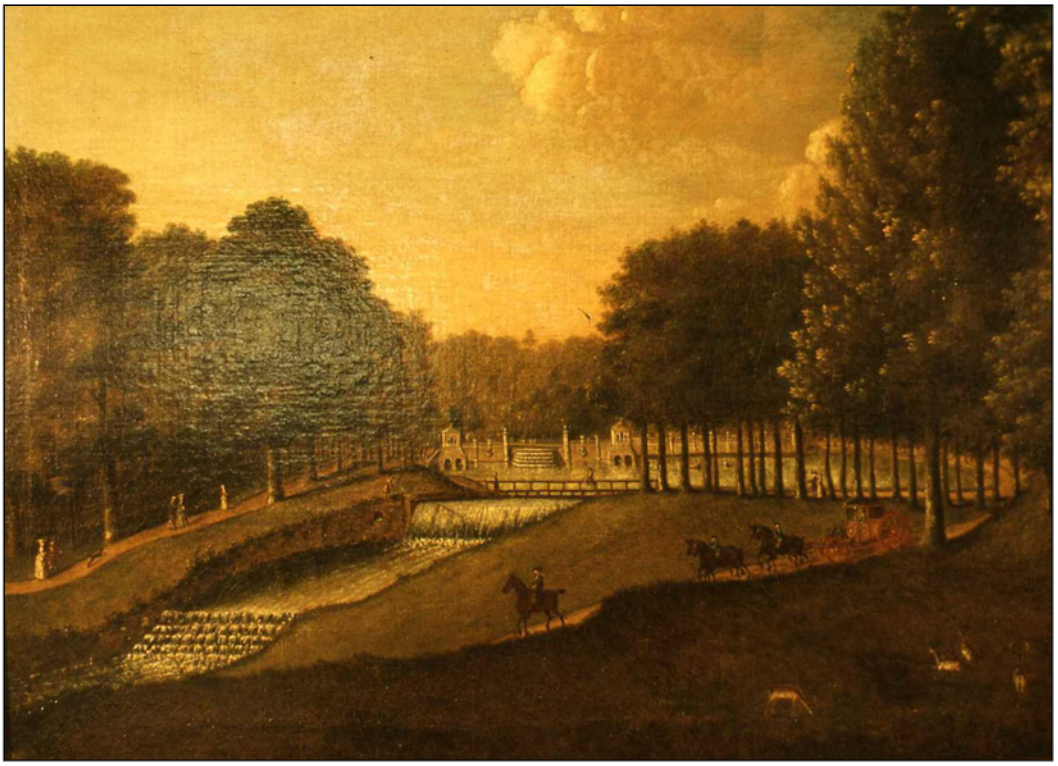
OUTLET DAM AT STUDLEY ROYAL WATER GARDEN.

REPORT ON AN ARCHAEOLOGICAL EVALUATION

OSA REPORT No: OSA17EV32

December 2017



OSA

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Painting of Studley Lake from downstream the River Skell, showing the outlet dam.
- Balthazar Nebot, mid-18th Century.

Report Summary.

REPORT NO:	OSA17EV32
SITE NAME:	Outlet Dam at Studley Royal Water Garden
NATIONAL GRID REFERENCE:	SE 28177 69275
COMMISSIONED BY:	National Trust (North Region). Goddards 27 Tadcaster Road York YO24 1GG
TEXT:	James Stanley Ryan Wilson
GRAPHICS:	Ryan Wilson
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TIMING:	Fieldwork: September 2017 Post excavation & report preparation: October-December 2017
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1.0 Abstract.

An archaeological evaluation was undertaken by On-Site Archaeology Limited *in September 2017. The evaluation was commissioned by Mr Mark Newman, Archaeological Consultant for the National Trust, to record remains exposed during repair works during the resurfacing of the crest of the outlet dam at Studley Lake.*

The existing concrete surface of the western side of the dam crest, an area measuring approximately 21 metres by 4 metres, was excavated in advance of the installation of new concrete capping. Excavation revealed the stonework of the former surfacing of the dam and remains of a timber structure with associated ironwork, which appear to relate to a former footbridge.

