South Hill Park Bracknell
Lake Dam Culvert Investigation

Archaeological Watching Brief Report

oxford archaeology south

March 2015

Client: Bracknell District Council

Issue No: 2
OA Job No: 6113
NGR: SU 87073 66811

Archaeological Watching Brief

Client Name:	Bracknell District Council
Client Ref No:	
Document Title:	South Hill Park, Bracknell: South Lake Sluice Investigation
Document Type:	Archaeological Watching Brief Report
Issue/Version Number:	2
Grid Reference:	SU 87073 66811
Planning Reference:	N/A
Invoice Code:	BRPASHWB
OA Job Number:	6113
Site Code:	BRPASH15
Receiving Museum:	Reading Museum
Museum Accession No.:	
Event No.:	

Issue	Prepared by	Checked by	Approved by	Signature
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Document File Location:	X:\s\South_Hill_Park_Bracknell\2015 Culvert Watching Brief
Graphics File Location:	R:\B_invoice codes\BRPASHWB
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South Hill Park, Bracknell: South Lake Sluice Investigation

Archaeological Watching Brief Report

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Summary

On January 26th and 27th 2015 Oxford Archaeology South (OAS) carried out an archaeological watching brief at South hill Park, Bracknell, Berkshire (NGR SU 8710 6675), during ground investigations at the northern end of South Lake, on the site of a former sluice. The work was carried out on behalf of Bracknell Forest Borough Council to investigate the cause of a collapse in the pathway overlying the sluice, and to investigate the date and function of a brick-arched culvert exposed by the collapse. The ground investigation and archaeological watching brief were required to inform a programme of remedial and repair works.

The investigation revealed that the subsidence had occurred over part of the original 18th century culvert, in a section which had previously collapsed and been repaired in recent times. Further investigation exposed a series of parallel brick channels along the crest of the weir or dam, thought to be inlet channels designed to carrying excess water over the bank and under the footpath.

1 INTRODUCTION

1.1 Scope of work

1.1.1 Oxford Archaeology South (OAS) carried out an archaeological watching brief during a ground investigation within the gardens of South Hill Park, Bracknell, Berkshire (centred on NGR SU 8710 6675), following the subsidence of a section of footpath at the north end of South Lake, which had exposed an old brick culvert (Plate 1). The South Hill Park Manager (Kath Moss) organised the investigation on behalf of Bracknell District Council to establish the nature and significance of the brick structure (Fig. 2) and to inform the necessary repair work. Berkshire Archaeology advised of the need for an archaeological watching brief during the ground investigation, and prepared a specification detailing the scope of work. The ground investigation took place on January 26th and 27th 2015.

1.2 Location

1.2.1 The site is located at South Hill Park, Bracknell, Berkshire, centred at OS Grid Coordinates: SU 87073 66811 (Fig. 1).

1.3 Archaeological and historical background

1.3.1 The archaeological and historical background to the site has been described in the Conservation and Management Plan (CMP, November 2005). The CMP includes a review of history of the site, including consideration of historic maps. The following outline history of the Park, and details relating to the hydrology of the site and creation of the lakes, is drawn from the CMP except where otherwise referenced below.

1.3.2 The following six main periods have been identified in the development of the park:

- Period One: Early history to 1750;
- Period Two: 1760-1810 – William Watts' ownership;
- Period Three: 1810-1853 – Limerick ownership;
- Period Four: 1853-1930s – High Victorian period;
- Period Five: 1940-1963 – Institutional ownership;
- Period Six: Arts Centre and public ownership.

1.3.3 South Hill Park itself comprises a Grade 2 Listed building and a Registered Park and Garden. In the mid-17th century the park was enclosed, possibly illegally, and a mansion was built at some date prior to 1679. The estate at that time was described as a park of about 100 acres (40ha) with fields, orchards, woods and a pond or ponds.

