The Glasshouses, Bicton College, East Budleigh, Colaton Raleigh, East Devon.

A programme of Historic Building Recording

context one
ARCHAEOLOGICAL SERVICES LTD

The Glasshouses, Bicton College, East Budleigh, Colaton Raleigh, East Devon.

A programme of Historic Building Recording

for

NPS South West Ltd

by

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Front cover image: North wall of walled garden following removal of glasshouses, from the south-west.

Contents

Non-technical summary..... i

1. Introduction..... 1

2. Site location and topography..... 3

3. Historical and Archaeological Background..... 3

4. Objectives and Methodology..... 3

5. Results..... 5

6. Discussion and Conclusions..... 20

7. Archive..... 22

8. COAS acknowledgements..... 22

9. Bibliography..... 22

Illustrations

Figure 1. Site setting..... 2
Figure 2. Schematic figure showing ladder configuration & ventilation shutes..... 10
Figure 3. Sections of vine ladders showing details of fixtures..... 11
Figure 4. Elevations of selected vine arches and schematic representation of full length of vine arches..... 19

Plates

Plate 1. Demolition of Glasshouse A (looking NW)..... 4
Plate 2. Excavation of exploratory trench along front wall of central glasshouse (from ENE)..... 4
Plate 3. Glasshouse B (looking W) (from Thompson 2009)..... 6
Plate 4. Window opening mechanism in roof of glasshouse B (looking N) (from Thompson 2009)..... 7
Plate 5. Gear with handle for opening roof lights in glasshouse B (from SW)..... 7
Plate 6. Roof opening mechanism of glasshouse B..... 7
Plate 7. Close-up of gear for roof opening mechanism with stamp 'Harding' 'Torquay'..... 7
Plate 8. Gear of roof opening mechanism fixed to wooden bracket, with long pole to connect to roof & pin with chain to lock the gear..... 7
Plate 9. Front window opening mechanism in glasshouse B during demolition (from NW)..... 8
Plate 10. Tap on back wall of glasshouse B, with stamp 'Norwich Tap' 'Halcast' (from SW)..... 8
Plate 11. Vine ladders along back wall of Glasshouse A (2 x 2m scales; looking ENE)..... 8
Plate 12. Section of vine ladders along back wall of Glasshouse A (2 x 2m scales; looking N)..... 9
Plate 13. Vine ladders along back wall of central glasshouse (looking N)..... 12
Plate 14. Vine ladders along back wall of central glasshouse (looking NE)..... 13
Plate 15. Section of vine ladders along back wall of central glasshouse (2m scales; looking N)..... 13
Plate 16. Fixings for vine ladders along back wall of central glasshouse..... 13
Plate 17. Vine ladder fixings in rear wall behind central glasshouse (looking SW)..... 14
Plate 18. Close-up of vine ladder fixing in rear wall behind central glasshouse (looking SSW)..... 14
Plate 19. Vertical lines of small pegs along back wall of glasshouse B (2m scales; looking ENE)..... 14
Plate 20. Close-up of vertical line of small pegs along back wall of glasshouse B (0.5m scales; looking NE)..... 14
Plate 21. Vine arch in glasshouse A (2 x 1m scales; looking N)..... 15
Plate 22. Vine arch in central glasshouse (1 x 1m scales; looking N)..... 16
Plate 23. Vine arch in glasshouse B (1 x 1m scales; looking ENE)..... 16

Plate 24. Vine arch in glasshouse B (inner side) showing central pier & corbels (1 x 1m scales; looking S)..... 17
Plate 25. Vine arch in glasshouse A (inner side) showing broken central pier & corbels (1 x 1m scales; looking S)..... 17
Plate 26. Vine arch in central glasshouse (inner side) showing broken central pier & corbels (1 x 1m scales; looking S)..... 18
Plate 27. Solid walling between arches in central glasshouse (1 x 1m scales; looking SSW)..... 18
Plate 28. Layer of rubble encountered during excavation of glasshouse B test-pit (2 x 1m scales; looking S)..... 20

Non-technical summary

Context One Archaeological Services Ltd (COAS) carried out a programme of historic building recording relating to the demolition of the glasshouses within a walled garden at Bicton College, East Budleigh, Colaton Raleigh, East Devon, over two days on 6 and 13 November 2014. The work was commissioned and funded by NPS South West Ltd.

*The walled garden lies within the Grade I listed Historic Park at Bicton (ref: 1000338). There are two extant glasshouses in a ruinous condition (labelled **A** and **B**) and evidence of a further central glasshouse (removed by 1905). An historic building evaluation was carried out by COAS in 2013 (Green) at the request of Mr Stephen Reed (Archaeologist, Devon County Historic Environment Team (HET)) and Mr Kim Auston (HAR Landscape Architect, English Heritage) to evaluate the historic greenhouses and their setting. The two extant glasshouses could not be entered during the historic building evaluation due to the risk of falling glass. Consequently, the report recommended that a further phase of historic building recording should be carried out following the partial dismantling of the superstructures in order to answer specific questions relating to date and manufacturer and to record the form and extent of the vine arches and vine ladders.*

The continuous vine arches within one long wall beneath the three sets of dwarf front walls for each glasshouse, suggest that all three glasshouses were intended for the growing of vines from the outset. However, the evidence from the vine ladders and ventilation shutes indicate a different function for each structure. It appears that only the central glasshouse was actually used for vines, as this retains original and substantial vine ladders strong enough for supporting grapes. There is no evidence that similar vine ladders were ever present in glasshouse A and B; the 'vine ladders' in glasshouse A are less substantial and possibly not original, while the fixings in the back wall of glasshouse B are certainly a later addition and probably intended for supporting light-weight plants such as flowers. The more numerous ventilation shutes in the back wall of glasshouse A suggest this glasshouse required greater air flow therefore further supporting the theory that the original glasshouses were used for different purposes.

Unfortunately, no evidence was found regarding the exact date and manufacturer of the original fabric of glasshouse B. Although a tap stamped 'Norwich' suggests a link with Boulton and Paul, no convincing evidence was found to support the claim that the Norwich company made the glasshouse. Indeed, the glasshouses are fairly standard for large kitchen gardens of the time and it does seem more likely that they were supplied by a more local company. The roof opening system and probably the front window opening system were made, at least in part, by Harding of Torquay. Although this company was certainly in operation in 1878, the mechanisms must have been installed when the roof was replaced in the early 20th century.

