

Eaton Weir Anchor Island Buscot Oxfordshire



**Historic Buildings Recording
and Investigation**



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Eaton Weir, Anchor Island, Buscot, Oxfordshire

Historic Building Recording

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Summary

Oxford Archaeology undertook a programme of archaeological investigation and recording on the surviving walls and other remains of a water wheel pit at Anchor Island, to the south-west of Kelmscott, on the border between Oxfordshire and Gloucestershire. The site forms part of the Buscot Estate and was commissioned by The National Trust in advance of proposed repair and consolidation works to the structure.

The substantial remains survive from a pair of waterwheels which were installed in the 1860s to pump water from a well adjacent to the Thames around Buscot estate as part of major agricultural improvement works and an ambitious irrigation scheme created by Robert Campbell the new owner of Buscot Park.

The principal surviving visible structures on which the recording focussed are two brick walls which formed the pit for one of the waterwheels; the immediately adjacent pit has now been infilled, as has the main channel of water which was diverted from the river to power the wheels. Each wall retains evidence of the former wheel including mountings, holding down bolts, guard plates, empty sockets and areas of collapse from former adjoining structures.

Although the remains of the pit form only a relatively minor structure they are of interest as evidence of Victorian attempts to apply principles of industrial efficiency and modernisation to agriculture. They are also of interest as a wider example of the range of structures required by a great country estate as well as the fact that they are located less than a mile from Kelmscott Manor, William Morris's important country house. Kelmscott was Morris's house during the period towards the end of the 19th century when the waterwheel was in operation.

Eaton Weir, Anchor Island, Buscot

Historic Building Recording

1 INTRODUCTION

1.1 Project Background

- 1.1.1 Oxford Archaeology (OA) has been commissioned by The National Trust (Thames and Solent Region) to undertake a programme of historic building investigation and recording on the surviving walls from a waterwheel pit at Eaton Weir, Anchor Island, Buscot in Oxfordshire.
- 1.1.2 The work is being undertaken in order to both provide an archive record of the structure in its current condition and also to assist with the planning and specification of repair works to the structure which are proposed for later in 2010.
- 1.1.3 The remains of the wheel pit were included in an archaeological survey for Buscot and Coleshill undertaken for The National Trust in 1992 by WL Matthews and A Wainwright.

1.2 The Site

- 1.2.1 Eaton Weir¹ is located c.5 miles north-west of Faringdon towards the western edge of Oxfordshire (historically part of Berkshire) and it forms part of the National Trust's Buscot and Coleshill Estate. The weir is c.2 miles to the north of Buscot House and less than 1 mile to the south-west of Kelmscott Manor which was William Morris's country house from 1871 to 1896. The area immediately adjacent to the current site is used by a boat club and a public footpath passes close by.

2 HISTORICAL BACKGROUND

2.1 Introduction

- 2.1.1 The current project has not included extensive documentary or archival research but a brief summary historical background would be of value from readily available sources.

2.2 Buscot Park

- 2.2.1 Buscot Park is a neo-classical mansion that was laid out between 1780 and 1783 for Edward Loveden Townsend. In 1859 it was sold in a semi derelict state to Robert Tertius Campbell, an Australian Gold Trader and keen agriculturalist who proceeded to extensively modernise the estate so that within a few years it became one of the most highly industrialised farms in the country. Campbell built a new reservoir to the west of Buscot House, he laid out new areas of woodland as well as a great network of narrow-gauge railways to serve the new distillery on his estate. He also dredged sections of the river and installed an ambitious system to irrigate his farmland (detailed further below).
- 2.2.2 In 1887, having spent much of his fortune on Buscot, Campbell died and the estate was acquired by a London financier, Alexander Henderson, later to become Baron Faringdon, who in 1889 added a large new wing to the house. In 1934 the 1st Baron died and the estate passed to his son the 2nd Lord Faringdon who returned the house closer to its original form by pulling down the wing that his father had added.

1 The weir is also known as Hart's weir, West weir or Lower Farmer's weir

2.3 Eaton Weir and surrounding structures

- 2.3.1 The wheel pit which forms the focus of the current recording project survives from a pair of large waterwheels which were installed by Robert Campbell, probably in the 1860s as part of a new irrigation system to serve the Buscot Estate. The wheels were used to pump water c.2 km from the Thames up to Campbell's large new reservoir to the west of Buscot House. It was also fed by a surviving waterwheel-powered pump at Buscot Lock.
- 2.3.2 The water wheels and associated pump house formed part of a complex of structures in this area which also included a weir and the Anchor Inn. The site is of some interest as it formed the last surviving paddle and rymer 'flashlock' on the Thames. Detail on the flashlock and further historical background on Eaton Weir is included at Appendix B.
- 2.3.3 In 1866 the recently Superintendent of the created Thames Conservancy undertook a report on the condition of the Thames navigation and John Kemplay, in his book *The Thames Locks* reports that further investigation was requested into the origin of the water being pumped by Robert Campbell to Buscot Park reservoir from Harts upper weir (or Eaton Weir) and from Buscot lock. The further investigation was intended to ensure that the water was being taken from a well as was claimed rather than directly from the river itself.
- 2.3.4 The earliest map consulted in the current study is the the First Edition 25 inch Ordnance Survey map of 1876 (Fig 2). This shows the diverted channel which creates Anchor Island, the pumping house immediately to the south-east of the wheels and various other structures that form Eaton Weir.
- 2.3.5 The next map is dated 1899 (Fig 3) and this labels the pumping house adjacent to the wheels as 'disused'. Therefore presumably the waterwheels themselves were also out of use before the end of the 19th century. The 1899 map shows that by this date the layout of other structures and weir on Anchor Island had altered significantly from the earlier map.
- 2.3.6 The 1912 OS map (Fig 4) again shows the pumping house as 'disused' and it also shows the tail-race channel which would have taken water away from the wheels, as marshy ground rather than flowing water. The map suggests that the millrace which would have taken water towards the wheels is not shown as marsh, presumably because this still linked to a narrow diversion channel which is believed to have linked with Eaton Hastings Wharf. The 1912 map shows a small footbridge which would have spanned directly over the waterwheel pit. A further OS map from 1922 has also been seen in the current work but this shows no discernible difference from the 1912 map and may have merely have been the 1912 map with very minor revisions.
- 2.3.7 Although the pumping house is shown as disused on the 1899 and 1912 maps the structures in this area do show some alteration and development and it may be that they had found a new use, possibly with a turbine to continue pumping the water to the reservoir, thus making the waterwheels redundant.
- 2.3.8 An Environment Agency factsheet ('River Thames Walks Around Buscot') and the report on Eaton Weir by Wainwright and Matthews (1990) both states that such a conversion to turbine pumping was undertaken at Buscot Weir.
- 2.3.9 The adjacent weir, with the Thames' last surviving flash lock, was removed in 1936 to alleviate local flooding.
- 2.3.10 The last OS map consulted is dated 1976 and this shows that the back-cut channel which fed water to the waterwheels, and which has today been substantially infilled, remained intact (although it was no doubt very marshy). This map also shows that the pit for the north-western wheel had been infilled by this date but the map still shows the small footbridge which spanned the wheel pit. This bridge was presumably removed when the western half of the channel was infilled.