1.3.4 William Watts, an official of the government of Bengal, acquired the estate and had a house built in the Italianate style, for his retirement, in 1760. The Park was extensively landscaped in the 18th century, including the creation of lakes and parkland, with extensive woodlands. North and South Lakes were probably established in essentially their current form this period, by damming the Gormoor Brook. The pond between North and South Lakes was subsequently infilled in the late 19th century and the watercourse covered with a culvert.

1.3.5 During the first half of the 19th century the Earl of Limerick increased the estate from 148 to 346 acres and began development of the pleasure grounds to south of the house. Later in the century Sir William Hayter laid out new geometric gardens, terraces,

shrubberies and serpentine walks, and remodelled the house in the Italianate Style. The architect Temple Moore designed the later 19th century redevelopment of the house, which resulted in the present form.

1.3.6 In the 1930s the house was converted into luxury flats. During WWII South Hill Park housed the Royal Sea Bathing Hospital, which had been evacuated from Margate, and after the war was used by the BBC as a recording studio. The 17th century enclosed park, gardens, lakes, carriage drives and productive kitchen gardens continued to be maintained until the development of the new town, which had very a significant impact on the development of the site.

1.3.7 Bracknell Development Corporation took over South Hill Park in 1963. The house was developed as an arts centre, while 6 Ha of the Park was opened to the public. During this phase the lakes were reduced in size, Ringmead was constructed, carparks were added, and new housing areas were built over two thirds of the area of the original enclosed park and inside the walled garden. The other third was linked to the surrounding area of the new town via numerous paths. Further modifications were made subsequently over time, including further changes to the lakes, while the extents of the formal gardens were gradually reduced (CBA 2005).

1.3.8 Previous archaeological work at South Hill Park has included a watching brief during geotechnical test pitting in advance of the proposed construction of a disabled access ramp in December 2008. The results revealed details of the construction of the south terrace walls and deposits of made ground associated with landscaping of the grounds . A photographic record of the South Lake inlet and retaining walls was also undertaken at the same time following subsidence of part of the retaining wall (OA 2009). Further watching briefs were completed between December 2010 and November 2011 during renovation works, which comprised watching briefs on nine areas of landscaping and 10 tree pit excavations (OA 2012). The investigation revealed minor details of earlier phases of landscaping.

1.4 Hydrology

1.4.1 The north and south lakes were established in the latter half of the 18th century on the line of the Gormoor Brook, a stream which rises in a valley in Bracknell Forest to the south. The line of the brook is now largely set in a culvert (part underground). The stone-built, circular-sectioned inlet culvert which carries the stream into South Lake was photographed during renovation works in 2008 (OA 2008). A number of surface water drains feed into this local system (some flow directly into the lakes) and these form the principal source of water feeding into the lakes. The South Lake is linked to the North Lake via an underground culvert, which runs beneath the car park and Ringmead. A third lake that formerly filled the gap between North and South Lakes was infilled during remodelling of the site in the late 19th century. Water flows via an artificial dam and sluice at the northern end of the north lake into the balancing pond and then via an underground culvert beneath South Hill Road. From there the line of the current stream then broadly follows that of the original Brook in a north-westerly direction, flowing into Mill Pond on the western edge of Bracknell.

1.5 Project Aims and Methodology

1.6 Aims

1.6.1 The specification lists the following questions to be addressed by the investigation:

- What was the cause of the collapse?
- What is the date, nature and purpose of the brick-lined culvert?
- What is the nature and condition of the capping to the culvert between the void and the Headwall?
- How deep is the culvert and what is at its base?
- Do other culverts exist along the length of the Headwall and if so, what is their condition?

1.7 Methodology

1.7.1 A watching brief was maintained during the excavation of three adjoining trenches. All excavation work was carried out using a mini-digger fitted with a toothless ditching bucket.