Addendum:
The discovery of the continuous run of vine arches in November 2014 necessitated the re-designing of the new glasshouse that would replace glasshouse A and the central glasshouse, ensuring that the vine arches would be preserved in situ. Further archaeological work was also requested by Mr Reed in order to provide a more detailed record of the vine arches. Test-pitting was carried out on 20 May 2015 at the outset of the construction programme. The test-pits were positioned on the inside of the dwarf front walls to fully record an exemplar vine arch from each glasshouse. Two further archaeological monitoring and recording visits were made on 26 and 28 May 2015 during the complete exposure of the vine arches prior to the installation of a protective gauge membrane between the Victorian walling and the new glasshouse foundations. With the exception of one small area of solid walling near the eastern end of the central glasshouse, the vine arches were found to run continuously beneath the dwarf front walls. The vine arches in glasshouse B were slightly different in design to those in the other glasshouses, with evidence of later modifications throughout. No archaeological features or deposits were encountered during the test-pitting or groundworks.

1. Introduction

1.1 Context One Archaeological Services Ltd (COAS) carried out a programme of historic building recording relating to the demolition of the glasshouses within a walled garden at Bicton College, East Budleigh, Colaton Raleigh, East Devon (the 'Site'), over two days on 6 and 13 November 2014 (**Figure 1**). The work was commissioned and funded by NPS South West Ltd.

1.2 The walled garden lies within the Grade I listed Historic Park at Bicton (ref: 1000338). There are two extant glasshouses in a ruinous condition (labelled **A** and **B** on **Figure 1**) and evidence of a further central glasshouse (removed by 1905). An historic building evaluation was carried out by COAS in 2013 (Green) at the request of Mr Stephen Reed (Archaeologist, Devon County Historic Environment Team (HET)) and Mr Kim Auston (HAR Landscape Architect, English Heritage) to evaluate the historic greenhouses and their setting. The two extant glasshouses could not be entered during the historic building evaluation due to the risk of falling glass. Consequently, the report recommended that a further phase of historic building recording should be carried out following the partial dismantling of the superstructures. A Condition Survey was undertaken by Mr Paul Belcher (NPS Group) in 2013 which confirmed the precarious state of the glasshouses. This was followed by a Heritage Statement carried out by COAS (Green 2014) in support of a Planning Application submitted to Devon County Council (DCC/3650b/2014).

1.3 Planning Permission was granted on 7 May 2014 (Planning reference (DCC/3650b/2014) for the demolition of the two glasshouses and lean-to central store shed and replacement with a new single glasshouse to reflect the appearance of the three conjoined glasshouses that were once the focal point of this Victorian kitchen garden. Condition 6 states that:

> *"No demolition works to which this consent relates shall commence until an appropriate programme of historic building recording and analysis has been secured and implemented in accordance with a written scheme of investigation which has been submitted to and approved in writing by the County Planning Authority. The development shall be carried in accordance with the approved scheme.*
>
> *Reason: To ensure, in accordance with paragraph 141 of the National Planning Policy Framework and East Devon Local Plan policies EN7 (Nationally and Locally Important Archaeological Sites) & EN8 (Proposals Affecting Sites Which May Potentially be of Archaeological Importance), that an appropriate record is made of the historic buildings fabric, and fixtures and fittings that will be affected by the development."*

1.4 The programme of archaeological works comprised four elements: the production of a Written Scheme of Investigation (WSI) which set out the project strategy; historic building recording during demolition of the glasshouses; post-excavation and report production; and archive deposition. The WSI was approved by Mr Reed in June 2014 prior to the commencement of any Site works. In addition, the WSI stated that a method statement for the protection of the vine ladders would be provided however in the event this was not necessary.

Addendum

1.5 Following submission of this report in December 2014, further archaeological work was requested by Mr Reed (ARCH/DM/ED/21857b) to record the vine arches in more detail. Archaeological test-pitting was carried out on 20 May 2015 and monitoring and recording during the first phase of construction works on 26 and 28 May 2015. The historic building recording breaks down into four elements; the compilation of a Method Statement; historic building recording; the addition of the results as addendums to this report; production of an interpretation board; and archive deposition. The Method Statement was approved by Mr Reed prior to the commencement of the archaeological works.

Figure 1. Site setting

2. Site location and topography

2.1 The Site (centred on SY 07036 86744 (Glasshouse A) & SY 07084 86734 (Glasshouse B)) is situated within the northern side of a large walled garden on the northern edge of Bicton College campus, immediately north of Bicton Park Botanical Gardens (**Figure 1**). The two glasshouses and central missing glasshouse occupied level ground at *c.* 55m above Ordnance Datum (aOD). Prior to demolition, the two glasshouses were in a ruinous condition, covered in dense vegetation and surrounded by safety fencing. A lean-to store shed and hard standing occupied the area where the central missing glasshouse once stood. The area immediately in front (to the south of) the glasshouses was utilized for animal enclosures and wooden huts.

3. Historical and Archaeological Background

3.1 The detailed historical and archaeological background is set-out in the two previous reports and was drawn from secondary sources, including readily available cartographic and documentary sources held at the Devon Heritage Centre (DHC). The Historic Building Evaluation report presents the results of the Level 2/3 building survey, as set out in *Understanding Historic Buildings – A guide to good recording practice* (English Heritage, 2006). The subsequent Heritage Statement provides a summary description of the glasshouses, other relevant heritage assets and their setting (COAS 2014). Both reports should be referred to for a full structural and historical account however the following section provides a brief summary.

3.2 The glasshouses and walled garden are curtilage structures to Bicton House, a Grade II listed building (no: 1334023) and the walled garden is also encompassed by Bicton Park, a Grade I Listed Registered Park and Garden (no. 1000338). Bicton College and gardens once formed part of Bicton Park (MDV32459), amongst the most remarkable of Devon's Victorian parks and gardens (Gray 1995, 44) and a Grade I Listed Registered Park and Garden (no. 1000338). Bicton House (MDV10604), a Grade II listed building (no. 1334023), was built in 1730 replacing two earlier buildings. The gardens were laid out at the same time (Delderfield 1959, 91) and the walled kitchen garden within which the glasshouses are situated is listed as one of many surviving 19th century garden features (Gray 1995, 44). The estate was divided in 1957 into Bicton College of Agriculture, Bicton Park Trust Company and Bicton Arena (*ibid*).

