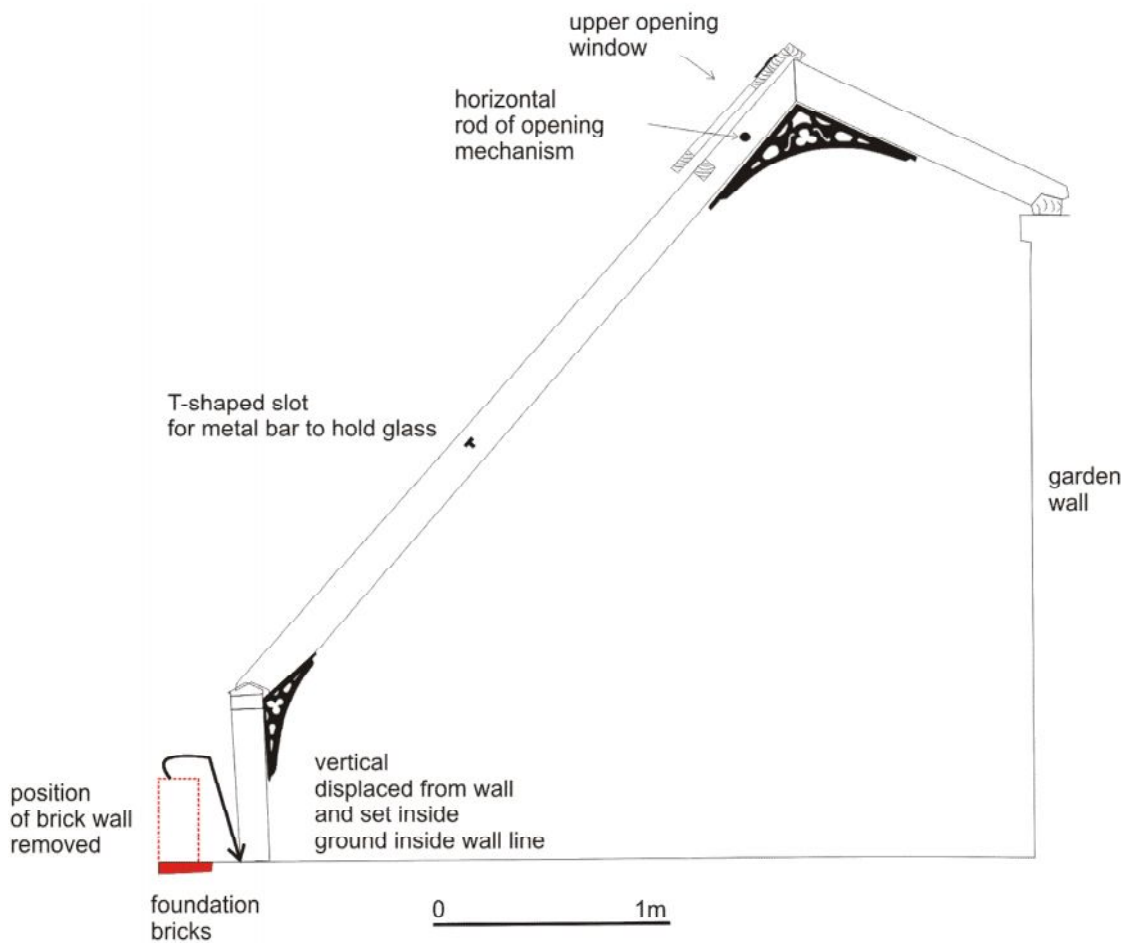
**Illus 8 Detail of bracket between vertical wall post and rafter, also showing the horizontal timber (A) that ran along the top of the wall posts. Note the glazing grooves (B) for the sloping glass in the rafter and in the LHS face of the horizontal timber. Note also the glazing groove (C) in the base (LHS) of the horizontal.**

Apart from the gable rafters, each pair of rafters was strengthened and bolted together at the apex by a cast iron bracket (with cast number '8'). In the side wall each rafter was similarly strengthened and bolted to the vertical wall timber by another cast iron bracket (with cast number '10B'). An upper horizontal of half-jointed timber extended the full length of the roof some 500mm below the apex.