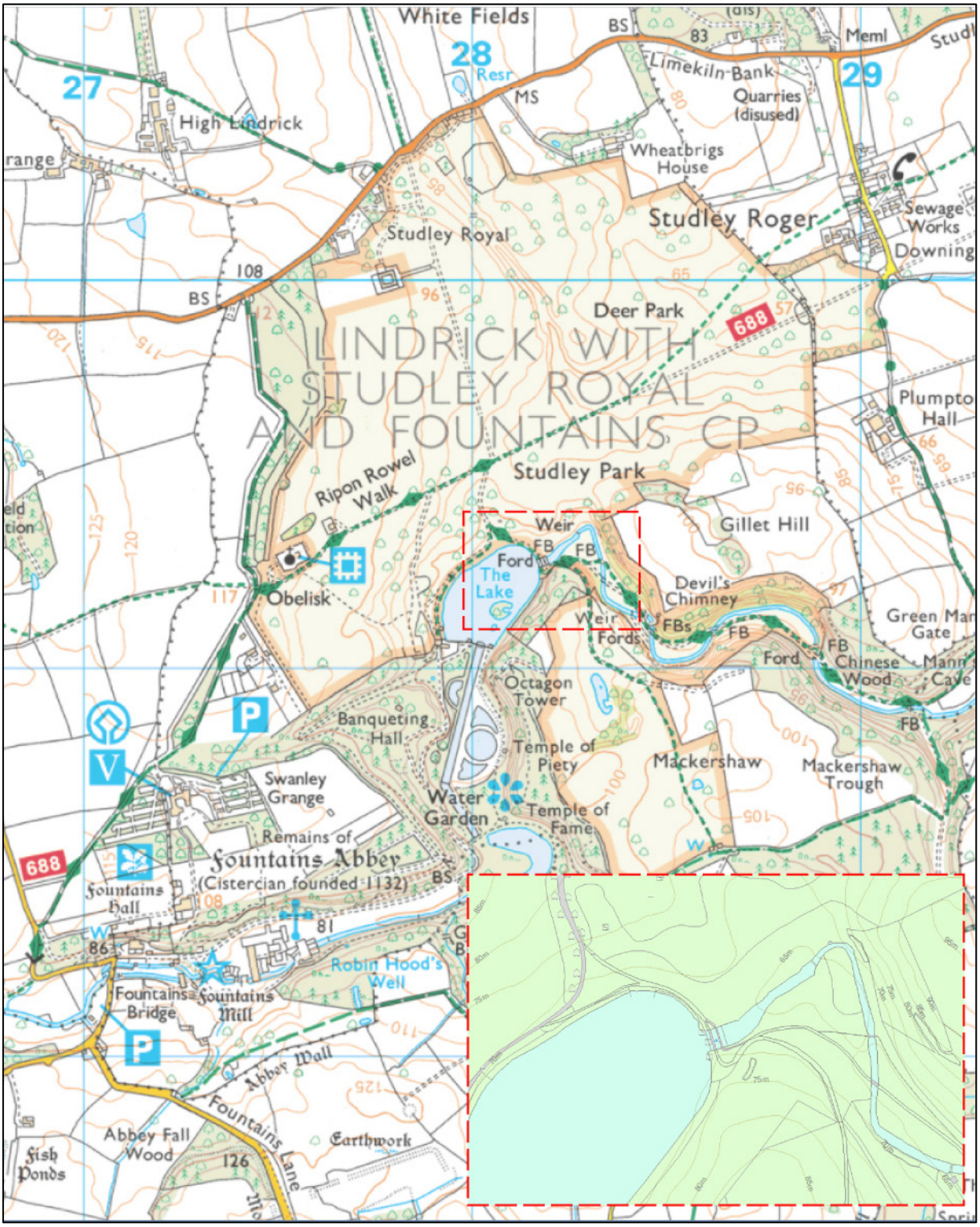

Figure 1. Site location.