1.7.2 The structures exposed were cleaned up with hand tools, photographed, and surveyed using a combination of GPS survey and hand drawing. All work was carried out under the supervision of an experienced archaeologist. Recording followed procedures detailed in the OAS Fieldwork Manual (Wilkinson 1992)

2 RESULTS

2.1 Description of deposits

2.1.1 **Trench 1** was centred on the collapsed footpath section and measured 2m x 2m. It was excavated to a depth of 1.43m, further exposing the partially collapsed north-south aligned brick culvert (context 1), presumed to be an original feature of the lake sluice arrangements. The intact northern section of the culvert comprised a semi-circular brick arch, the bonding mortar of which appeared somewhat degraded (Plates 2, 3 and 4). The unfrogged bricks are only broadly dateable to the late 18th or early 19th century, but are consistent with the suggested late 18th century date of construction for the lakes.

2.1.2 A section of the culvert adjacent to the headwall had collapsed previously and been repaired in recent years with a pair of parallel, single skin brick walls, constructed with modern frogged bricks. Steel support bars and metal pipes were placed across the gap between the walls, supporting a roof of corrugated metal sheets, which were in turn covered with a 0.20m thick layer of poured concrete. An inspection hole had been built into this structure.

2.1.3 Within the south-facing section there appeared to be a cut (context 7) into the clay forming the dam structure (context 8) on either side of the culvert. It is uncertain whether this was made during the original construction of the culvert or during the modern repair. Overlying the clay forming the body of the dam (contexts 6 and 8) was a layer of made ground forming the surface (context 5).

2.1.4 **Trench 2** was a 1m wide trench which extended northwards from the culvert headwall for a distance of 3m, joining up with Trenches 1 and 3 at a right angle. It was excavated down to the concrete slab recording in Trench 1 and did not reveal any features of archaeological interest.

2.1.5 **Trench 3** extended for a distance of 13m in an easterly direction from Trench 1, along the top of the upstream side of the dam. It was excavated to a maximum depth of 0.74m. The trench was excavated through the modern path surface (context 9), which comprised a very dark grey pebble and sand mix with a surface of yellow sand. This overlay a loose, mixed soil (context 3) which covered and infilled a series of parallel brick channels (context 2). Context 3 produced a single sherd of red border ware pottery, which has a date range of *c* 1700-1850.

2.1.6 The brick channels (context 2) had an approximately U-shaped profile up to 0.8m in diameter and 0.75m deep. They all appear to be of the same period and the unfrogged bricks are consistent with a late 18th century date. The channels appear somewhat irregular in their spacing and dimensions, possibly as a result of subsidence (Fig.3, Plates 5, 6 and 7). They were generally constructed in English style bonding although the uppermost layer was in headed bond. The mortar was somewhat degraded.

2.2 Finds

2.2.1 ***Bricks*** - Two sample bricks were recovered from contexts 1 and 2, the culvert and inlet channels respectively, for specialist identification. Both are complete unfrogged soft red bricks of late18th – early 19th century date. The brick from the culvert had two different types of mortar adhering, primary white overlain by secondary grey. The brick from the channels had only grey mortar adhering.

2.2.2 ***Pottery*** - A single rimsherd from a pottery dish in red border ware (RBOR) was recovered from context 3, the infill of the brick channels. The sherd has a sooted exterior from heating/ cooking. This pottery has a date range of *c* 1700 - 1850 but is clearly from a disturbed context, later in date than the original lake construction.

3 Discussion and Conclusions

3.1 Interpretation of the exposed brick structures

3.1.1 The brick culvert exposed in the path collapse, when overlaid on the 1871 OS map, clearly lies on the west side of the lake dam. An outflow channel appears to be depicted at the northern end of the culvert, although the map is too small scale to show any detail. As the culvert is at a lower level than the brick channels in Trench 3 it is probably a sluice gate, designed to by-pass the dam. While the dam/ weir structure would have maintained the water level in the lake at a consistent level, the sluice gate would have allowed South Lake to be drained, by blocking the inlet at the southern end of the lake, then opening the upstream end of the culvert, releasing the lake waters into the northern lakes. This would have allowed maintenance of the lake, including de-silting. Ornamental lakes require periodic dredging to maintain their form which, before the advent of mechanised dredging, would have been done by hand. Without careful maintenance silt soon builds up and the banks are liable to collapse (Turner 1985). Opening the gate in times of flooding would also have helped to carry excess water downstream.