Illus 9 Looking N along long wall showing main structural elements



Illus 10 Section between 3<sup>rd</sup> and 4<sup>th</sup> bays to show structural elements



### 5.6 *NW gable*

This end had been largely destroyed and the door jambs were out of position set in the ground to the S of the wall foundation. The former position of the door was indicated by a cast iron grill path outside. The wall line was indicated by the foundation bricks. The position of the wall-side vertical of the gable can be seen in the vertical rattle in the garden wall (Illus 5), with an angled slot for the wall plate of the part of the glasshouse to the E of the door.



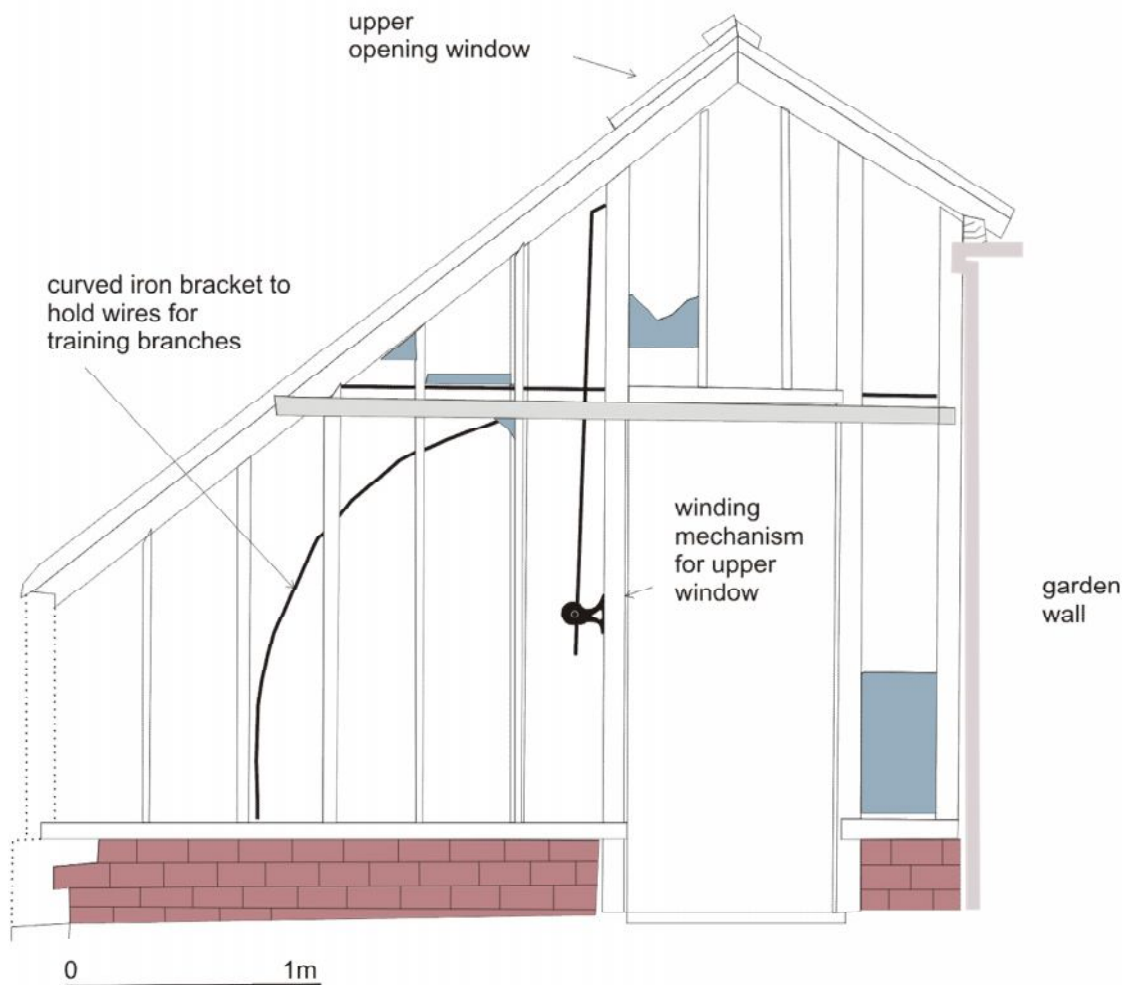
**Illus 11 NW gable showing displaced door jambs.**

### 5.7 *SE gable*

The SE gable was fairly intact. There was a doorway (W: 0.87m H: 2.05m), the door was missing but had hung on two hinges on the E side, with marks of the hinges surviving. The door jambs ran from the ground to either side of the ridge, where they were bolted to the rafters. On either side of the door, the wall comprised a low brick wall with a horizontal wall plate. The vertical timber was missing from the W corner, but an intermediate vertical timber (90

x 55mm) remained. It had vertical grooves up the faces to hold the glass in addition to the intermediate glazing bars. A vertical timber of similar size stood E of the door against the inner face of the garden wall. The end rafters were bolted into half-joints in the jambs and into these additional uprights. The outer end of the short rafter had an open joint which was fixed to a horizontal timber along the top of the garden wall.