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2.0 Site Location

Located in North Yorkshire 3.75 kilometres west-southwest of Ripon Cathedral, the dam lies on the northeast extent of Studley Lake (**Plate 1**) at the downstream outlet of the River Skell (**Plate 2**). It is centred at National Grid Reference SE 28177 69275.

The outlet dam / weir is a Grade II Listed structure (HE List: 1173726), which is located central within the Studley Royal Grade I Registered Park and Garden (HE List: 1000410), and the "Studley Royal Park including the ruins of Fountains Abbey" UNESCO World Heritage Site.

3.0 Archaeological Background.

The following text is a direct extract of the background information from the Historic England List entry for the dam (Historic England, N.D.).

Weir and cascade with flanking walls and ford. c1720 by John Simpson, mason, for John Aislabie. Gritstone. [More recent research indicates that this is only partially true. The dam may not be by Simpson but probably dates to around 1740 when the lake was expanded to its present size. It also underwent modification in the Victorian period where a hydro-electric scheme was installed nearby (Newman, pers. comm.]) *Ford of stone setts, weir and flanking walls of large blocks. Ford approximately 3 metres wide, weir approximately 3 metres high. Flanking walls have segmental-arched sluice outlets. The River Skell emerges from the Lake over the ford and drops into its natural bed to continue on a meandering course through the valley known as Seven Bridge Walk. The lake is almost entirely man-made and the weir forms the northern limit to Aislabie's planned garden scheme. Below the weir the natural features of the landscape predominate. The ford carried a carriage drive which encircled the lake and continued down the stream through Mackershaw Wood. It was not then possible to cross the River Skell on foot at any point between the Rustic Bridge and Seven Bridges Walk.*

4.0 Methodology.

The evaluation was comprised of two parts, split longitudinally through the dam: upstream, west, and downstream, east. On both halves, works entailed recording archaeological material revealed beneath the crest of modern concrete that was installed around 1984 (Newman, pers. comm.)

An arbitrary baseline cast lengthwise across the dam was used to locate and record features; these measurements will be written throughout the report as a figure from zero metres commencing at the south end of the dam.

Standard *On-Site Archaeology* techniques were followed throughout the investigation. Where appropriate, this involved the completion of a record sheet for each archaeological context

exposed, along with plans and cross-sections drawn to an appropriate scale. A photographic record was also maintained. A full catalogue of context descriptions and photographs is provided within Appendix 1.

5.0 Results.

Shallow excavation of the existing concrete dam surface revealed variable stonework (104/105/106/107/108) forming the historic surface of the dam (**Plates 4-7**). Two parallel narrow, shallow channels within the stonework and forming part of the upper construction of the historic surface extended across the width of the dam. These channels measured a maximum of 0.30 metre wide and 0.20 metre deep, approximately 0.30 metre apart, and contained the remains of long sub-structure support beams (henceforth labelled as "timber beams") (101/102/103) (**Plates 8-19**). These timber beams were interpreted as the base of a former footbridge (**Plate 3**).

The timber beams within the western channel comprised of two layers: (101) was some 0.05 metre thick; and (102) was around 0.12 metre thick. The lower level (102), likely a hardwood, consisted of several long lengths of timbers connected using a lap joint with iron nails (**Plate 20**). Two pairs of vertical pins (111) were visible following the removal of the timber beams (**Plate 21**), which were mortared to the base of this channel presumably to hold the timber beams in place. The upper run (101) also consisted of long lengths of timber connected using both splayed and lap joints (**Plate 22**), and were affixed to the lower timber run (102) by several smaller iron nails. Several mortises were visible in both levels of timber beaming (see previous Plates), appearing to have supported the tenons of vertical timbers (**Plate 23**). The differences in the wood, dimensions and joints of the two layers of timber beaming may suggest they represent two phases of construction, or structural repair.