3.1.2 No evidence was found for a sluice gate, but one must have been present, located directly above the upstream end of the culvert (in the vicinity of the collapsed section). It is unlikely that there would have been multiple culverts on a structure this small. Much larger dams commonly have only one sluice-gate. For example, at Petworth House in Surrey, in 1752, Capability Brown designed a much larger earth dam with a single culvert underneath the main bank. The culvert in that case was controlled by a wooden sluice gate operated from the crest of the dam through a vertical shaft (Skepton 2002). Various sluice gate designs were in use in the late 18th - early 19th century, for a wide variety of water management purposes, a common form being a hand-wheel operated vertical metal screw, raising a vertically-sliding timber gate. Surviving examples of 18th century sluice gates include those at Mortimer Cross Mill, Herefordshire (HAC 2008).

3.1.3 The parallel brick channels in Trench 3, when overlaid on the Ordnance Survey map of 1871, clearly lie along the upstream edge of the dam separating South Lake from the (now infilled) lake to the north (Fig. 2). They are presumed to be inlet channels to carry overflow from the South Lake into the northern lakes, thus preventing the water in South Lake from rising above the desired level. The structure as a whole is described as a 'sluice' on the 1871 map, which if correct would imply the presence of one or more gates on the upstream side. This could refer to the brick culvert in Trench 1. Certainly no traces of gates were found in Trench 3, but if present they could have been positioned slightly further to the south, beyond the limit of excavation. Given the comparatively small scale of the lakes and limited flow of water from the Gormoor Brook it is possible that the parallel brick channels had no associated gates and rather served as a weir, channelling excess water over the clay bank and underneath the path.

3.1.4 In 18th century ornamental parks the unsightly sluice gate controls were sometimes hidden within an ornamental structure such as a bridge or summerhouse. There is no evidence for any superstructure in this case. The 1843 Tithe Map shows a simple path running across the top of the dam.

3.2 Condition of the dam and culvert

3.2.1 The collapsed section of path coincides with both the original collapse in the culvert arch and the subsequent modern repair. There appears to be evidence of water getting past the metal seal of the culvert and into the cavity under the concrete slab, which in turn may have affected the supporting material for the path. The condition of the metal (both sheeting and supports) within the capping structure was found to be badly degraded, with the metal sheeting providing almost no support to the concrete.

3.2.2 A very similar situation seems to have arisen at Stourhead in Wiltshire, where a recent collapse in a path overlying an 18th century lake dam revealed a brick-arched culvert of similar type to that at South Hill Park [Parkhttps://archaeologynationaltrustsw.wordpress.com/2014/07/19/stourheads-dam-drain/].

3.2.3 The base of the original culvert was largely obscured by a build up of mud/silt, to the extent that the full depth could not be established. The top of the culvert arch was 1.06m below the path surface.

3.2.4 Excavation further eastwards along the lake dam revealed what appears to be inlet channels, which are entirely infilled. These may extend further to the eastern side of the dam.