A similar joint in the end of the longer rafter would have been fixed to the missing corner post. A narrower curved fillet of wood was fixed to the top of each of the end rafters. Traces of white/cream paint survived on many timbers. At the level of the lintel of the door, on either side of the door there were horizontal T-sectioned metal bars, bolted between the door jambs and the other main vertical timbers. A secondary horizontal bracing timber (grey on elevation) had been nailed across the outside of the frame.



Illus 12 Elevation of SE gable wall

### 5.8 *Glass (Illus 13-15)*

The only remaining glass comprised a few broken panes at the SE gable end. Traces of putty remained elsewhere. The glazing on the main long side had comprised short panes in the opening windows at the apex of the outer face of the roof with two series of long fixed panes along the slope of the roof below this. Glazing grooves show that there were vertical panes of glass in the wall between the uprights above the brick base wall.

Some of the glazing bars of the upper windows survived, showing there were 4 panes to each bay. The timber glazing bars were 60 x 30mm with rebates on the outer edges to hold the glass.



**Illus 13** Bay 4 from S end showing glazing bars

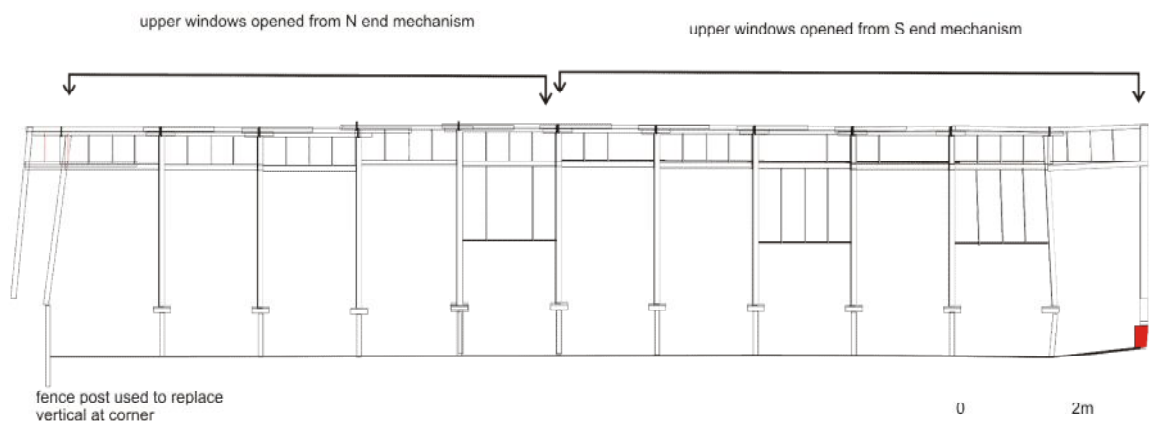




**Illus 14** Detail of base of glazing bar mortised in wall plate in SE gable

The upper panes of the fixed windows were held between a horizontal timber at the top and a horizontal T-sectioned angle iron bar at the base; each bar being the width of a bay and slotted into T-shaped holes in the rafters on either side. The sides of the edge pieces of glass fitted into grooves along the rafters. In the gables there were long vertical panes between the wall plate and an upper horizontal timber and between that timber and the base of the gable rafters.

All the panes had been a uniform 14 inches (35.5mm) wide, set between narrow glazing bars.