- 2.3.11 The Anchor Inn, which is shown on each of the OS maps including that of 1976, served boats passing on the Thames as well as people crossing the river by foot and the men that operated the waterwheels. The pub was not served by a public road and when it unfortunately burnt down in 1980 it was not rebuilt. Foundations are all that now survive of this building.

3 DESCRIPTION

3.1 Summary description of Anchor Island

- 3.1.1 The remains of the waterwheel pit which is the focus of the current work form part of a complex with a number of interrelated features and a short summary description of the wider site would be of value.
- 3.1.2 Anchor Island, which includes the features investigated in the current work, is an area which was until relatively recently a small artificial island, c.130 m long, created by the excavation of a back-cut channel to the south of the main river. This channel diverted a flow of water beneath the former Eaton weir which spanned the Thames and powered the two waterwheels which were located just to the east of the central point of this channel. The western half of this channel, from the wheel pit to the junction with the Thames has now been infilled (map evidence suggests since 1976) and therefore Anchor Island is no longer an island. The outline of the channel is still easily traced and it is clearly shown by the remains of a collapsed footbridge which was rendered redundant by the infilling of the channel.
- 3.1.3 From the limited research undertaken in the current project it is not certain whether the channel which forms Anchor Island was created in the 1860s specifically to provide power for Robert Campbell's new waterwheels and pump or whether this was an existing channel which had been used for other functions before the 1860s and was then reused by Campbell.
- 3.1.4 The eastern half of the channel, or tailrace where the water would have been carried away from the wheel to rejoin the Thames, remains water filled and this area is used by the boat club for mooring. The water extends into the wheel pit and is at a significant depth other than at the very western end where the channel is infilled (detailed further below).
- 3.1.5 A small group of buildings survive towards the western part of Anchor Island adjacent to the location of a footbridge which replaced the former flashlock weir. These buildings are outside the scope of the current report.

3.2 Remains of Waterwheel pit

- 3.2.1 The structure which forms the focus of the current recording is a pit which housed one of a pair of waterwheels; the former pit immediately to the north which housed the other wheel has now been infilled (map evidence suggests prior to 1976). The two walls which form the pit and which would have flanked the wheel are c.3.7 m apart and the main pit is c.10 m long (excluding curved flanking walls). Each wall extended to a height of c.1.75 m above the waterline (when the current site work was undertaken) although in many areas the upper courses have been lost.
- 3.2.2 The depth of water within the pit varies at different times of year and the height of the base of the pit also varies along its length. When the current work was undertaken the deepest sections of water within the main wheel pit extended to c.60-70 cm. It is believed that there the pit has a hard base but in parts this is covered by a thick layer of silt and the base is not flat or regular.
- 3.2.3 Each wall is constructed from orange/pink pierced bricks (potentially from the Eaton Hastings brickworks) laid in English bond.

- 3.2.4 The *southern wall* is c.13 m long by c.95 cm wide and its western end curves sharply towards the south. The eastern end has a squared return to the south.
- 3.2.5 The wall retains a number of features of interest relating to the use of the wheels including the very large stone bearing block (3.4 m x 48 cm tall x 95 cm wide) which supported the axle and which is set within the central section of the wall along its uppermost edge. Eighty two cm beneath the main bearing block is another very large stone bearer, apparently of similar dimensions to the upper block (although the west end is obscured behind a further brick face) and it is likely that the two blocks are fixed together with long bolts behind the wall facing. On the upper face of this stone there are the truncated tops from seven iron holding-down bolts and although some of these are probably relatively shallow and held pipes which led to the former adjacent pump house, there are two principal bolts which probably do extend down through the wall to the lower stone. These two principal bolts would have fixed a cast-iron bearing for the wheel axle. The other bolts on the upper face of wall are towards the southern edge of the stone and broadly align with two separate iron plates within the ground, beyond the wall on which pipes going to the pump house would almost certainly have sat.
- 3.2.6 Immediately to the east of the stone bearing blocks is a scar on the southern wall from a former feature. Just below the upper surface in this area there is a 70 cm wide horizontal slot or socket where a feature formerly adjoined and the brickwork here has been altered to allow the insertion or removal of this feature. Any abutting structure at this location would have directly interfered with the rotation of the wheel so the feature was presumably added after the wheel fell out of operation. It may relate to a small footbridge inserted after the wheel was removed; possibly that shown on the 1976 map referred to above. There is no clear comparable mark on the north wall however.
- 3.2.7 To the west of the stone bearers there remains a large curved cast-iron plate which would have protected the pit walls from abrasions or wear caused by the wheel paddles. This plate also creates a 10 cm step in the wall with the longer section to the east being slightly recessed behind the plane of the western section.
- 3.2.8 To the west of the curved iron plate there are two distinct areas where the upper half of the brick facing to the wall has substantially collapsed. One or both of these areas of collapse probably relates to a support structure for a former cast iron tray which would have carried the final section of the mill-race channel to the wheel. It may also be that one of the areas of collapse relates to a former footbridge which would have spanned the pit immediately above the mill-race and behind the wheel.
- 3.2.9 Unlike the possible bridge referred to above a bridge in this location would not have interfered with the rotation of the wheel although it appears that the bridge was only inserted after the wheel ceased operations. As referred to above neither the 1876 nor 1899 maps indicate a footbridge crossing the pit but one is shown 1912 map, well after the pumping house ceased operations.
- 3.2.10 Between the two distinct areas of collapsed brickwork there is a full height vertical slot or rebate in the wall (c.10 cm deep). There is also a similar slot towards the eastern end of the south wall, as well as two corresponding slots on the north wall. These would have been for temporary barriers to be inserted in order to create a chamber within the pit 7.2 m long, from which water could be pumped out to allow the repair or removal of the wheel.
- 3.2.11 There are several areas where bricks have become loose or been lost, particularly along the upper courses where vegetation has caused damage, and there is a c.2.8 m long band towards the eastern end, just above the waterline where much of the facing has been lost.
- 3.2.12 The *northern wall* would have formed the central pier between the two wheel pits but as referred to above the northern pit has now been infilled and is no longer a free-standing pier.