3.3 The 1842 Colaton Raleigh tithe map shows the walled garden without any glasshouses (see Green 2013, Figure 2). The 1st edition 1889 Ordnance Survey map shows that the glasshouses had been constructed within the walled garden by this time. They are shown as one continuous structure against the north wall with a space between each gable end and the side walls of the garden. Water tanks are shown to the south-west and to the south-east of each gable end. The 1905 Ordnance Survey map shows two separate glasshouses (labelled A and B in this report) with an open area in the middle. Aerial photographs taken in 1946 appear to show the glasshouses running the full length of the north garden wall (see Green 2013, Plate 1). The 1956 and 1961 Ordnance Survey maps continue to show a central open area which either indicates that a temporary structure had occupied the central area in 1946 or that the mid-20th century maps had not been revised to show the addition.

3.4 The Level 2/3 building survey carried out by COAS on 13 February 2013 comprised a photographic survey with general shots illustrating form and setting, and detailed shots to record historic features and general condition. AutoCad drawings provided by NPS Group were used as the basis for recording structural features of historic or architectural significance condition and key measurements as a cross-check to the architects drawings provided by the client.

4. Objectives and Methodology

Objectives

4.1 The primary objective of the historic building recording was to complete aspects of the survey which could not be carried out in 2013 due to access restrictions and to fully inspect the walling beneath the dwarf front walls. Once the glasshouses were safe to enter it was hoped it would be

possible to answer specific questions relating to date, manufacturer, form and purpose. This was achieved by:

- Inspection of mechanisms and surviving doors for manufacturer stamps to look for evidence of where the glasshouses were made.

- Archaeological recording of the walling beneath the dwarf walls to establish whether further vine arches were present in glasshouse B and whether vine arches were present in glasshouse A and the central missing glasshouse should they survive.

- Archaeological recording of the vine ladders.

Development groundworks methodology

4.2 The lean-to store shed was first removed followed by the careful dismantling of the superstructure of glasshouse A then glasshouse B (**Plate 1**). All mechanical mechanisms attached to the superstructure were carefully removed and placed at a safe distance away from the demolition works. A machine equipped with a 0.50m toothless bucket was used to excavate an exploratory trench (*c*. 0.80m wide) along the front of each glasshouse (**Plate 2**). These were dug to a sufficient depth (up to 1.20m deep) to facilitate archaeological inspection of the walls beneath the dwarf front walls. Each trench could only be excavated to the maximum reach of the machine arm, which was coterminous with the full width of each vine arch. Although it was intended that the machine would expose the entire length of each glasshouse, the presence of obstacles such as fencing and poor ground conditions prevented this (**Plate 2**).

Plate 1. Demolition of Glasshouse A (looking NW)

Plate 2. Excavation of exploratory trench along front wall of central glasshouse (from ENE)

4.3 The vine ladders are generally robust and it was not necessary to protect them during the demolition of the glasshouses, which involved the removal of the superstructures away from the back wall. Similarly, the construction of the new glasshouses will encompass the vine ladders and therefore no damage or alterations will occur.

Archaeological methodology

4.4 The survey conformed to recording Level 2/3 as set out in *Understanding Historic Buildings – A guide to good recording practice* (English Heritage, 2006). Specifically the survey related to the following parts of these recording levels:

- Level 2. Sketch drawings (roughly dimensioned); measured drawings showing the locations of historic features; digital photography showing the context of historic features; written record summarising the building's form, function, date and sequence of development.

- Level 3. Measured drawings to record specific historic features in detail; digital photography to record specific details of historic features; detailed written record to include analysis and discussion of architectural or historic context and significance.

The survey also conformed to the *Standard and Guidance for the archaeological investigation and recording of standing buildings or structures* published by the Institute for Archaeologists (IfA) in September, 1996 (rev.2001 & 2008).

4.5 Historic features were photographed and involved the sole use of digital images captured using a Nikon DS40 SLR camera. All photographs illustrating architectural details featured an appropriately sized scale. The photograph record also included shots showing the Site setting and demolition works.

4.6 The photographic survey was accompanied by digital recording comprising scaled photographs taken on iMeasures using an iPad mini, annotated with accurate measurements and observational notes. This included the position and width of each run of vine ladders, detailed recording of a single representative segment of each of the vine ladders, and a single representative elevation of a vine arch from each glasshouse. These digital records were used to produce digital elevation drawings at an appropriate scale, usually 1:20 and 1:10 respectively. Plans/sections/elevation drawings provided by the client/agent were used as a basis for the drawings reproduced in this report.

Addendum

4.7 The primary objective of the final phase of historic building recording conducted in May 2015 was to record an 'exemplar' of the vine arches. This was achieved by:

- archaeological recording of an 'exemplar' following exposure within the foundation trench for the new foundations
- recording of a representative sample of the vine arches

Three vine arches were recorded as a representative sample. The original plan was to record one at either end and one in the middle however in glasshouse B it was necessary to re-open the previously recorded vine arch due to the presence of a service cable (**Figure 4**). The three test pits were excavated by a machine equipped with a 0.5m toothless bucket, extending to the full depth of the wall and providing a working width of *c.* 1.50m from the vine arch wall.

4.8 Each exemplar vine arch was cleaned by hand. A single representative elevation of each exemplar vine arch was made together with any additional representative historic features. The exemplar vine arches were digitally recorded using rectified photography. The vine arches were photographed digitally using a Nikon DS40 SLR camera with an appropriately sized scale.

4.9 During full exposure of the vine arches of glasshouse A and the central glasshouse, prior to the installation of the protective gauge membrane, archaeological monitoring and recording was carried out to establish whether the vine arches were a continuous feature beneath the dwarf front wall. The results were annotated onto an existing reconstruction drawing, based on recording carried out during the Historic Building Recording by COAS (Green 2014b, fig. 5).

4.10 An interpretation board has been prepared containing information and illustrating the history of the glasshouses, vine arches and selected historic images.

5. Results

Mechanisms

5.1 No glasshouse mechanisms were found to be present in glasshouse A. The roof opening mechanisms and the front window opening mechanism remained *in situ* within glasshouse B prior to demolition. These are best shown in a photographic survey by a Bicton College student which captures the interior of the glasshouses before they became overgrown (Thompson 2009) and reproduced in the Historic Building Evaluation report by COAS (Green 2013) (**Plates 3** & **4**). The roof opening mechanisms comprised a long rotating pole attached to the underside of the principal rafters via brackets, with small hinged arms connected to the central division of each roof light and thicker short arms attached to a long pole via a hinge (**Plate 4**). The lower ends of each long pole were linked to gear mechanisms, each of which were attached to the side of wooden brackets located

along the back wall near ground level (**Plates 3** & **5**). The front window opening mechanisms were very similar, comprising a long rotating pole with short hinged arms attached to the front windows (**Plate 3**).

