

**An Archaeological Watching Brief during
Reconstruction of the Stop Lock and Upper Arm
at Foxton Inclined Plane, Leicestershire.
(SP 69230 89590, Centre)**

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For British Waterways

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An Archaeological Watching Brief During the Restoration of the Stop Lock and Upper Arm at Foxton Inclined Plane, Leicestershire (NGR SP 469230 289590).

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An Archaeological Watching Brief during the Restoration of the Stop Lock and Upper Arm at Foxton Inclined Plane, Leicestershire (NGR SP 69230 89590)

Summary

University of Leicester Archaeological Services were commissioned to undertake an archaeological watching brief during the restoration of the Stop Lock and re-watering of the Upper Arm at Foxton Inclined Plane, Leicestershire. The Upper Arm and Stop Lock were constructed at the turn of the twentieth century along with the adjacent Inclined Plane in order to bypass the congested Foxton Locks.

The Inclined Plane only remained in operation for 10 years, and the Upper Arm was abandoned and dammed in 1928 after which it was allowed to fall into dereliction. The Inclined Plane is now a Scheduled Monument.

On the whole the structure of the Stop Lock was in very good state of repair, reflecting its short period of use. There is evidence that tight budgetary constraints influenced the materials used during construction.

1. Introduction

University of Leicester Archaeological Services were commissioned by British Waterways to undertake an archaeological watching brief during the restoration of the Stop Lock and re-watering of the Upper Arm at Foxton Inclined Plane, Leicestershire (SP 69230 89590, Centre). The proposed works included the stripping of all vegetation and accumulated humus within the cut away to the original puddle clay prior to lining with a membrane, and the sheet piling of weakened embankments. The Stop Lock was also to be emptied of any accumulated silt and detritus, and areas of damaged brickwork repaired and re-pointed.

The site is within a Scheduled Monument (Monument Number 30248). Scheduled Monument Consent was given for the restoration work by the Department of Culture Media and Sport (hereafter DCMS), subject to the specification of the restoration and the meeting of archaeological conditions as requested by English Heritage, advisors to DCMS.

2. Background

Foxton Inclined Plane was opened in 1900 and is an exceptionally rare and near complete example of late Victorian canal engineering which has remained largely undeveloped. The Upper Arm was constructed at the same time and joined the existing cut approximately 300 yards north of the uppermost lock. The Stop Lock was constructed as a fail safe to prevent wholesale water loss should a catastrophic failure occur at the Inclined Plane. The gates were balanced such that rapid water-flow past the gates would cause them to shut automatically. The Stop Lock also provided a point at which the Upper Arm could be dammed above workings of the Inclined Plane

The Upper Arm went out of use along with the Inclined Plane, and traffic reverted to the original lock flight in 1910; the Upper Arm was dammed in 1928 when the Inclined Plane was cut up for scrap. The damming appeared to consist of a clay bund dumped into the Stop Lock and can be clearly seen in an aerial photograph of 1969 along with the rest of the cut being very overgrown.

3. Aims and Methodology

The aim of the archaeological work, as defined by the Design Specification (ULAS Specification 06/912, Beamish 2006, Appendix 1) was to:-

- Identify the presence/absence of any archaeological deposits (including identified and unidentified structural features).
- Establish the character, extent and date range for any archaeological deposits to be affected.
- To record any archaeological deposits to be affected by the groundworks prior to their deconstruction.

The project involved the monitoring of works carried out by British Waterways and site contractors, Morrison Construction Ltd and CPC Ltd to expose, assess and repair the Upper Arm and Stop Lock. Excavation of the Upper Arm was carried out by back actor with a ditching bucket with a number of site visits being carried out as work progressed. The Stop Lock was excavated by mini digger with a ditching bucket and some hand digging under continuous archaeological supervision. A number of profiles were recorded by Electronic Distance Measurer (EDM) across the Upper Arm while the Stop Lock was hand cleaned and recorded. All work followed the Institute of Field Archaeologist's (IFA) *Code of Conduct* and adhered to their *Standard and Guidance for Archaeological Watching Briefs*.