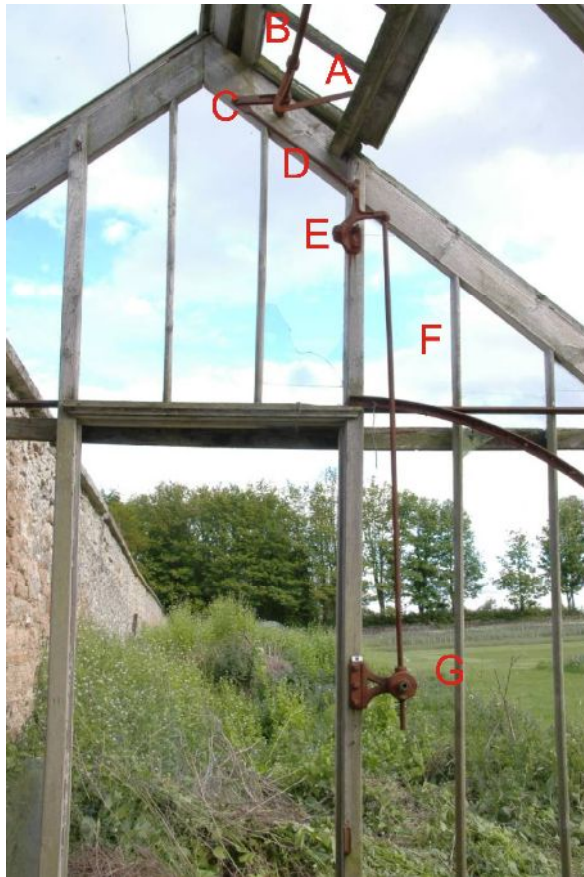


**Illus 15** SW elevation showing the two sections of upper opening windows

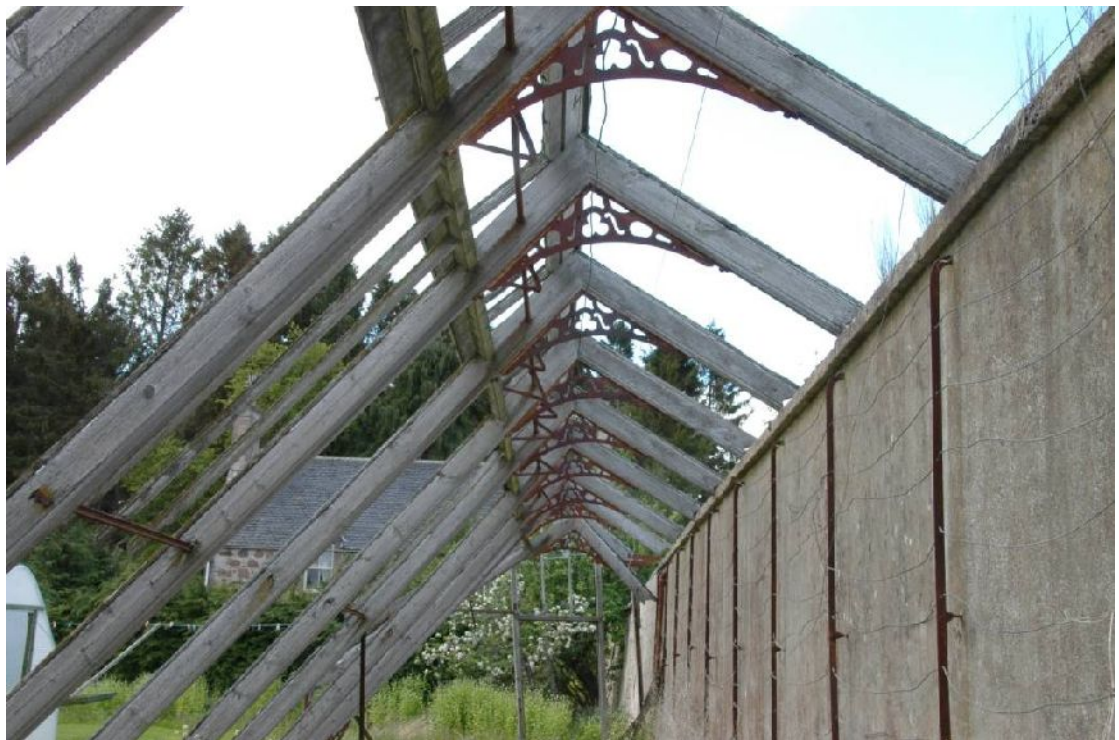
5.9 *Window mechanism for upper windows (Illus 16-20)*

The small paned windows at the top SW facing angle of the ridge were in two sets – one set of 6 bays operated by a mechanism at the N end of the building. The other set of 6 bays operated from the S end of the building. The windows were hinged by stepped strap hinges from the ridge, one hinge to each rafter. The main elements of the window mechanism had been removed from the S end. This description applies to the presumably identical system at the N end.