3.2.5 Proposed repair works

3.2.6 Because the path is used to allow trucks, as well as pedestrian traffic, into the grounds, the engineer recommends that the collapsed inspection manhole is not reinstated. The following repair method will be followed:

1. Remove, completely, the concrete and steel supports over the upstream end of the culvert. Take additional photos of the exposed upstream end of the culvert behind the headwall.
2. Move the rubble which is currently filling the excavation up towards the headwall to expose the collapsed end of the culvert. Take a downstream photo of the inside of the culvert.
3. Protect the top of the culvert by laying a sheet/sheets of Richard Lees Holorib over the top, supported on either side of the culvert by carefully graded hardcore.
4. Pour concrete grade GEN 3 on top of the steel sheet to a depth of 150mm. This will protect the culvert from further collapse.
5. Once the concrete has gained sufficient strength, after approximately 14 days, the excavation will be backfilled with the material which was removed, and compacted in 150mm layers using a wacker plate.
6. The sluices will be filled with small mixed aggregate, 10mm down, and then compacted as far as possible, possibly by overfilling and using a wacker plate.
7. The geotextile membrane will be replaced and filled as it was originally
8. The footpath will be finished with material to match the original surface.
9. Settlement will be expected over 12 – 18 months, so topping up will be required.

APPENDIX A. ARCHAEOLOGICAL CONTEXT INVENTORY

Context	Type	Depth	Width	Length	Comments	Finds	Date
1	structure				culvert	brick	C18th/19th
2	structure				sluice	brick	C18th/19th
3	deposit				make up layer	pottery	C18th/19th
4	layer				topsoil		
5	deposit				make up Layer		
6	fill				back fill of [7]		
7	cut				cut for culvert		
8	deposit				clay		
9	deposit				pathway layer		

Appendix B. Bibliography and references

Berkshire Archaeology December 2014, Specification for Investigatory Works Adjacent to the Head Wall, South Hill Park, Bracknell

CBA, 2009 South Hill Park Arts Centre, Design and Access Statement. Chris Blandford Associates on behalf of Bracknell District Council

CBA, 2005 South Hill Park Arts Centre, Conservation Management Plan. Chris Blandford Associates on behalf of Bracknell District Council

Oxford Archaeology, 1992 Fieldwork Manual, (Ed. D Wilkinson, first edition, 1992)

Oxford Archaeology, 2009 South Hill Park, Bracknell, Berkshire; Archaeological Watching Brief, unpublished client report

HAC 2008 Mortimer's Cross Mill, Lucton, Herefordshire, Archaeological Survey and Recording, November 2008. Herefordshire Archaeology Series 806, Archaeology Data Service

Skempton, A, (ed), 2002 Biographical Dictionary of Civil Engineers, Volume 1, 1500 – 1830. ICE and Thomas Telford Ltd, p.83

Appendix C. Summary of Site Details

Site name:	South Hill Park, Bracknell: South Lake Sluice Investigation
Site code:	BRPASH15
Grid reference:	NGR SU 8710 6675
Type of inestigation:	Watching brief
Date and duration of project:	26th and 27th January 2015
Area of site:	17m^2
Summary of results:	Oxford Archaeology South (OAS) carried out a watching brief during ground investigations at the northern end of South Lake, on the site of a former sluice. The work was carried out on behalf of Bracknell Forest Council to investigate the cause of a collapse in the pathway overlying the sluice, and to investigate the date and function of a brick-arched culvert exposed by the collapse. The ground investigation and archaeological watching brief were required to inform a programme of remedial and repair works. The investigation revealed that the subsidence had occurred over part of the original 18th century culvert, in a section which had previously collapsed and been repaired in recent times. Further investigation exposed a series of parallel brick channels along the crest of the weir or dam, thought to be inlet channels designed to carrying excess water over the bank and under the footpath.
Location of archive:	Oxford Archaeology, Osney Mead, OX2 0ES, pending deposition at Reading Museum