Figure 1: Site location

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4. Results

4.1 The Upper Arm

The Upper Arm was constructed at the same time as the Inclined Plane, joining the top of the incline to the existing cut approximately 300 yards south of the uppermost lock. The arm has stood derelict and overgrown since dewatering in 1928.

Excavation of the arm was limited to the removal of vegetation and accumulated topsoil to reveal the puddle clay lining; this revealed a profile which is likely to be similar to the original (Figure 6). Nearest the plane the clay was grey in colour, similar to that observed within the bottom basin while the clay became yellow further to the south, away from the plane. The greyer clay probably reflects made ground derived from the *blue lias* clays excavated from the lower half of the incline and bottom basin whilst the more yellow may be *in situ* clay of the *middle lias* or Dyrham Formation. There was little of artefactual interest within the cut - a number of early twentieth century bottles were observed and a selection retained.

Re-watering of the arm required the strengthening of the banks which had been weakened by badger sets and some resulting subsidence. A guide trench for sheet piling was excavated within the eastern towpath which allowed a limited examination of the embankment (Figure 16). As expected the bank consisted of mixed layers of both the yellow and grey clays and occasional fragments of brick and stone.



Figure 2: Re-excavated Upper Arm

The towpath nearest the plane had a surface of burnt shale (Figure 3 - Figure 5), reddened with heat; the same type of tow-path surface was recorded during the excavation of the test pits within the bottom basin (Richards, G. ULAS Report 2006-114).

Approximately 30 metres south of the plane two granite kerb stones were uncovered within the towpath, which although undoubtedly placed rather than dumped, provided no evidence of their original purpose. The shale surface appeared to abut both the front and back of these stones, suggesting that the stones were originally visible in the surface of the towpath. Fortunately the stones were visible in section and not disturbed by further works and were therefore left *in-situ*.

The location of the stones may indicate that mooring or strapping posts were installed; certainly the Upper Arm would have become congested with loaded and unloaded boats awaiting passage on the incline, and mooring points would have been required.



Figure 3: Section through eastern towpath showing reddened shale.

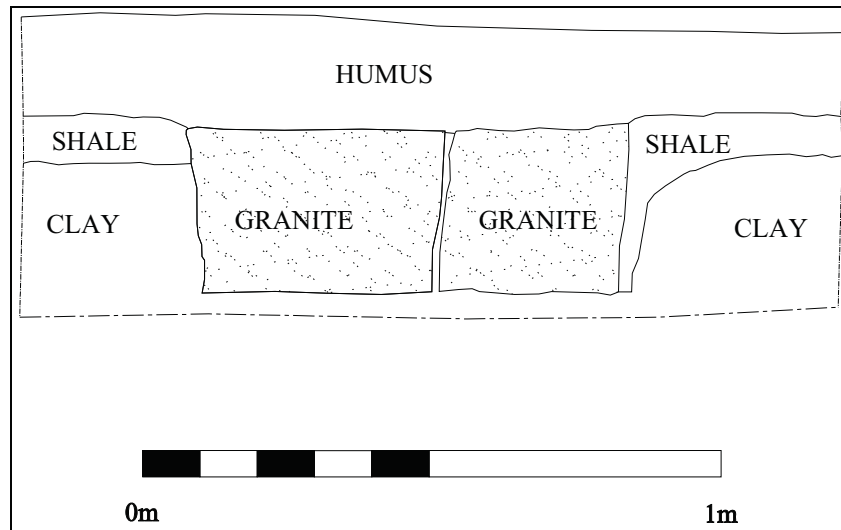


Figure 4: Granite blocks observed within Upper Arm towpath.



Figure 5: Granite blocks.

On the western towpath an area of rubble was observed during the groundworks some 100m north of the Stop Lock (Figure 9). It was very localised and may represent a repair or strengthening work, as no other similar rubble was observed elsewhere within the upper arm.