This wall is slightly wider than the southern wall (c.1.05 m) presumably to take the weight of the wheels bearings to both north and south.

- 3.2.13 Similarly to the south face of the pit this wall retains many features which provide evidence of the wheel including to large stone bearing blocks which would have supported the axle of the wheel. The stone blocks are each approximately 2.2 m long by 45 cm tall by 1.02 m and they are set with one along the upper edge of the wall and the other c.35 cm below. An iron axle housing or shoe would have been set on top of the upper stone and although this does not survive there is a segmentally curved rebate (c.7 cm deep) at the surface which indicates where the main iron bearing for the axle would have sat. There is also a further concentric groove (c.12 cm thick) within the stone and brick face which is 75 cm below the upper surface (at its deepest point) and which would have prevented one part of the wheel from scraping against the wall. There is no clear surviving oil staining on the beneath the former axle location.
- 3.2.14 Immediately beneath the lower stone block there are two access sockets (30 cm x 23 cm) into the body of the wall and which would have been used to secure the lower ends of two large holding-down bolts to 'sandwich' the two stone bearing blocks together. These sockets would almost certainly both have been roughly infilled and although the infill remains in-situ in the western void it has been removed from the eastern void. The lower end of the wrought iron bolt is clearly visible in the hole with a square cast iron nut (c.20 cm x 20 cm) directly beneath the underside of the stone.
- 3.2.15 To the west of the stone bearing blocks and bolt access sockets is a curved cast-iron guard plate which is flush with the face of the wall and which would have protected the wall from abrasions from the wheel paddles. This forms another partial concentric circle with the other groove and rebate referred to above but there is no comparable plate on the eastern half of this wall.
- 3.2.16 Immediately to the west of this cast-iron plate is a clear but partially collapsed horizontal socket (c.1.2 m wide x 18 cm tall) which would have housed an adjoining structure. As referred to above this corresponds with an area of collapse on the south wall and it is likely that a beam or frame spanned the pit at this point to support the end of an iron channel which fed the water into the paddles of the waterwheel. The location of this socket immediately behind the iron guard plate is strongly suggestive of this interpretation although there may also have been a small footbridge in this general area.
- 3.2.17 The western edge of this socket adjoins a full height vertical rebate in the wall which corresponds with three other similar rebates (two in south wall and another in the north wall). As referred to above barriers would have been inserted between these rebates which would have allowed water to be pumped out of the wheel pit and repair works undertaken to the wheel.
- 3.2.18 The western end of the north wall curves to the north and at the eastern end it converges to a point between the two wheel pits.

3.3 Condition and recommendations for repairs

3.3.1 Condition

- 3.3.2 The condition of the walls on the northern and southern sides of the wheel pit varies between different areas. The main structure is essentially sound and in no areas are the walls on the point of total collapse. However, as detailed above it appears that the structures have been disused since the 19th century and consequently their condition has deteriorated through lack of essential maintenance.
- 3.3.3 There are several areas where the brickwork facing has been lost or partially collapsed. This is particularly true for relatively substantial parts of the south wall where a large part of the wall top has suffered a gradual collapse and there are now many loose bricks within this area which

have been further weakened through vegetation growth. The upper parts of both walls have significant vegetation cover and although the lighter plants with small roots whose affects would be relatively benign there have been a number of larger shrubs or small trees whose roots have loosened the upper courses of brickwork in a number of areas.

- 3.3.4 The wall facing has also been lost from a large part of the lower section of the south wall, towards the eastern end, and immediately above this there is a structural crack apparently caused by some movement in the brickwork.
- 3.3.5 The general condition of the north wall is better than the south wall and there are fewer areas where the wall facing has been lost. The main structural issues on the south wall are towards the west end where part of the upper courses of the wall have been lost and the partial collapse of a socket has dislodged the brickwork above.
- 3.3.6 ***Recommendations for repair***
- 3.3.7 Prior to any programme of repairs a schedule of specific works should be drawn up by a specialist conservation architect detailing issues such as the correct types of mortar to use and appropriate methods for removal of invasive roots. However it would be appropriate in the current document to provide an outline indication of recommended repairs.
- 3.3.8 Each of the two wheel-pit walls would benefit from remedial stabilisation and repair works. The most important work should be to stabilise areas where the brickwork is gradually eroding through firmly re-setting loose bricks.
- 3.3.9 In-situ but loose bricks should be reset with an appropriate bedding mortar both to prevent loss of individual bricks and to halt the deterioration of the wider wall. In some areas it is apparent that structural collapses have taken place leaving sections of brickwork dislodged from their original location. It would be possible to reconstruct collapsed areas of brickwork to the probable original height but that would involve a considerable element of speculative rebuild and from the heritage viewpoint this would not be recommended. This may however be necessary due to other considerations such as health and safety.
- 3.3.10 Similarly, as the basic structure of the walls appears sound it is not recommended from a heritage standpoint to reconstruct the lost facing from the lower part of the south wall. Loose bricks should be re-set but there should only be reconstruction of the wall face if this was recommended by a structural engineer.
- 3.3.11 The work to repair and re-set loose brickwork should be undertaken to high conservation standards by a specialist builder. Whenever possible bricks will be re-set in their original location but there may occasionally be situations where it is necessary to insert new (or reused) bricks.
- 3.3.12 The mortar used to repair the brickwork should be appropriate and for the nature of the works. As this structure is of late 19th century date this is likely to mean that the use of cement mortar is appropriate (unlike most works on historic buildings). However the cement may lead to forced drying of the structure, leading to subsurface crystallisation and blown faces, or if heavy cement pointing is added to a surviving wall, vulnerable to water ingress from above, then this can lead to frost damage. Mortar sampling may be required prior to selecting suitable inclusions, and the pointing detail will need to be approved.
- 3.3.13 The initial stage of consolidation work should involve the cutting back and poisoning of any trees or substantial plants.