The eastern channel only consisted of a poorly preserved single layer of timber beaming. These beams (103), possibly a hardwood, appeared similar to (102) therefore may be contemporary. The survival was too poor to determine the true length of the beams but they also appeared to be connected using a lap joint. Remains of several mortises were also visible.

The two parallel channels continued beyond and below the existing southern wall of the dam by approximately 0.40 metre (**Plate 24**) and the northern wall by 0.15 metre (**Plate 25**). Sealed brickwork (112) was visible at the northern end of the channels (**Plate 25**).

Metalwork (109) associated with the timber construction also survived. This largely comprised of the remains of iron straps which appeared to span both channels and was leaded and mortared to the stonework (see previous Plates). The former shape of the strapping was preserved in some parts that showed that the strapping lay flat across the eastern run of timber beams, yet formed raised over multiple layers for the western run (**Plates 26-27**). Small isolated remnants of former connections to the stonework and timber beams were also recorded (**Plate 28**), including vertical pins (111) below beam (102). An isolated small fragment of metalwork (110) was revealed bonded to the stonework towards the west edge of the dam (**Plates 29-30**), and may relate to the former mechanism of the central sluice gate.

Stonework presented itself in a variety of forms. These included large, locally sourced Millstone Grit blocks (104) typically flanking the timbers (**Plate 31**), discreet areas of cobblestone (105) and limestone (106), reclaimed masonry (107) (**Plate 32**), and swathes of pitched stone blocks acting as a broad base (**Plate 33**).

6.0 Discussion and Conclusion.

During the course of the evaluation, timbers and associated metalwork that were uncovered beneath late-20th century concrete are highly likely to relate to the construction of a former narrow footbridge that once spanned the dam crest.

The date and relationship between the timbers is unclear but two phases appear to be visible. The dam is recorded to have been constructed in the early 18th century; a footbridge matching the surviving remains is depicted in a mid-18th century painting by Balthazar Nebot (**Front Cover**) and was also photographed in 1967 (**Plate 3**) as part of property photo survey.

7.0 Bibliography.

Historic England (N.D.) 'Weir and Cascade at Outlet From the Lake with Flanking Wall and Ford'. https://historicengland.org.uk/listing/the-list/list-entry/1173726. Accessed October 2017.

Newman, M. (2017) Personal communication. Email dated 11th December 2017 at 15:53, comments added via PDF attachment.

8.0 Appendix 1: Archive Index.

8.1 Context Register

Context no.	Description	Thickness	Extent
100	Concrete. Small areas of remaining concrete of the recently removed dam surface.	0.2m	Area
Timber			
101	?Hardwood timber within western channel. Forms upper timber above (102). Fixed to (102) with iron nails. May relate to later phase. Several mortises. Each timber approximately 4 metres in length. Lap and splayed joints.	0.05m	21.55m x 0.25m
102	?Hardwood timber within western channel. Forms lower timber below (101). Several mortises survive. Each timber approximately 3.80 metres in length. Lap joints.	0.12m	21.55m x 0.2m
103	?Hardwood timber within eastern channel. Poor survival. Several mortises survive. Too fragile to determine lengths of timbers. Lap joints.	0.08m	21.55m x 0.2m
Stonework			
104	Former dam surfacing. Areas of roughly worked Millstone Grit blocks, possibly re-used stone, occasionally associated with the metalwork.	-	Area
105	Former dam surfacing. Small areas of cobblestone.	-	Area
106	Former dam surfacing. Areas of large slabs and blocks of eroded limestone.	-	Area
107	Former dam surfacing. Single large Millstone Grit block, thought to be reused stone, two small square notches cut into the stone are thought to be unrelated to the dam.	-	0.5m x 0.4m
108	Former dam surfacing. Large areas of eroded pitched ?gritstone blocks.	-	Area
Metalwork			
109	Iron, remains of iron straps associated with timbers, appear to span both sets of timbers and occasionally survive bolted to the stonework (leaded or mortared to stonework). Also remains of small isolated former connections to the stonework or timbers.	Approx 0.04m	Approx 1m x 0.06m
110	Small area of ironwork thought to relate to former sluice gate in centre of dam which is now blocked.	-	0.08m x 0.08m
111	Iron, two pairs of vertical pins mortared to stonework (102).	0.18m	0.05m x 0.05m
Brickwork			
112	Obscured brickwork inside channels to house the timbers, located beneath extant north dam wall.	-	-