After the completion of the initial strip a terrace, approximately 800mm deep, was excavated on each side of the cut, altering the original profile. Nothing of archaeological significance was observed during this excavation; the new profile was then surveyed (Figure 6).

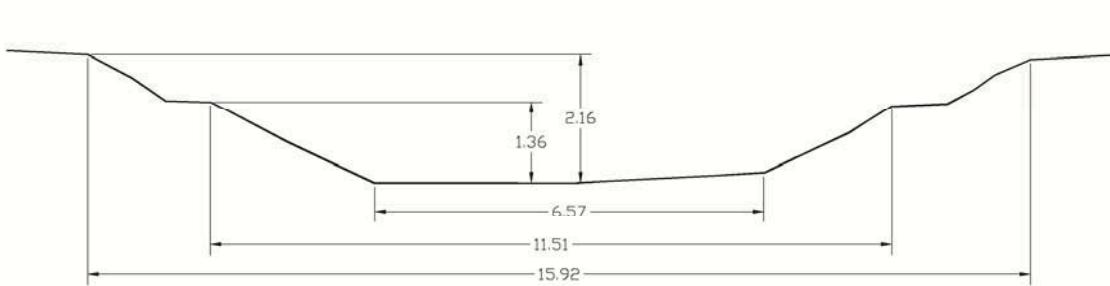


Figure 6: Surveyed profile of re-excavated Upper Arm to north-east of Stop Lock (dimensions in metres)

4.2 The Stop Lock

The next phase in the re-watering of the Upper Arm was the restoration of the Stop Lock; the Stop Lock was originally constructed as a safety measure for the Inclined Plane and therefore went out of use at the same time as the plane did. Locks on a whole are of a uniform design, however, this is without doubt one of the latest locks constructed and may, therefore, contain features not commonly seen. In all likelihood the Stop Lock was the point at which the cut was originally dammed in 1928. An aerial photograph from 1969 shows an earth, or within the Stop Lock, and it is possible that at the lock gates themselves, or stop planks, were used originally to dam the Upper Arm.