4 CONCLUSION

- 4.1.1 The features recorded in the current project form fragmentary remains from a highly ambitious scheme to transform Buscot Park into one of the country's most highly industrialised farms. The former waterwheels, from which one of the pits survives visible and the other is buried, would have pumped water from a well adjacent to the river two kilometres to a newly created reservoir and from here it would have been used to irrigate the great arable estate.
- 4.1.2 The waterwheels were only constructed in the 1860s and they appear to have become disused before the end of the 19th century, possibly being superseded by a turbine but the remains are an important reminder of both this particular improvement scheme as well as generally the range of industrial or functional operations on a great country estate.
- 4.1.3 The walls of the wheel pit retain a variety of evidence relating to the form, size and operations of the wheel including holding down bolts, large stone bearers, cast-iron guard plates, sockets from former bridges and rebates which would have allowed barriers to be installed and the chamber drained of water when the wheel required repairing.
- 4.1.4 The site almost certainly also retains extensive buried remains from the other wheel pit and relating to the wider pumping operations.
- 4.1.5 The remaining structures suggest that the wheel operated as an undershot with the mill race entering the paddles below the wheels mid point. The undershot is a less powerful and less efficient type of waterwheel than the overshot but it would have provided a regular source of low level power which would have been adequate for pumping water. The wheels in each of the two pits would have been the same size, c.3.5 m wide by c.5 m in diameter.
- 4.1.6 The wider complex of structures at Eaton weir is also of interest due to the weir forming the last surviving paddle and rymer weir on the Thames and also due to its proximity to Kelmscott Manor, William Morris's home during the period in which the waterwheels were in operation, less than a mile away. This is an idyllic site adjacent to the Thames which Morris would no doubt have been very familiar with and would have passed on numerous occasions.

APPENDIX A. BIBLIOGRAPHY

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APPENDIX B. EATON WEIR FLASHLOCK

Although it is only indirectly related to the current project Eaton Weir is of interest as it was the site of the last surviving paddle and rymer flash lock on the Thames. Flash locks such as this had been used on the Thames since the medieval period but due to the hazards involved in their operation, as well as their inefficiency and the vast amount of water required to operate them, they were steadily replaced in the post-medieval period with pound locks.

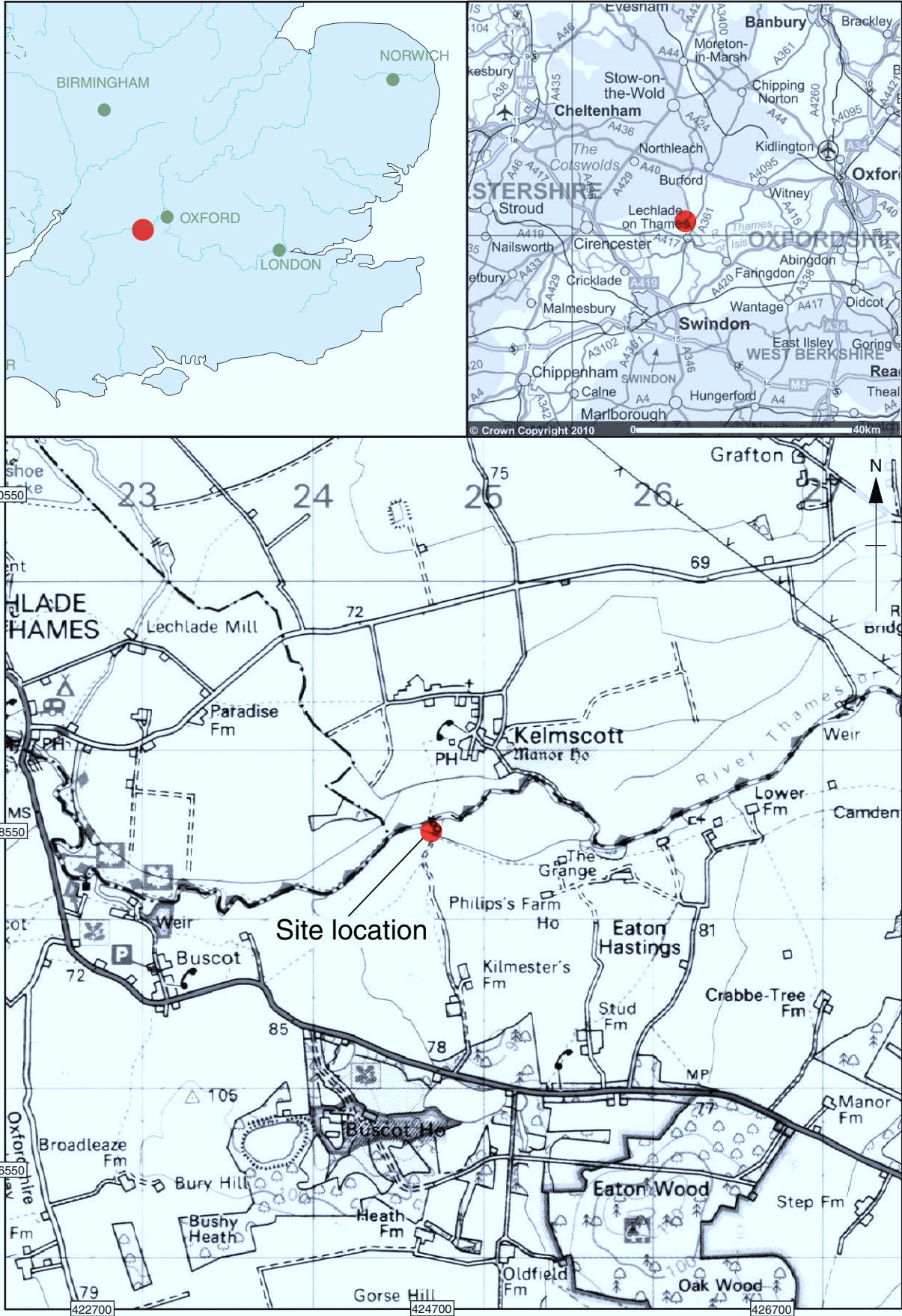
Some historical background to Eaton Weir is included in *The Thames Highway, Volume II: Locks and Weirs* by FS Thacker. This details a reference to the weir in 1792 when it was 'in bad repair, not capable of bearing a head of water' and a separate report from 1802 which described the weir as being 'in very bad order' and belonging 'as a freehold to a poor woman, who cannot afford to reconstruct it at all'.