8.2 Photographic Register

JPEG No.	Description	Scale	View	Initials	Date
1-182	Various: excavation area + exposed archaeology	1m	Various	JS+BmcC	15-09-2017
183-189	Various: excavation area + exposed archaeology	1m	Various	JS	17-09-2017
190-262	Various: excavation area + removed archaeology	0.5+1m	Various	JS	21-09-2017
263-302	Various: excavation area + removed archaeology	0.5+1m	Various	JS	22-09-2017

8.3 Drawing Register

Drawing No	Description	Scale	Initials	Date
1	Dam crest 0-5m	1:20	JS	22-09-2017
2	Dam crest 5-10m	1:20	JS	22-09-2017
3	Dam crest 10-15m	1:20	JS	22-09-2017
4	Dam crest 15-21m	1:20	JS	22-09-2017
5	Dam crest detail 5-7m	1:20	JS	22-09-2017
6	Dam crest 12-14m	1:20	JS	22-09-2017
7	Dam crest profile, post-removal of timbers @ 6m	1:20	JS	22-09-2017

9.0 Appendix 2: Plates.

Plate 1. Site location of the dam against Studley Lake, looking southwest.

Plate 2. Rear of the dam, looking northwest.

Plate 3. The dam and former footbridge as seen in 1967 Property Photo Survey. ©National Trust.

Plate 4. Post-removal of 20th century concrete, pre-recording, looking north-northwest.

Plate 5. Post-removal of 20th century concrete, pre-recording, looking north.

Plate 6. Post-removal of 20th century concrete, pre-recording, looking south.

Plate 7. Post-removal of 20th century concrete, pre-recording, looking southeast.

Plate 8. Timbers, 0-2 metres along baseline, looking west.

Plate 9. Timbers, 0-3 metres along baseline, looking southwest.

Plate 10. Timbers, 4-6 metres along baseline, looking west.

Plate 11. Timbers, 5-7 metres along baseline, looking west.

Plate 12. Timbers, 7-9 metres along baseline, looking west.

Plate 13. Timbers, 7-10 metres along baseline, looking southwest.

Plate 14. Timbers, 10-12 metres along baseline, looking west.

Plate 15. Timbers, 12-14 metres along baseline, looking west.

Plate 16. Timbers, 13-15 metres along baseline, looking west.

Plate 17. Timbers, 15-17 metres along baseline, looking west.

Plate 18. Timbers, 17-19 metres along baseline, looking west.

Plate 19. Timbers, 20-21 metres along baseline, looking west.

Plate 20. Lap joint and affixing nail for (102).

Plate 21. Upright pins (111), 13 metres along baseline.

Plate 22. Lap joint foreground-right and splayed joint background-left, for upper timbers (101), around 7 metres along baseline.

Plate 23. Mortises still retaining inserted tenons, 5-6 metres along baseline.

Plate 24. Channels running beneath southern dam wall, 0 metres along baseline.

Plate 25. Channels running beneath northern dam wall, showing brickwork (112), 21 metres along baseline.

Plate 26. Groundwater flooding accentuating shaped metal straps, looking northwest.

Plate 27. Detail of metal straps, showing the flat form over the eastern run, looking south.

Plate 28. Miscellaneous surviving metalwork, 9-10 metres along baseline, looking south.

Plate 29. Placement of metalwork (110), around 10 metres along baseline, looking west.

Plate 30. Detail of metalwork (110).

Plate 31. Sample of Millstone Grit blocks (104).

Plate 32. Detail of reclaimed masonry (107), 1-2 metres along baseline, looking west.

Plate 33. Sample of pitched stonework (108), looking west.

Plate 34. Removal of timbers, looking southwest.