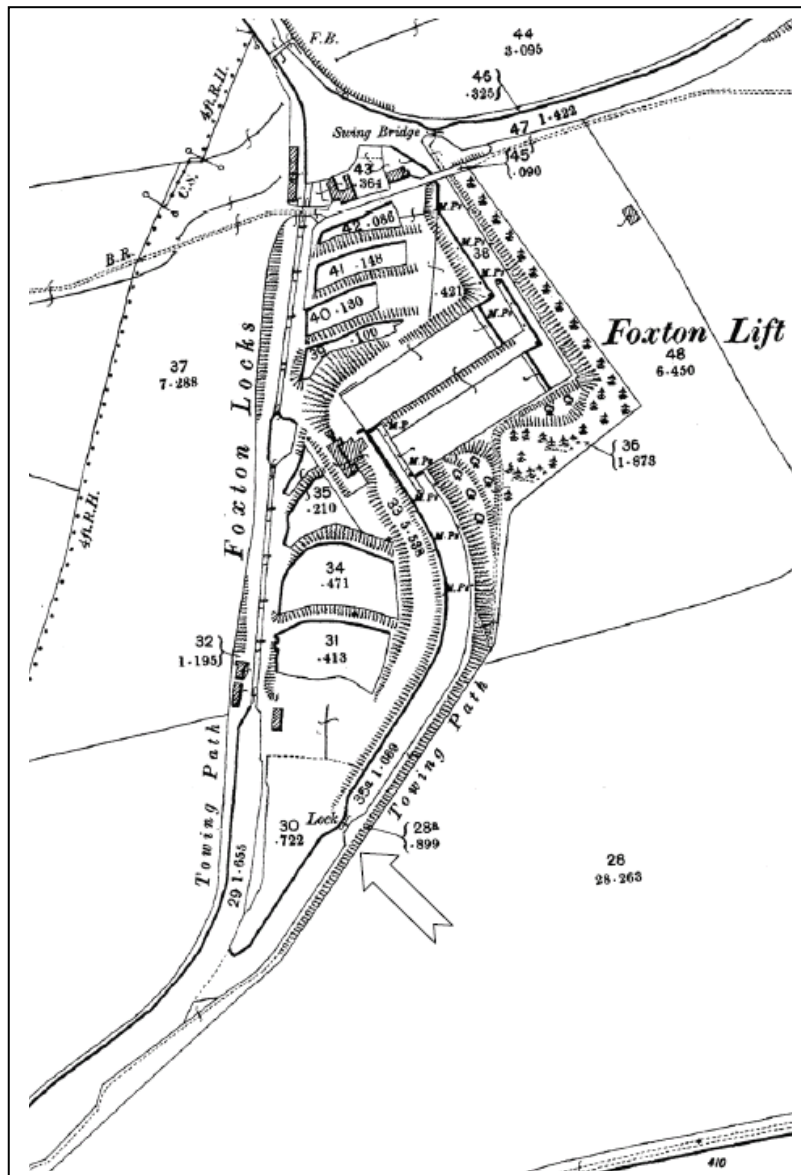


Figure 7: 1904 Ordnance Survey with Stop Lock Arrowed

The dam was moved further south with the construction of a sheet pile and clay coffer dam in 2005 and the Stop Lock emptied. British Waterways had commissioned recording of the general condition of the Stop Lock in 2005 (Appendix 1 p18 Figures 3 and 4). The brickwork was generally in good order, with only limited root damage and a few of the coping stones displaced, and with the exception of surface corrosion the iron fenders were also in good condition.

Approximately 200mm to 300mm of accumulated material was excavated by mini-digger under archaeological supervision; during which one of the original “U” shaped iron collars for holding the heel post within the clapping quoins was recovered. As anticipated the cut was clay-lined while the base of the chamber was brick-lined. The brickwork was 9 inch by 3 inch blue brick in an English Bond above the waterline and red bricks of the same size and bond below the waterline; blues had been used above the waterline as they are more robust and will

withstand frost damage, whilst the reds, below the water line, were unlikely to suffer such damage and the expense of using blue bricks saved. The top course of bricks was a row of headers, on which granite coping stones were laid.

Excavation of the puddle clay indicated that the walls were constructed on concrete footings, approximately 450mm deep; the puddle clay abutted the Stop Lock walls, sealing the porous concrete footing. There were slight differences between the brickwork of the two walls, suggesting perhaps two gangs worked simultaneously. Of note was a projecting header brick starting off the first course of the western wall. The exact purpose of this is unclear, but it possibly was a "trick" the bricklayer employed when laying out, to create a right angle to ensure the wall was straight (the brick, after all, cannot be seen once the puddle clay was laid). Further evidence that two gangs worked simultaneously can be seen on the eastern wall; the first course had been laid on edge to compensate for the course being too high to align properly.

The removal of the coping stones during the ensuing restoration works revealed that the upper courses of blue bricks were only single skin with an inner skin of red bricks. As with only using blues on the upper courses of the outer skin, the use of reds on the inner skin can again be seen as an economy measure. The removal of the coping stones also allowed for the removal and inspection of the iron fenders; these proved to be of substantial size, being the full width of the walls and as a result there is no direct bond between the coping stones and the brickwork. There is, however, a substantial deposit of concrete behind the coping stones which would have kept the coping stones in position. The burnt shale seen elsewhere within the site was again used on the towpath.

Within the walls there were two rendered recesses to house the paddle gear when the gates were open (Figure 8); unusually these were off-centre and were much closer to the heelpost than is normally seen. The recess for the paddle gear is also unusually short (650mm); there is a course header bricks perhaps indicating the base of the paddle gear. These anomalies may have been because the paddle on a stop lock gate needs only to allow adjusting slight changes in level to re-open the gate during day to day use, and not the large change managed by a pound lock where the paddles are set near the base of the gate. The course on the eastern wall had been damaged, creating the impression that the recess is full length, while in fact it is not, the damage probably occurring during the scrapping of the gates. The paddle gear is likely, therefore, to have been gate-mounted and the paddle possibly near the top of the gate. The exact form and workings of the paddle gear remains unclear as no surviving drawings or photographs have been identified.