The weir was operated by a Mrs Hart in both 1802 and 1821 and then 'Mr Hart of Hart's Weir is mentioned in 1879. W Hart is also listed as being at the Anchor Inn in 1883.

Thacker states that in 1868 Robert Campbell proposed permanently damming the site but was not allowed and then in 1887 Campbell restored the weir after its collapse, when the Conservancy were proposing to remove it.

Charles Harper, writing in 1910 describes in some detail the novelty of the paddle and rymer weir which survived at Eaton Weir and the fact that this was one of the last surviving such structures on the Thames:

'Eaton Weir, and others of its kind, are, in fact, complete barriers across the river, affording a check to all craft until four or five of the paddles are pulled up. The construction is simple, consisting of a sill, generally a heavy beam of wood, laid across the bed of the river with a similar beam crossing immediately over it, from bank to bank. These form the framework of the weir which is completed by a number of stout supports going perpendicularly down at intervals from upper beam to lower and by a continuous row of 'paddles' set between them. The 'paddles' are roughly speaking in the shape of shovels, but much longer in the handle and bigger in the blade. It is obvious that when all the paddles are down in their places the head of water must be considerably raised above the weir, although a volume of water pours through all the while. To admit the passage of a boat the weir-keeper draws up four paddles or more, and then, if the craft be going down stream it is guided by the steersman carefully to the weir and deftly allowed to be shot through by the force of the waterfall thus created in the opening. A little mild excitement generally accompanies this 'shooting the rapids' even though the fall be only about eighteen inches to two feet when the paddles are first drawn, and reduced to almost nothing if you wait a few minutes while the head of accumulated water runs itself away. The Thames Conservancy will have its dues and whether it be a lock or a weir you pass you render threepence for a small boat and receive a pink ticket in return'



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Figure 1: Site location



Figure 2: First edition 25 inch Ordnance Survey map (1876)

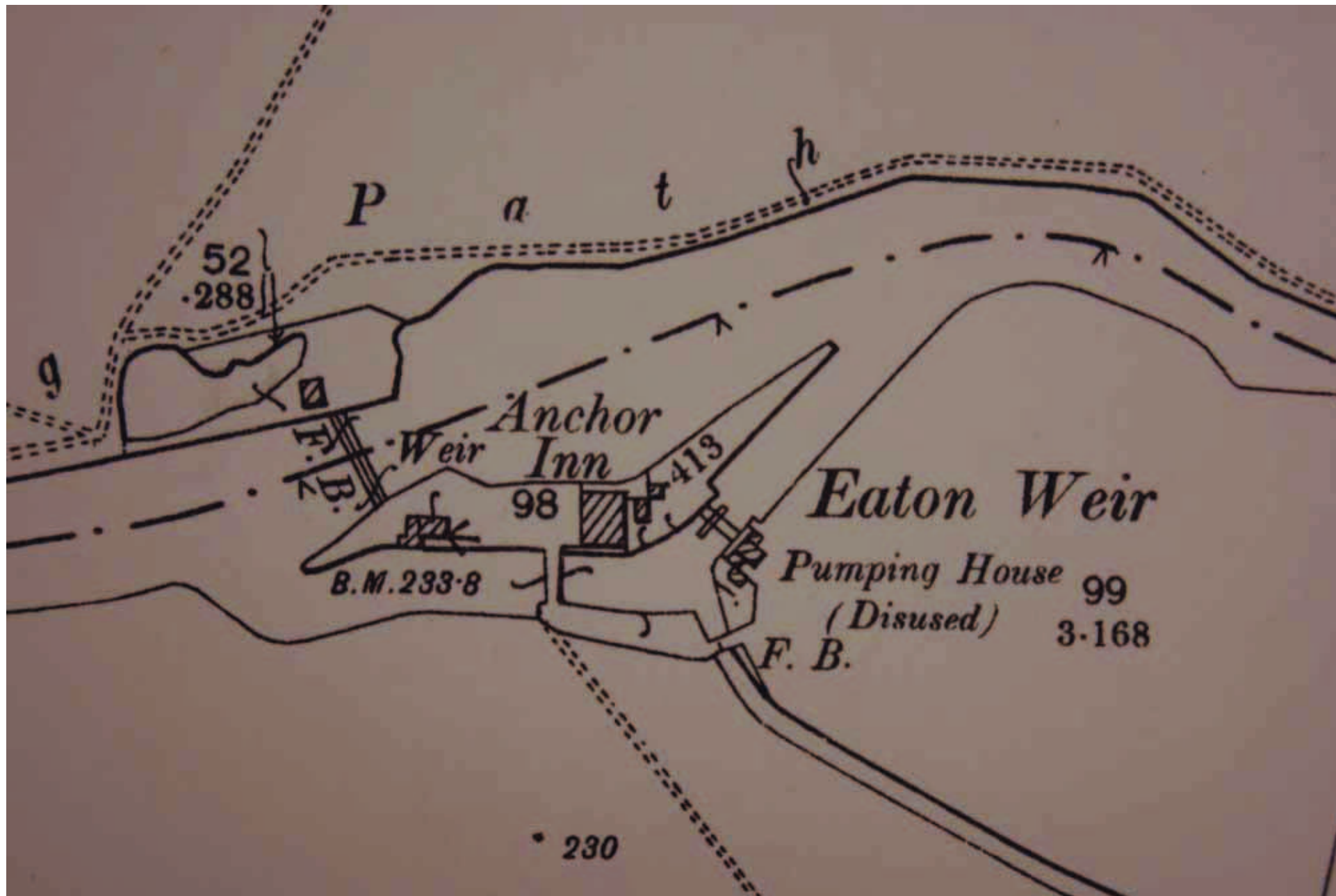


Figure 3: Second edition 25 inch Ordnance Survey map (1899)



Figure 5: 1:2500 inch Ordnance Survey map (1976)