A horizontal iron rod (B) ran the length of the 6 bays, through drilled holes in the rafters. It was c 400mm from the top of the roof, just above the horizontal timber that formed the base of the top windows and the top of the middle glazed section. This rod was fixed to a series of elbow joint levers (A), one beside the first glazing bar to the S in each bay. At the S gable, the bar was jointed to an angled lever (C) attached to the top of the wall, which moved up and down when rod (D) was moved by Y-shaped lever (E) as a partly threaded vertical bar (D) was wound up or down by a (missing) handle which would have attached to the socket at the bracket (E) bolted to the W door jamb.



**Illus 16** The mechanism at SW end of building.



**Illus 17** Rod (B) running along length of building, opening levers (A) at each bay (LHS of apex).





**Illus 18 Ratchet at bracket (G) and threaded rod (F). Winding handle appears to be missing**



**Illus 19 Detail of upper levers (C) and (E) connected by rod D. window lever (A) in front of (C). rod (B) at top of mechanism**



**Illus 20** Opening upper windows from outside

*5.10 Window mechanism for lower windows*

Some, or all, of the lower, vertical windows were opened by a similar mechanism of rods moved on a ratchet system. This was removed for re-use at Pitmedden, Aberdeenshire but some photographs taken by Robert Grant in 2009 indicate how it operated (Illus 25-26).

*5.11 Heating pipes*

Two cast iron pipes at the N end of the structure may have been part of a heating system. The larger pipe, 150mm (6") diameter was broken off where it came up through the ground near the middle of the NW end. A smaller pipe 50mm (2") in diameter ran up the face of the garden wall and at the top went through the wall.



There is thought to have been a heating boiler to the NW of the glasshouse (pers. comm. Peter Mitchell).



**Illus 21 NW end. Large cast iron pipe in foreground marked by red circle, smaller diameter pipe up wall beside ranging rod**

#### 5.12 Interior

No details survived of the interior arrangements at ground level. There were horizontal wires for attaching branches held on vertical iron bars bolted into the garden wall. In the apex of the roof, horizontal wires had been threaded through some of the decorative holes in the ridge brackets. At the SE end, a curved iron bracket held wires to run along the outer (SW) side.

#### References

McGowan et al 2014 *Brodie Castle and Estate: Historic Landscape Survey*, vol 1. Seen in draft form.

Sproat, D 2012 *Newhailes glasshouses, Newhailes House, East Lothian: Historic Building Recording Report*. AOC Archaeology: Client report for the National Trust for Scotland.

Website visited for information on Mackenzie and Moncur : Glasgow University Archives.

<http://cheshire.cent.gla.ac.uk/ead/search?operation=search&fieldidx1=dc.subject&fieldrel1=exact&fieldcont1=building%20design>



## Acknowledgements

We are grateful to Shannon Fraser, Robert Grant and Derek Alexander, all of the National Trust for Scotland for sharing archive information relating to the glasshouse. Thanks are also due to Peter Mitchell, Estate manager at Brodie Castle for further information.

<b>Photo number</b>	<b>Content</b>
1-4	General shots before cleaning
5-10	SE gable wall looking N
11-12	SE gable wall looking E
13	Joint between rafter and wall at SW corner
14-15	End joint of wall plate of SW corner to hold missing wall vertical
16-17	Wall plate and base of glazing bar
18	Wall plate and base of glazing bar from side
19	Join between door jamb and wall plate
20	From lintel to ridge SE gable wall
21-22	Joint at end of rafter at SE gable wall
23-24	Elevation of SE wall from inside
25-26	Detail of base bracket and winding for window mechanism S end of building
27	Central bracket of window mechanism
28	Upper part of mechanism
29	Upper mechanism
30	Whole of window winding mechanism
31-32	Looking N showing interior and ridge brackets
33	Detail ridge bracket
34	Detail of wall bracket
35-36	Detail side bracket and no 10B
37-39	Joints at top of wall posts with sawn through wall horizontal
40-42	Detail 4 <sup>th</sup> bay from S
43-45	Looking N along side wall
46-47	Looking E at S end of side wall
48-50	Detail of hinging of end of opening window at apex
51	Looking S along long side wall showing brick foundation and displaced wall uprights
52-53	Looking N along long side wall
54-55	Detail of garden wall, raggle of original end of glasshouse and displaced timbers of NW end
56-57	Oblique line of brick foundation at NW

	end, looking E to garden wall and raggle (by vertical rod)
58-60	NW gable from N
61-64	Looking S through building from NW end
65-66	Raggle on garden wall at NW end of glasshouse
67-69	6 inch cast iron pipe
70	2 inch cast iron pipe
71-72	Wall plate on stone garden wall
73-74	Interior from N looking S
75-79	General views looking NE