Figure 8: Recesses for Paddle Gear (damaged eastern wall to the right).

Further hand-cleaning revealed the exact construction of the Stop Lock floor. The floor in total was some 6m (20') long, with some 2.7m (9') to the north of the mitre point and some 3.3m (11') to the south. The apron to the south of the gates comprised 2.2m (7½') brickwork edged by a 0.3m (1') timber sill, whilst that to the north was built of sandstone flags 0.9m (3') wide and up to 1.7m (5½') long. The stop lock construction was 4.45m (14'7") wide) which would have been a little reduced by the iron guards.

The timber sill edge, probably a soft wood and, having been waterlogged, in very good condition, was aligned with recesses within the walls presumably for stop planks for a coffer dam should it be necessary to drain the chamber or dam the Upper Arm. In the centre of the timber was an iron "D" shaped bracket, probably to locate a king post to support the stop planks of the coffer dam.

The top of the sill was at the same level as the puddle clay within the cut and it was decided to excavate a small trench to further examine the relationship between the two. The trench confirmed that the timber sill-edge sat upon a concrete footing, approximately 600mm wide. The depth of the footing was not established because no further excavation was required. The trench also confirmed that the iron bracket passed through and was bolted to the sill-beam.

The brick floor of the sill was of 9 inch by 3 inch bricks, laid on their faces. The majority of the bricks were red but of mixed quality with some very over fired and some occasional near vitrified examples. Other than in appearance, these bricks are of acceptable standard and have survived well; it is possible that they were purchased as "wasters" or as reused kiln-bricks expressly to be used as the lock floor.

The apron into which the gates closed was of sandstone, consisting of seven individually carved slabs each with a 300mm rebate for the gates at the southern end (Figure 12). The edges of the rebate were re-enforced with an iron shoe bolted to each slab, onto which the gates would butt when closed to provide a water tight seal. The slabs are laid so that there are straight edges onto which the brick-work can be laid; and are also tied into the chamber walls to the height of two courses (100mm).

The slab on the western side appeared to have been broken prior to being laid as a corner was missing which had been repaired by extension of the brick floor to fill the void. The leading edge of the slabs has been attractively rounded, although probably for practical reasons, lessening the likelihood of grounding of boats when the water was low; it was possible that the aesthetic was also considered when this work was carried out.

The slabs sat upon concrete footings, which originally would have been at the same level as the bottom of the cut. The remains of a wooden stake can be seen within this concrete slab, which is on the centre line of the lock and may be an original laying out point.

4. Conclusion

As expected because of a comparatively short period of use, the Stop Lock was in a very good state of repair with only some damage caused by neglect and vegetation evident.

As a construction, the chamber walls appear to have been constructed independently, the western wall, on the whole being the better of the two. The gate paddle gear recesses are comparatively short and in an unusual position, being off-centre and set near the heel post. There are no known drawings or detailed photographs of the gates; it is, therefore, unclear how the paddle gear worked.

The construction of the Stop Lock appears to have used a combination of developed design and high quality materials in specific areas combined with a pragmatism and prudence in others. The more expensive blue bricks were only used where absolutely necessary. The sill of both brick and dressed sandstone flags with iron shoes is well constructed and arguably over-engineered for a Stop Lock chamber that would have seen little real use.

The variance in quality of design and construction was also recorded in the bottom basin where blast slag was used as an aggregate for the bottom basin walls, and the use of blue brick restricted (Richards 2006). The construction of the lower dock was however a high quality design and build as reflected in the structure's survival (Beamish and Richards 2006).