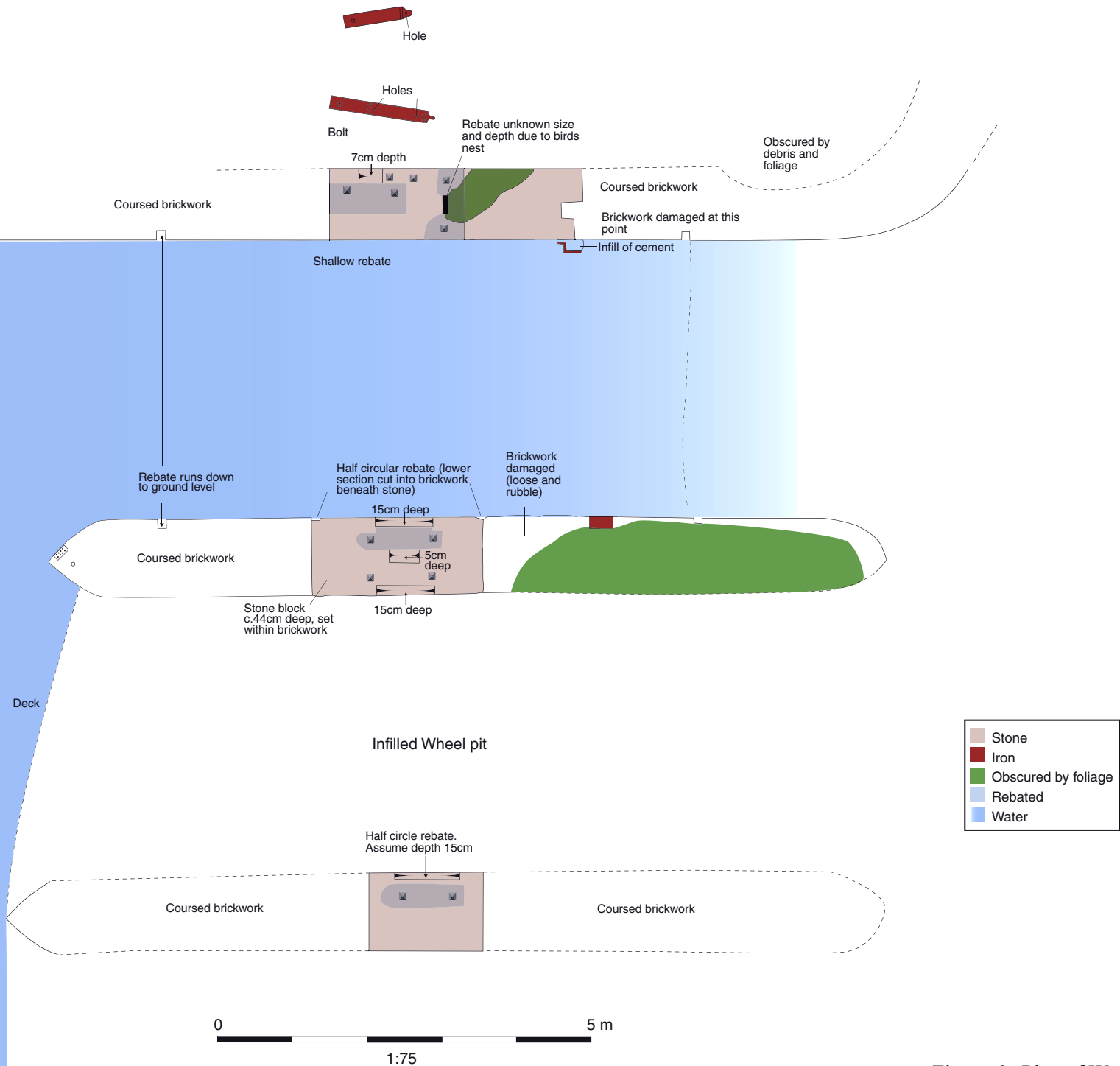
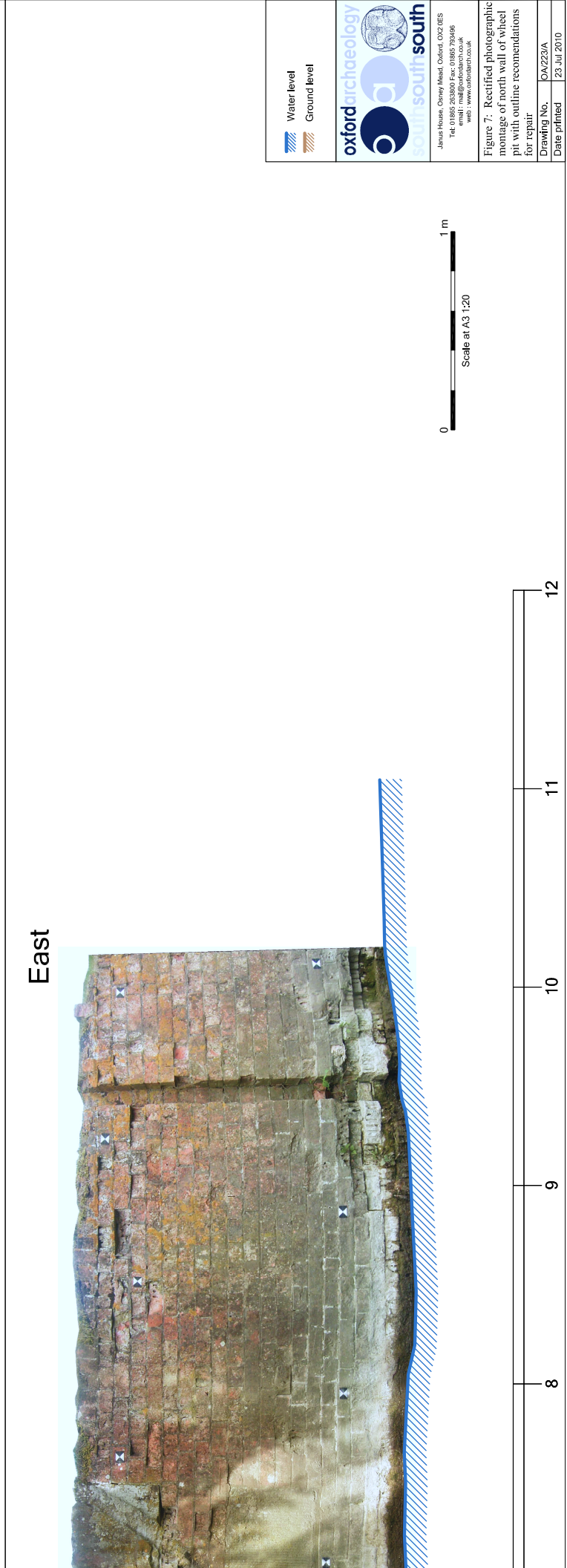
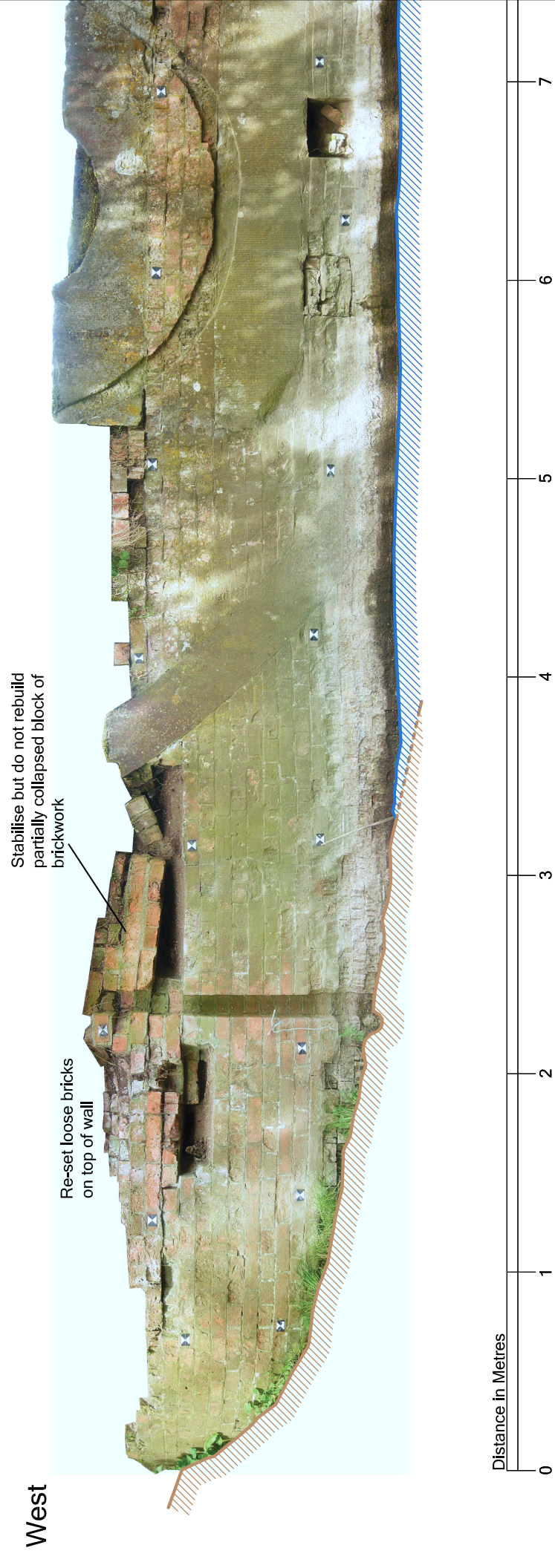