5.2 Following removal from glasshouse B, it was possible to view details of the roof opening mechanism in more detail. It was evident that the long pole (**Plate 6**) comprised individual sections each of which rotated freely within each bracket, allowing the roof lights to be opened individually or in sections. The gear mechanisms were stamped 'Harding' and 'Torquay' on either side of the handle (**Plates 7** & **8**). Inspection of the front window opening mechanisms did not identify any manufacturer's stamps, however the long rotating pole was again found to comprise individual sections each of which rotated freely within a bracket. At the time of the survey, the eastern end of glasshouse B was still upstanding and the brackets were attached to the supports between each window frame with each hinged arm attached to the central division of each window (**Plate 9**).

Fixtures

5.3 A single tap stamped 'Norwich Tap' 'Halcast' remained *in situ* on the back wall of glasshouse B (**Plate 10**). Pairs of square headed bolts for attaching the wooden brackets for the roof light gears were also present at regular intervals along the same wall.

The vine ladders and plant fixings

5.4 Vine ladders survive along the back walls of glasshouse A and the central glasshouses while less substantial fixings survive along the back wall of glasshouse B (**Figure 2**). In glasshouse A there are 16 ladders measuring *c.* 1.15m wide and set 0.70m in from the gable ends (**Plate 11**). Each ladder consists of 8 rows of wires positioned *c.* 0.33m apart with the wires running through holed pegs driven into the mortar joints between the bricks and held in place with cement (**Plate 12; Figure 3**). The wires measured *c.* 0.07m in diameter and the pegs protruded from the wall by 0.125m (**Figure 3**). The wires are missing from the lowest three rows and some of the pegs are either missing or insecure.

Plate 3. Glasshouse B (looking W) (from Thompson 2009)

Plate 4. Window opening mechanism in roof of glasshouse B (looking N) (from Thompson 2009)

Plate 5. Gear with handle for opening roof lights in glasshouse B (from SW)

Plate 6. Roof opening mechanism of glasshouse B

Plate 7. Close-up of gear for roof opening mechanism with stamp 'Harding' 'Torquay'

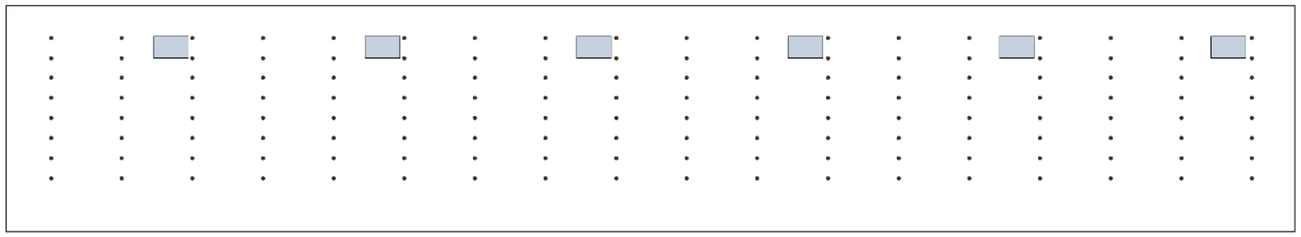
Plate 8. Gear of roof opening mechanism fixed to wooden bracket, with long pole to connect to roof & pin with chain to lock the gear

Plate 9. Front window opening mechanism in glasshouse B during demolition (from NW)

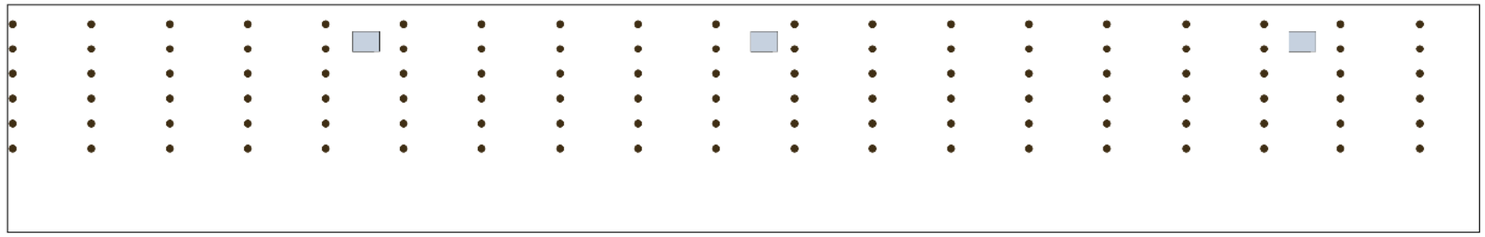
Plate 10. Tap on back wall of glasshouse B, with stamp 'Norwich Tap' 'Halcast' (from SW)

Plate 11. Vine ladders along back wall of Glasshouse A (2 x 2m scales; looking ENE)

Plate 12. Section of vine ladders along back wall of Glasshouse A (2 x 2m scales; looking N)