**Catalogue of photographs (supplied on CD).**

Selected photographs from 2009 photographic survey by Robert Grant  
A number of photographs taken in 2009 are included here to document the N end of the glasshouse and the mechanism that was removed for re-use at Pitmedden, Aberdeenshire.



**Illus 22 Overgrown state of glasshouse in 2009 showing N gable with winding gear (Photograph R Grant).**





**Illus 23 N end in 2009, clearly showing the truncated N bay. (Photograph R Grant).**



**Illus 24 N end in 2009, clearly showing the truncated N bay. (Photograph R Grant).**



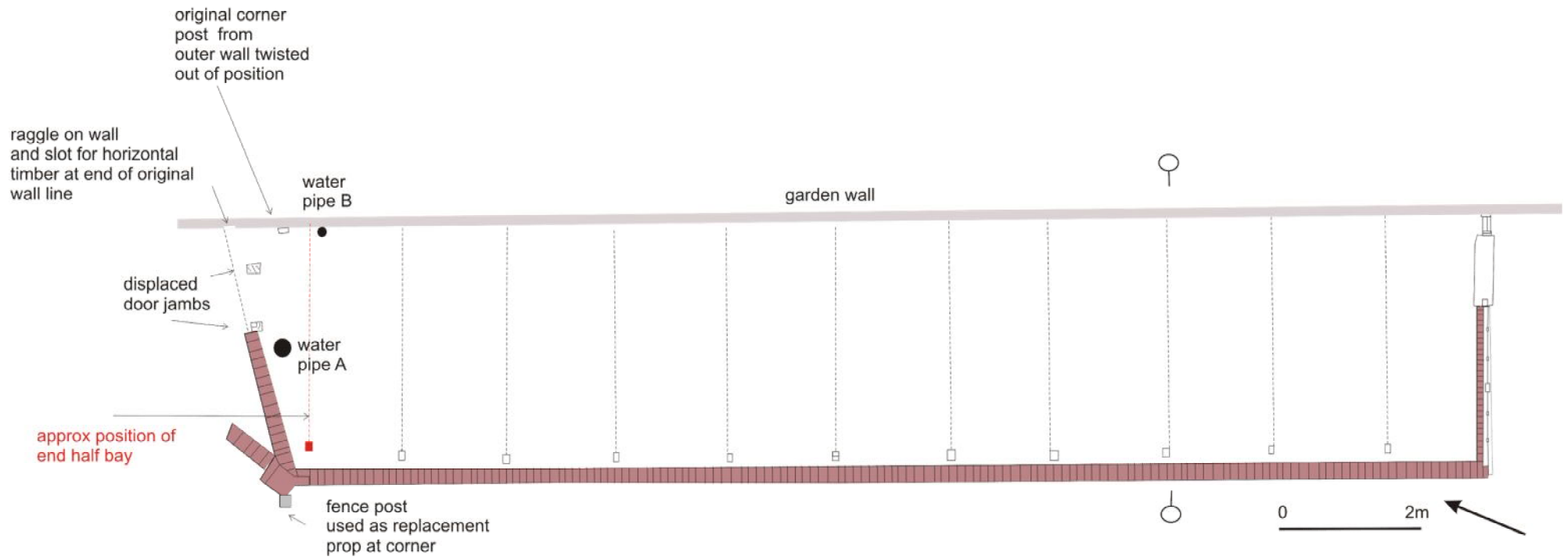


**Illus 25** S gable in 2009, showing ratchet mechanism for opening the lowest (vertical) windows. This mechanism was removed and is now in use at Pitmedden, Aberdeenshire. (Photograph R Grant).



**Illus 26 Horizontal metal rod for opening the lowest (vertical) windows. (Photograph R Grant).**





**Illus 27 Ground plan showing brick foundations and displaced timber uprights (bay shown in red augmented from 2009 photograph)**