Figure 6 : Plan of Water wheel pits



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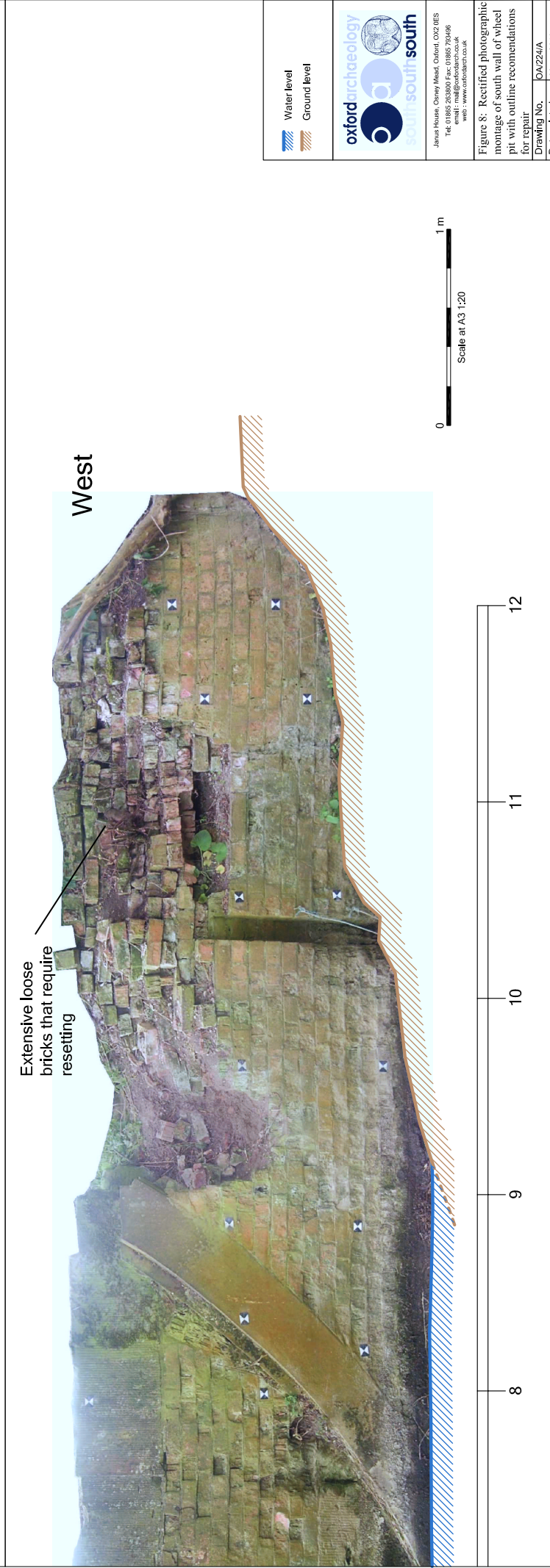
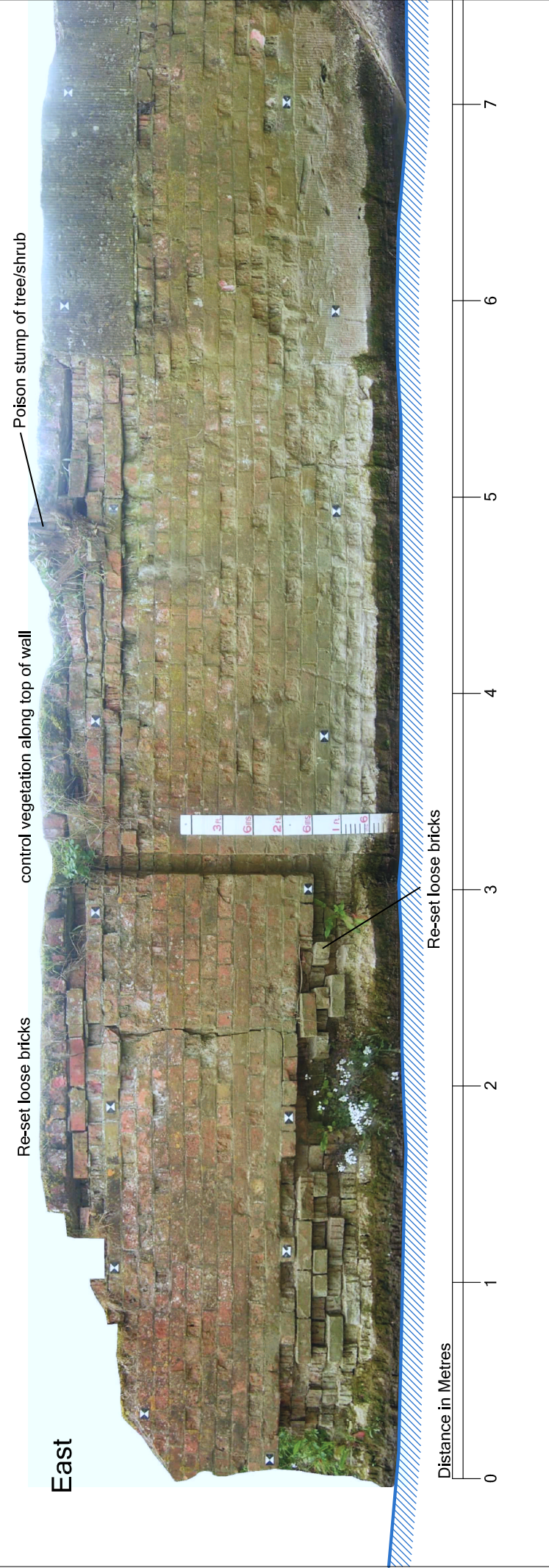
Figure 7: Rectified photographic montage of north wall of wheel pit with outline recommendations for repair