Glasshouse A



Central Glasshouse

Glasshouse B

Ventilation shutes

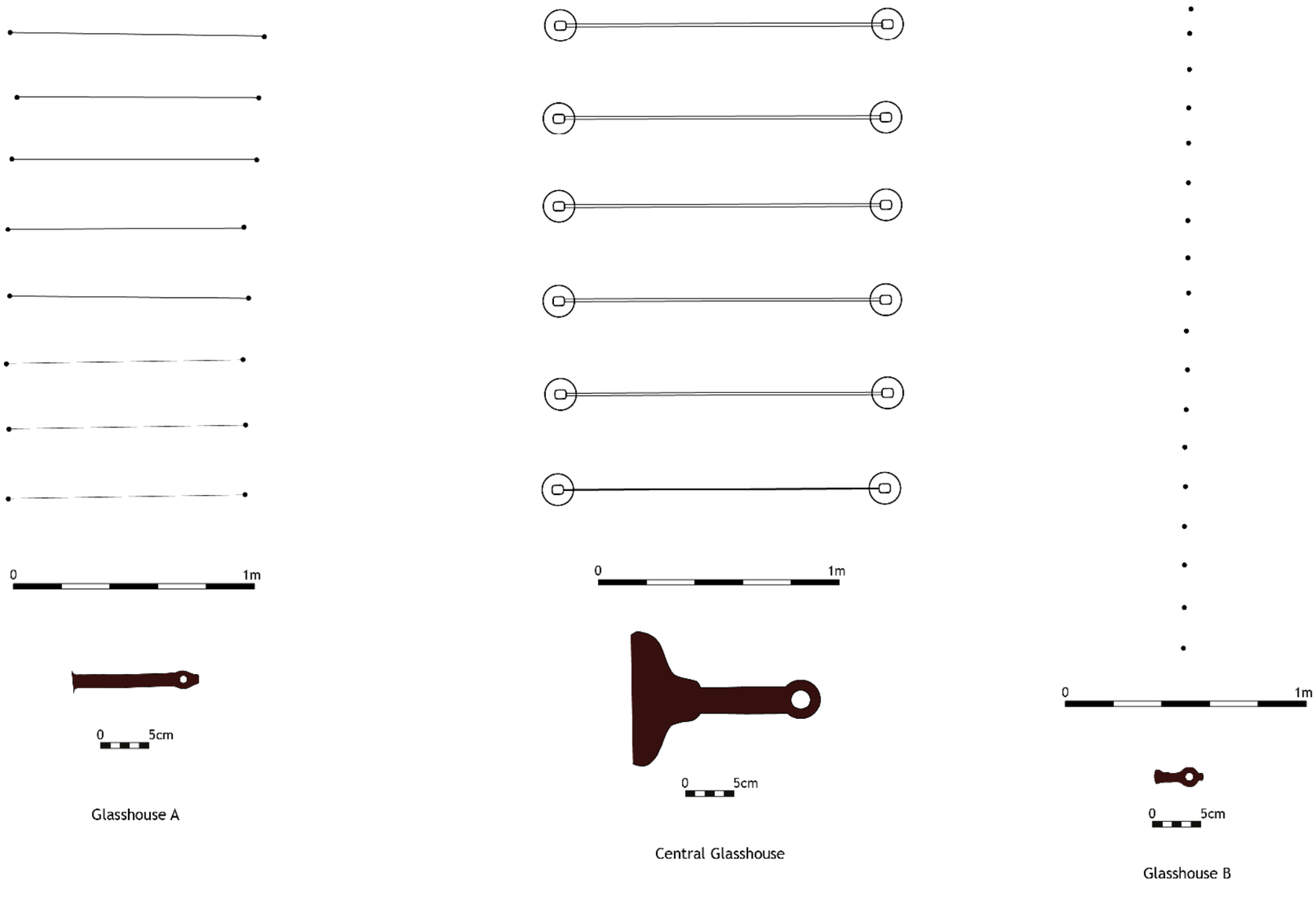
Unsafe to investigate

PROJECT TITLE
The Glasshouses, Bicton College,
East Budleigh, Colaton Raleigh, Devon

FIGURE TITLE
Schematic figure showing ladder configuration and ventilation shutes

SCALE	*PROJECT CODE*	*FIGURE NO.*
as shown	C1/SBR/14/GBD	**2**

Figure 2. Schematic figure showing ladder configuration & ventilation shutes



PROJECT TITLE
The Glasshouses, Bicton College, East Budleigh, Colaton Raleigh, Devon

FIGURE TITLE
Sections of vine ladders showing details of fixtures

SCALE	PROJECT CODE	FIGURE NO.
as shown	C1/SBR/14/GBD	3

Figure 3. Sections of vine ladders showing details of fixtures

5.5 Behind the central missing glasshouse, the vine ladders are the most substantial in terms of the size of the fixings and the dimensions of the wires. There are 18 ladders across a 24.04m length (**Plates 13** & **14; Figure 2**); the ladders vary slightly in width however the section subject to detailed recording measures 1.23m wide (**Plate 15**). The ladders extend to the former position of the west gable wall however they stop just short of the former position of the east gable wall. Each ladder consists of 6 rows of wires positioned *c.* 0.40m apart, the wires running through cylindrical-headed brackets attached to long 'stakes' driven into the wall and held in place with a bell-shaped disc pressed against the wall (**Plate 16; Figure 3**). Where the plates have come adrift the discs can be seen to have left distinct impressions within the brickwork and the underlying render is clean of render, indicating the fixtures were an original feature. The wires measured *c.* 0.12m in diameter and the brackets protruded from the wall by 0.17m (**Figure 3**). The lowest wire has been replaced with a much thinner wire in recent times, in some places the original wires have come adrift from their brackets and some of the discs are hanging off or have partly come away from the wall.

5.6 The rear wall of the garden was largely overgrown at the time of the survey however in the position of the central glasshouse vertical rows of circular plates were observed (**Plates 17** & **18).** These correspond with the positions of the vine ladder fixings and demonstrate that the fixings were driven right through the wall, terminating in the round plates along the rear wall of the garden.

5.7 In glasshouse B the fixtures along the back wall comprise 7 vertical lines of small pegs spaced at *c.* 3.5m intervals (**Plate 19**). There are 8 rows at 0.16m intervals within each vertical line and the pegs have small round holes in the head with a small rectangular projection, and are driven into the mortar joints between the bricks (**Plate 20; Figure 2**). The pegs protrude from the wall by 0.5m (**Figure 3**). No wires are present between the pegs.

Plate 13. Vine ladders along back wall of central glasshouse (looking N)

Plate 14. Vine ladders along back wall of central glasshouse (looking NE)

Plate 15. Section of vine ladders along back wall of central glasshouse (2m scales; looking N)

Plate 16. Fixings for vine ladders along back wall of central glasshouse

Plate 17. Vine ladder fixings in rear wall behind central glasshouse (looking SW)

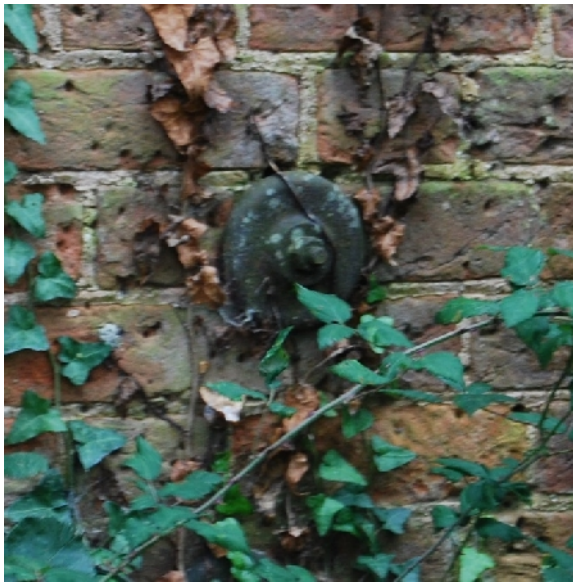


Plate 18. Close-up of vine ladder fixing in rear wall behind central glasshouse (looking SSW)

Plate 19. Vertical lines of small pegs along back wall of glasshouse B (2m scales; looking ENE)

Plate 20. Close-up of vertical line of small pegs along back wall of glasshouse B (0.5m scales; looking NE)

5.8 Rectangular ventilation shutes were present near the top of the back wall behind all three glasshouses although the configurations are variable. In glasshouse A there are six shutes at regular intervals, each on the immediate west side of a vertical vine ladder row (**Figure 2**). In the missing central glasshouse (**Plate 13; Figure 2**) and in glasshouse B (**Plate 14; Figure 2**) there are only three shutes approximately spaced.