5. References

- Beamish, M. 2006. *Design Specification for a watching brief during the Restoration of the Stop Lock at Foxton Inclined Plane, Leicestershire*. ULAS Specification 06/912
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- McKay, W.B. 1945. *Building Craft Series, Brickwork*. Longmans, Green & Co.
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Richards, G. 2006, *An Archaeological Evaluation by Test Pits In Advance of the Excavation of a New Service Trench at Foxton Lock, Leicestershire*, ULAS Report 2006-114

6. Archive and Publication

The site archive consists of

- 5 A2 permatrace sheets
- 1 A3 permatrace sheet
- 111 Black and white negatives with contact sheets
- 142 Digital Colour Images on CD and A4 contact sheet
- 10 Colour Side
- 3 A4 Photo Index Sheet
- 5 A4 Context Sheet
- 1 A4 Context Summary Sheet
- 10 A4 Watching Brief Sheets
- 1 A4 Levels Index

An unbound copy of this report

The archive will be held at Leicestershire County Council, under accession number X.A82.2006

A version of the summary (above) will be published in *Transactions of Leicestershire Archaeological and Historical Society* in due course.

7. Acknowledgments

The field-work was supervised by Gerwyn Richards and Jennifer Hayward, and the Project Managed by Matthew Beamish. Thanks to Peter Chowns of British Waterways for his enthusiasm and help and Angela Simco of English Heritage for her assistance.

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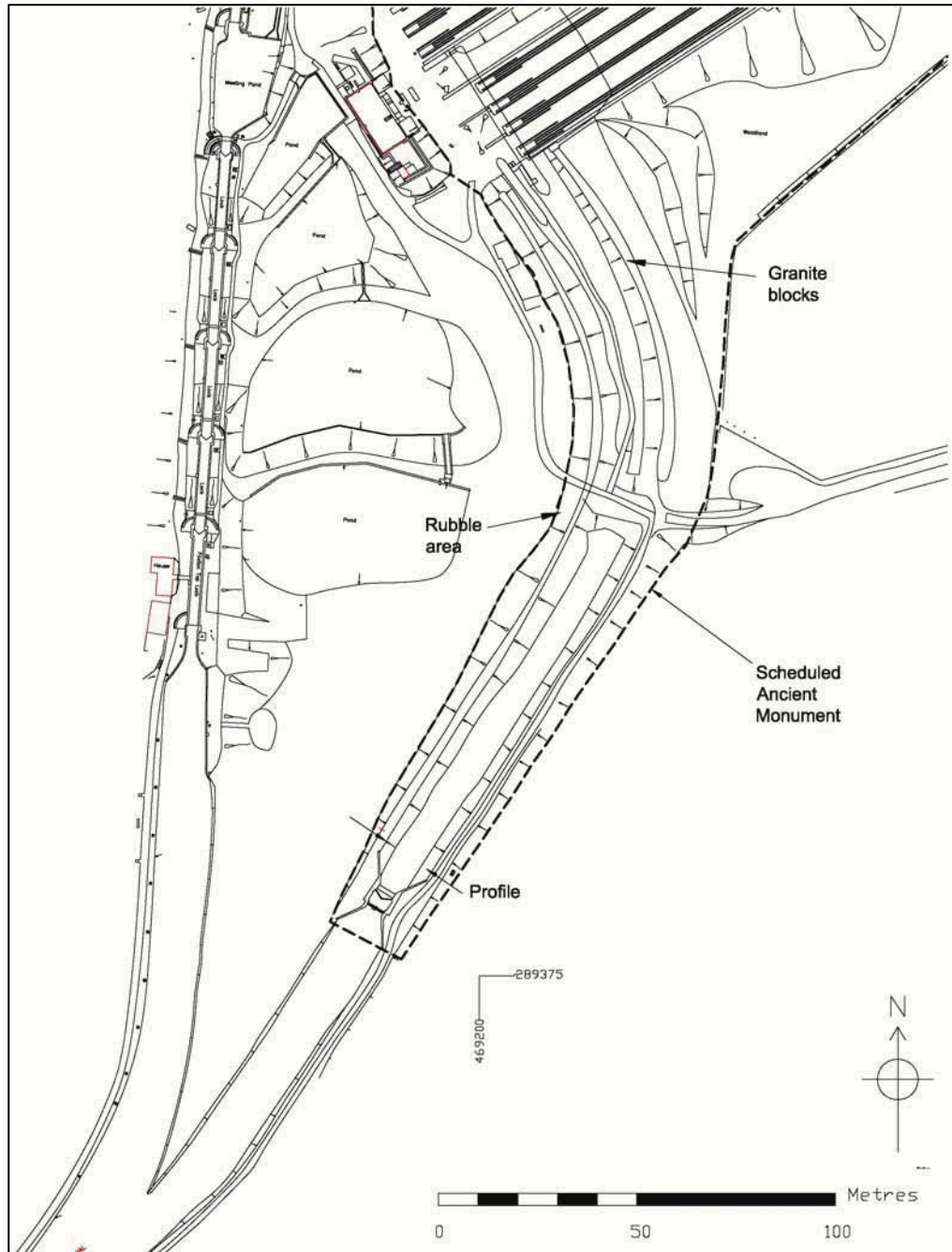