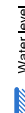

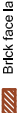
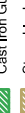

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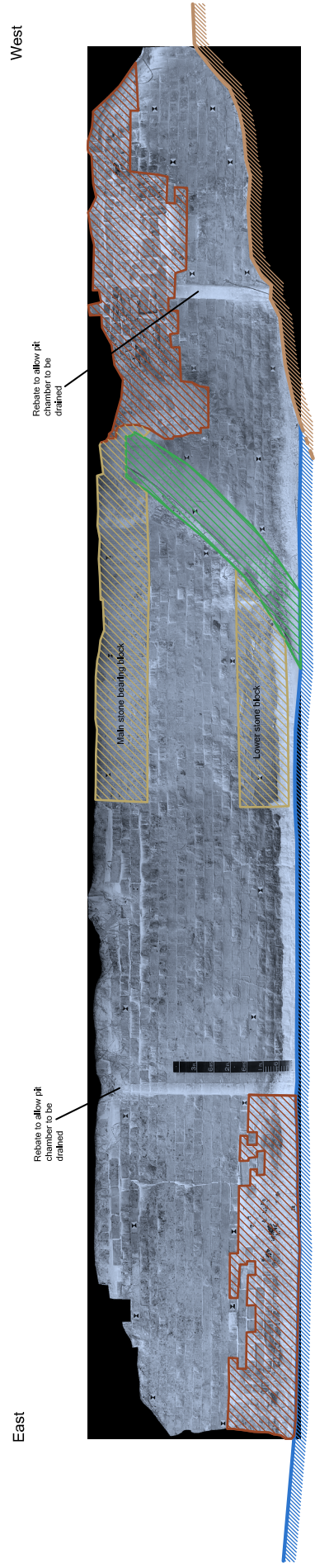


	Water level
	Ground level
	Brick face largely lost
	Cast iron Guard plate
	Stone block

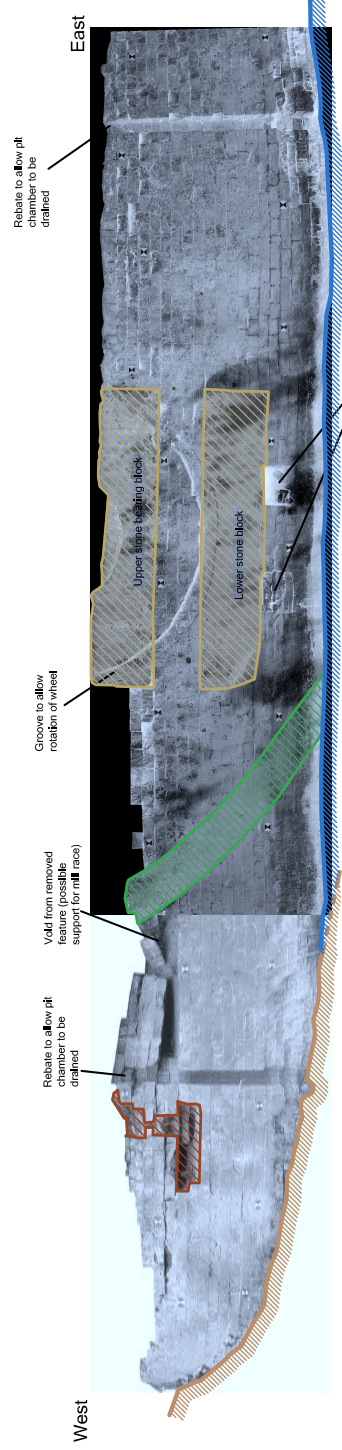



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Figure 9: North & South walls of wheel pit with annotations
 Drawing No. OAA2257A
 Date printed 23 Jul 2010



South face of wheel pit



North face of wheel pit





Plate 1: General view of infilled north wheel pit and tail race beyond



Plate 2: View of east end of central pier between wheel pits



Plate 3: East end of south wall



Plate 4: Curved west end of south wall



Plate 5: General view of north wall and infilled pit behind



Plate 6: Curved west end of north wall



Plate 7: Bolt within access void beneath lower stone in north face of wall



Plate 8: Holding-down bolts in upper face of stone bearing in south wall



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