The vine arches

5.9 Brick vine arches were found to be present along the front dwarf walls of each of the glasshouses and a single arch was fully exposed for each building, with the tops of further arches visible continuing along the walls. The arches were identical; the lowest part of the arches measured *c.* 1.92m wide. A narrow band of brickwork measuring 0.11m separated the arches (from the outer lowest part of the arch). The arches were constructed of two courses of rowlocks (brick laid on the long narrow side with the short end of the brick exposed) with four soldiers (a brick laid vertically with the long narrow side of the brick exposed), one at either end of the arch and two near the top of the arch (**Plates 21, 22 & 23; Figure 4**). The vine arch exposed during the 2013 survey in front of glasshouse B was of the same dimensions however there were no soldier bricks (see **Figure 4**). The void beneath the exposed vine arch in glasshouse A have been carefully blocked with brickwork (stretcher bond) and the three courses of walling above the arch employ a different type of brick laid Flemish bond and are clearly a later addition (**Plate 21**). Although the brickwork above the arch in the central glasshouse has been broken off, remnants of brickwork to the east reveal that at least one course of bricks continued across the arch (**Plate 22**). There is a single narrow course and a further two to three courses of brickwork above the arches in glasshouse B laid Flemish bond. Following completion of the building survey, COAS were informed that further exposure of the top of the wall showed the arches running the full length of the wall.

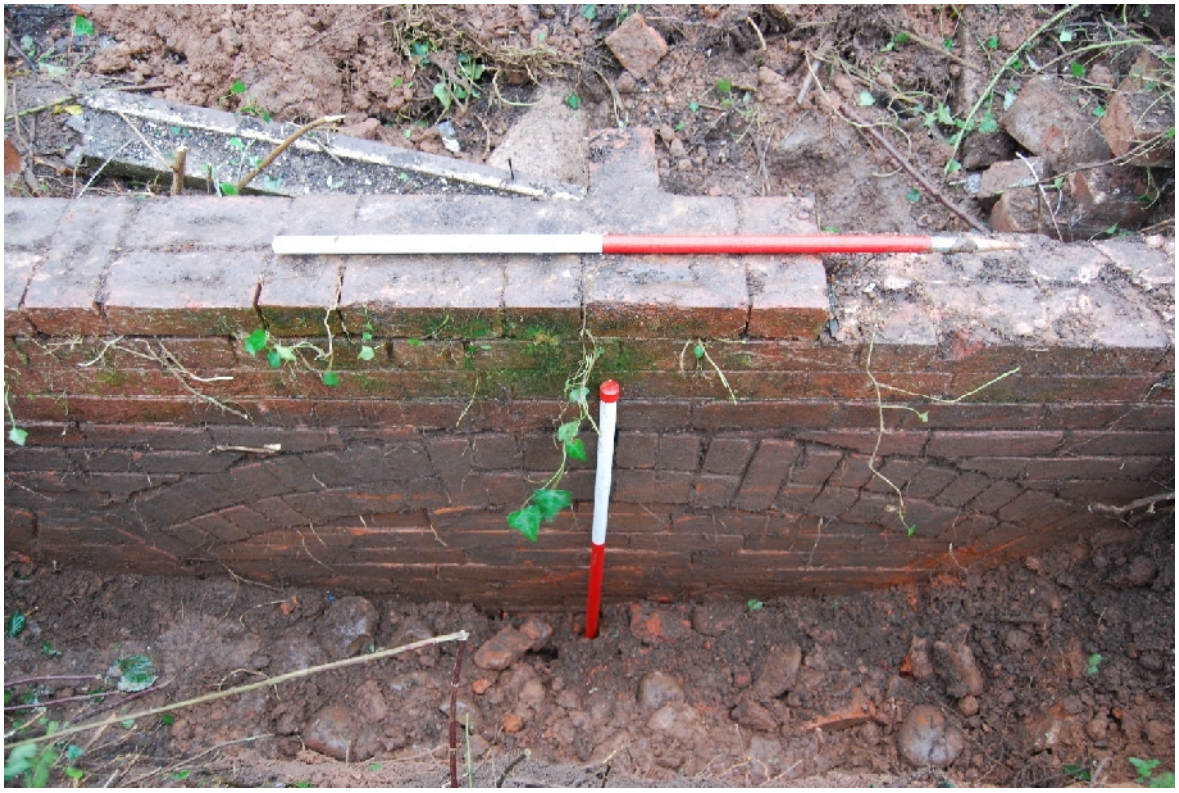


Plate 21. Vine arch in glasshouse A (2 x 1m scales; looking N)

Plate 22. Vine arch in central glasshouse (1 x 1m scales; looking N)

Plate 23. Vine arch in glasshouse B (1 x 1m scales; looking ENE)

Addendum

5.10 Test-pits positioned on the inside of the dwarf front wall revealed the full depth of the vine arches to be 0.7m, inclusive of the depth of the brickwork between each arch (**Figure 4**). Previous visits had recorded the external side of the wall and the inner side was found to differ slightly. In glasshouse B there was a pier in the centre of the arch with a corbel springing from above the

brickwork between the arches (**Figure 4; Plate 24**). These features were one brick wide and rose to the top of the wall. The central piers were constructed of equally sized bricks whereas the corbels comprised four courses with two smaller bricks below and two larger bricks above. The purpose is unclear however they may have provided a support for elements of the glasshouse superstructure. Interestingly, in glasshouse A and the central glasshouse the piers and corbels had all had been broken-off to varying degrees, reflecting the significant alterations to the former (**Plate 25**) and possibly relating to the demolition of the latter (**Plate 26**). The absence of soldier bricks in the exemplar arch of glasshouse B was also noted on the inner side (**Plate 24**). The mortar for the brickwork throughout the vine arches was identical, comprising natural silty sand with some shell inclusions.