Figure 1: Site location

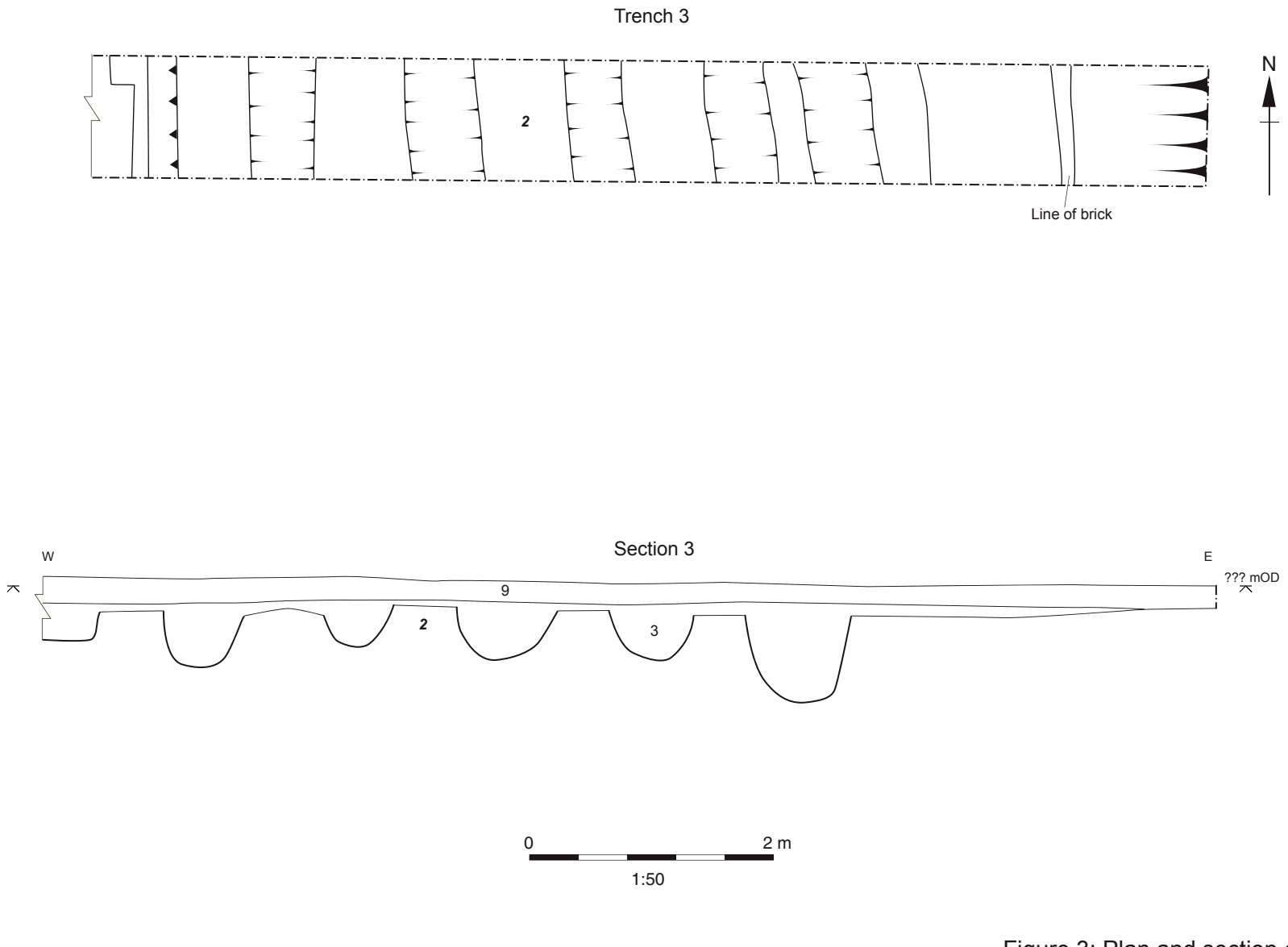

Figure 3: Plan and section of Trench 3

Plate 1: Showing collapse of path

Plate 2: State of corroded concrete slab

Plate 3: Showing state of condition of culvert

Plate 4: Concrete slab and inspection hole

Plate 5: Western end of sluice

Plate 6: Centre of sluice

Plate 7: Eastern end of sluice

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