Plate 35. Removal of timbers, looking northwest.

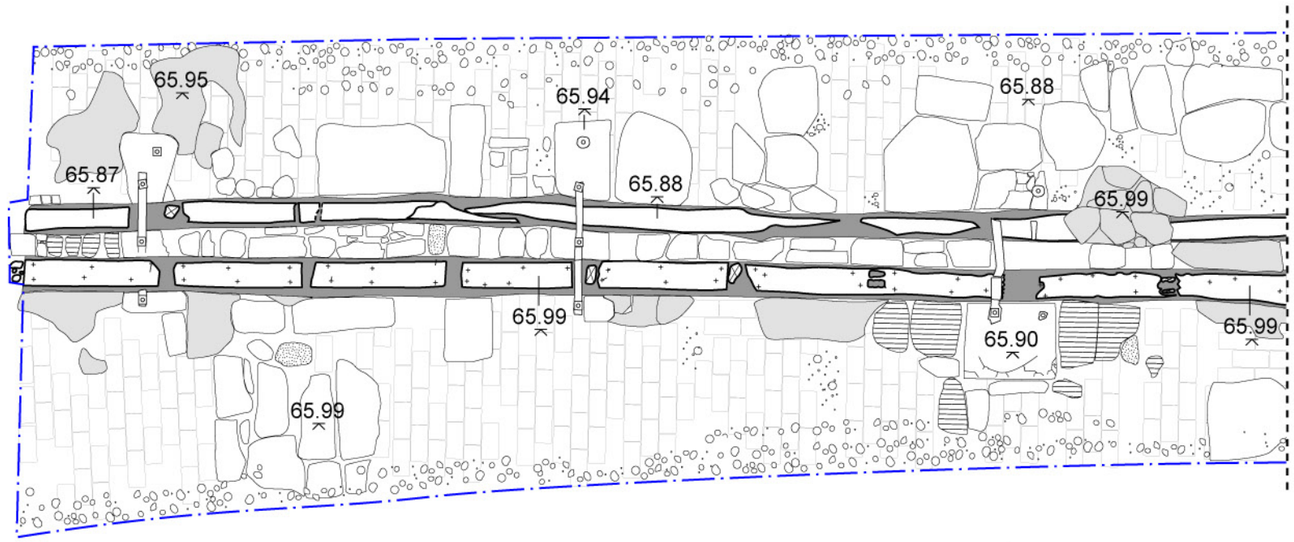
Plate 36. Timbers removed, looking north-northwest.

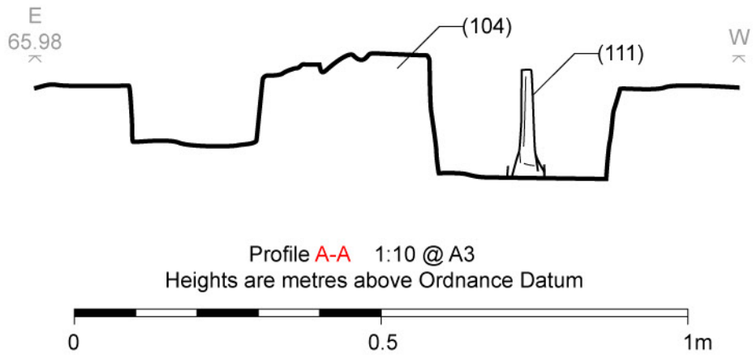
Plate 37. Timbers removed, looking northwest.

Plate 38. Timbers removed, looking southwest.

10.0 Appendix 3: Figures.

Figure 2. Survey data (produced by On-Site Archaeology) showing the location of the exposed archaeology in the context of the dam structure. See Figure 3 for detail.





Concrete (100)
Millstone Grit blocks (104)
Cobblestone (105)
Limestone (106)
Stone pitching (108)
Timber (101) - (103)
Standing timber
Timber trench
Metalwork (109)
Iron nail

Figure 3. Detail plan and profile of the archaeological remains revealed beneath the western half.