5.11 It was confirmed that the vine arches ran continuously along the front of the glasshouses, with the exception of one area of solid walling measuring 2.2m in width towards the eastern end of the central glasshouse (**Plate 27**). This is the same width as the widest measurements of the arches and therefore is simply a section where no arch was built. It was also confirmed that all the arches in glasshouse A had been roughly blocked (**Plate 25**) and that the courses of brick above the vine arches in the central glasshouse had previously been removed (**Plate 26**), no doubt during demolition of the superstructure in the early 20th century. A ceramic pipe ran through the blocking of the exemplar arch in glasshouse A (**Plate 25**).

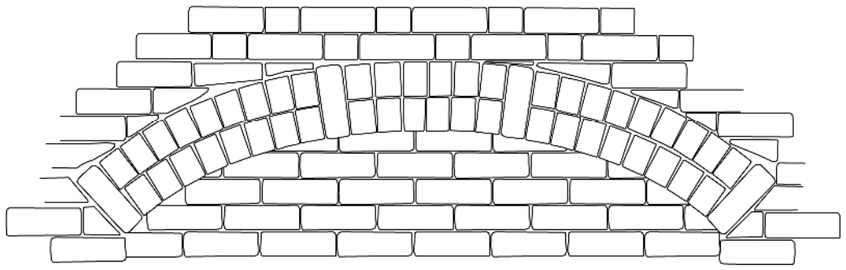
Plate 24. Vine arch in glasshouse B (inner side) showing central pier & corbels (1 x 1m scales; looking S)

Plate 25. Vine arch in glasshouse A (inner side) showing broken central pier & corbels (1 x 1m scales; looking S)

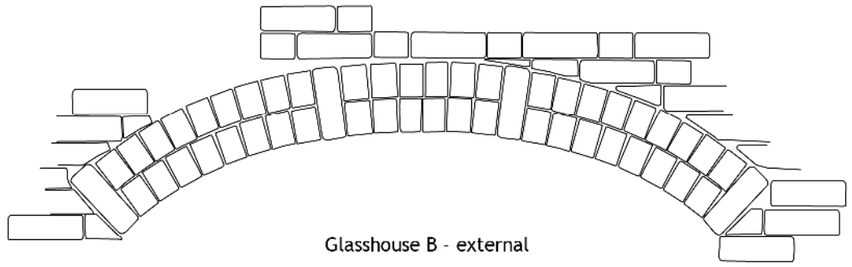
Plate 26. Vine arch in central glasshouse (inner side) showing broken central pier & corbels (1 x 1m scales; looking S)

Plate 27. Solid walling between arches in central glasshouse (1 x 1m scales; looking SSW)

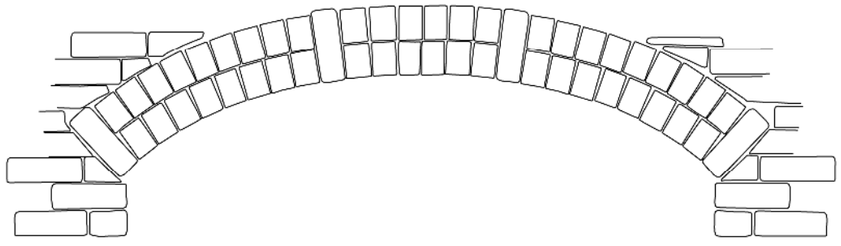
5.12 No archaeological features or deposits were observed during the test-pitting or during the construction excavations along the inside of the vine arches. The deposit sequence comprised deep topsoil, sometimes above a rubble layer of broken bricks (**Plate 28**) with mortar and some concrete, above clean natural sand with some very large flint/ chert nodules. Some of these nodules had been utilized to create a solid support beneath the wall (**Plate 26**). The rubble layers may relate to the breaking-up of previous Victorian structures or, more likely, alterations during the lifetime of the structures such as the removal of the brick piers and corbels or perhaps the removal of internal walls. This reveals that the inside of the glasshouses had been previously disturbed to a depth of *c*. 0.50m with natural geology directly beneath.



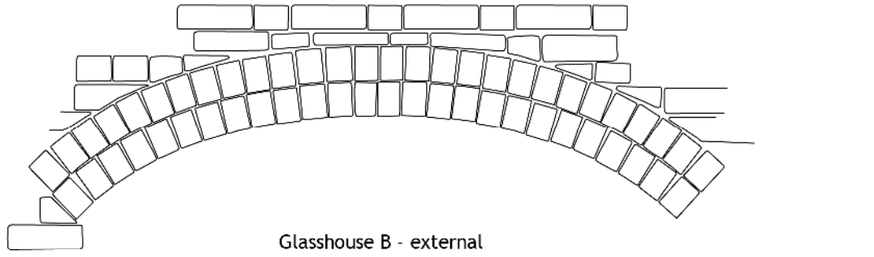
Glasshouse A - external



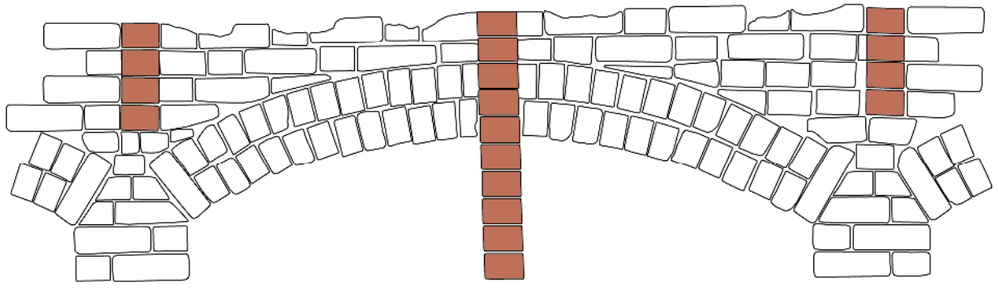
Glasshouse B - external



Central Glasshouse - external



Glasshouse B - external



Glasshouse B - internal

0
1m

PROJECT TITLE The Glasshouses, Bicton College, East Budleigh, Colaton Raleigh, Devon		
FIGURE TITLE Elevations of selected vine arches and schematic representation of full length of vine arches		
SCALE as shown	*PROJECT CODE* C1/SBR/14/GBD	*FIGURE NO.* 4

Figure 4. Elevations of selected vine arches and schematic representation of full length of vine arches

Plate 28. Layer of rubble encountered during excavation of glasshouse B test-pit (2 x 1m scales; looking S)

6. Discussion and Conclusions

6.1 Following the Historic Building Evaluation (Green 2013) and the subsequent Heritage Statement (Green 2014) carried out by COAS, a final phase of building recording was required for the two extant glasshouses and third central glasshouse which had been removed by 1905. The purpose was to attempt to answer specific questions relating to date and manufacturer and to record the form and extent of the vine arches and vine ladders. These questions could only be answered once the unstable superstructure of the glasshouses had been removed and the footprint of the buildings entered.

6.2 Glasshouses were very popular in the second half of the 19th century; following the 1851 Great Exhibition in London they became an important addition to the Victorian kitchen garden, providing the variety of exotic fruit and vegetables demanded at the time. By the 1880's the factory production of glasshouses was well established with designs advertised in brochures, pamphlets and catalogues (Hix 1974, 101). Both of the Bicton examples were very similar in form to other Victorian glasshouses, such as those recorded on drawings of the Royal Kitchen Garden at Frogmore and at Dalkeith Palace kitchen garden (see Green 2013, Plates 50 & 51). They were also similar to examples in the 1888 Boulton and Paul catalogue, the Norwich glasshouse producers who, it was suggested in the Historic Building Evaluation, may have manufactured glasshouse B (Green 2013, 25). They were certainly built somewhere between 1842, and 1889 (*ibid.*, 3), although a date from the 1860's following the Great Exhibition seems most likely.

6.3 The mechanisms and doors were inspected for manufacturing stamps to look for evidence of where and when the glasshouses were made. The gear mechanisms for the roof opening system in glasshouse B are stamped with 'Harding Torquay'. A search of on-line resources suggests that this was T. L. Harding, which in 1878 was an ironmongers shop and iron foundry in Torquay, later becoming T. L Harding & Sons, Torquay, which continued to operate in to the 20th century. The Historic Building Evaluation concluded that the purlin, principal rafters, common rafters and frames (for the gable ends and front windows) of glasshouse B appeared to be original (*ibid.*, 22). However, the glazed roof with lead tingles represents a replacement, although the tingles may have been re-used from the original roof (*ibid.*). Crucially, the alcan glazing bars were misaligned from the rest of the glasshouse frame creating an atypical uniform appearance (*ibid.*). Consequently, it is likely that the roof opening system manufactured by Harding, at least in part, formed part of this later addition. The front window opening system, which is very similar in form

with hinged arms attached to individually rotating poles set within a bracket, is likely to be of the same date.

6.4 The vine ladders behind the vanished central glasshouse are the most substantial, with a spike piercing right through the back wall and fixed in place with rounded plates on either side. By contrast, the fixings for the vine ladder of glasshouse A are much more insubstantial, the fixings only penetrating a short distance into the mortar joints of the brickwork with thinner wires suspended between. In glasshouse B, the even smaller fixings (comprising small bolts set within the mortar joints of the brickwork) are spaced at much wider distances and with no intact wires. The configuration of ventilation shutes are different for each glasshouse, with six ventilation shutes in glasshouse A and only three behind each of the other two glasshouses.

6.5 The wall containing the vine arches was found to run continuously beneath the dwarf front walls of all three glasshouses with vine arches throughout. From the four arches recorded in detail, it was established that these were of the same dimensions and form, although one of the two recorded arches in glasshouse B had a slightly different construction with no rowlocks in the brickwork. The blocking of the vine arches in glasshouse A appears to have been a modern addition, possibly carried out during the early 20th century re-modelling of the glasshouse.

6.6 To conclude, the evidence from the vine ladders and ventilation shutes indicate that each glasshouse was intended for a different function whereas the continuous vine arches suggest that all three glasshouses were intended for the growing of vines from the outset. It appears that only the central glasshouse was actually used for this purpose, as this retains original and substantial vine ladders strong enough for supporting grapes. The 'vine ladders' in glasshouse A are less substantial and possibly not original, while the fixings in the back wall of glasshouse B are certainly a later addition and probably intended for supporting light-weight plants such as flowers. There are no scars on the back walls to suggest that vine ladders similar to those of the central glasshouse were ever present, indicating that the other two glasshouses were from the very beginning utilized for other plants. The more numerous ventilation shutes in the back wall of glasshouse A suggest this glasshouse required greater air flow therefore further supporting the theory that the original glasshouses were used for different purposes. From a construction perspective, it would have been easier to have built a single wall than three individual sets of foundations. However, the presence of three separate glasshouses was established during the previous Historic Building Evaluation, meaning that the individual dwarf front walls for each structure were built above the arches. Indeed, the dwarf walls of glasshouses A and B use distinctly different bricks.

6.7 Unfortunately, no evidence was found regarding the exact date and manufacturer of the original fabric of glasshouse B. Although a tap stamped 'Norwich' suggests a link with Boulton and Paul, no convincing evidence was found to support the claim that the Norwich company made the glasshouse. Indeed, the glasshouses are fairly standard for large kitchen gardens of the time and it does seem more likely that they were supplied by a more local company. The roof opening system and probably the front window opening system were made, at least in part, by Harding of Torquay. Although this company was certainly in operation in 1878, the mechanisms must have been installed when the roof was replaced in the early 20th century.

Addendum

6.8 With the exception of one small area of solid walling near the eastern end of the central glasshouse, the vine arches were found to run continuously beneath the dwarf front walls. The vine arches in glasshouse B were slightly different in design to those in the other glasshouses with no soldier bricks in the apex of the arch. Also, a central brick pier and corbels on either side of the arch were present on the inner face, probably providing added support for the superstructure. These had been broken off to varying degrees in the other two glasshouses, reflecting damage during demolition of the central glasshouse and alterations to the superstructure of glasshouse A. The brickwork courses above the vine arches in the central glasshouse had also been largely removed, making these vine arches more vulnerable to damage. No archaeological features or deposits were encountered during the test-pitting or groundworks and no finds were recovered. However, spreads of rubble indicate previous impact levels inside the glasshouses of *c.* 0.5m below the top of the vine arches. These spreads most likely relate to debris from structural alterations during the lifetime of the glasshouses and directly overlay the natural geology.

7. Archive

7.1 The project archive is currently held by COAS and consists of the following:

Item	Number	Format
Digital recording survey images	41	.JPG
Digital images	97	.JPG

7.2 The information in the report will be entered onto the Devon County Council Historic Environment Record (HER).

7.3 The Devon County Council HER will receive a digital copy of the report as a PDF document. As part of our commitment to public archaeology, the full report will then become freely available as a downloadable document from the COAS Ltd website at http://www.contextone.co.uk. Following the completion of the report, an OASIS form will be completed.

8. COAS acknowledgements

8.1 We would like to thank the following for their contribution to the successful completion of this project:

Dave Pierce, Morgan Sindall
Stephen Reed, Archaeologist, Devon County Council
Claire Walkey, Project Manager, NPS South West Ltd

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