Figure 9: Plan of the Upper Arm

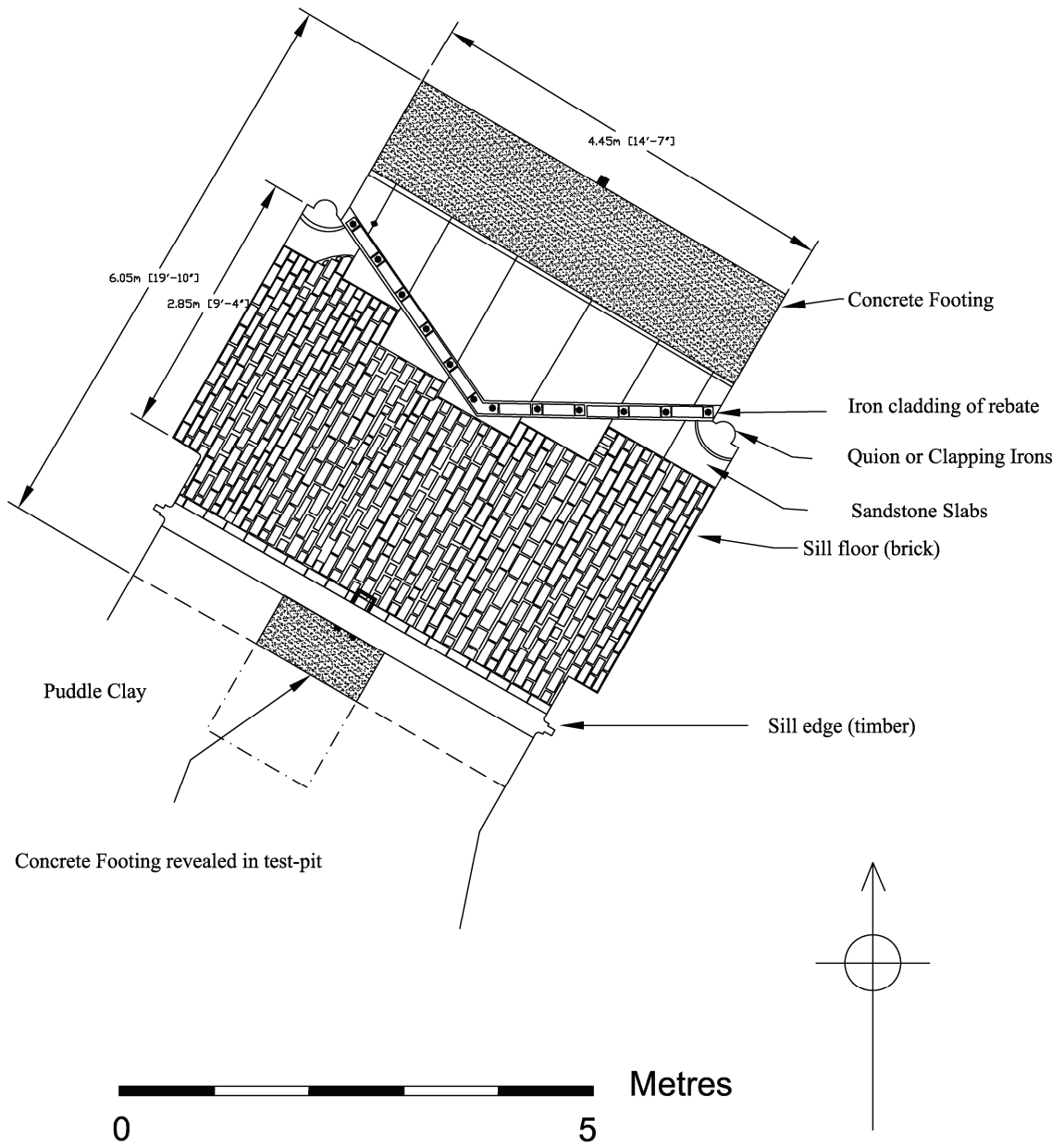


Figure 10: Detail survey of the excavated Stop Lock.



Figure 11: Detail of brick repair to sandstone flag



Figure 13: Iron Clapping Quoin or Post for Lock Gate heel post



Figure 12: Iron clad rebate in Sandstone flags



Figure 14: General view of Stop Lock floor



Figure 15: Chamber wall condition. May 2006



Figure 16: Piling of eastern bank

Appendix 1: Design Specification

UNIVERSITY OF LEICESTER ARCHAEOLOGICAL SERVICES
Design Specification for a watching brief during Restoration of Stop Lock at
Foxton Inclined Plane, Leicestershire

Client:	British Waterways
Site:	Foxton Inclined Plane, Leicestershire
NGR:	(SP) 469230,289590 (centre)
SAM:	Monument No. 30248: Inclined plane immediately east of Foxton Locks
Development:	Restoration of Stop Lock at southern end of Upper Arm above Inclined plane (Drawing GL-037-018/02)
Project:	Archaeological Watching Brief
Planning Authority:	Leicestershire County Council

1 Definition and scope of the specification

1.1 This document constitutes a written scheme of archaeological investigation which ULAS proposes to implement on behalf of the Client in mitigation of any potential damage to buried archaeological deposits which may be caused by the restoration of the stop lock in the Upper Arm above the Inclined Plane. This specification has been prepared in accordance with Planning Policy Guidelines 16 (PPG16, Archaeology and Planning), para.30, and the requirements of Scheduled Monument Consent (DCMS HSD 9/2/8026).

1.2 The proposed works are detailed in Appendix 2. Proposed works include the restoration of the stop-lock (the replacement of damaged brickwork, the resetting of displaced bricks and coping stones, and the re-pointing of brickwork), and investigative work of the lock floor and the northern end of the lock walls to help inform the engineering design of where stop-lock wall terminals will meet a water-proof membrane that is to be placed within the upper arm bed.

1.3 All archaeological work will adhere to the Institute of Field Archaeologist's (IFA) *Code of Conduct and Standard and Guidance for Archaeological Watching Briefs*.

2 Background

2.1 The Inclined Plane is a Scheduled Ancient Monument (National Monument Number 30248).

2.2 Scheduled Monument Consent has been gained by British Waterways to undertake the Restoration of the Stop Lock within the Upper Arm above the Inclined Plane at Foxton (DCMS HSD 9/2/8026). The work is to eventually enable re-watering of the Upper Arm.

2.3 In the late 19th Century flights of narrow beam (7') locks at Foxton and Watford (some 10 miles southwest) effectively joined waterways running north to the cities of the East Midlands with those from the South Midlands and South East. At Foxton the locks rose 23m from bottom to top level, and it took a single boat 45 minutes to pass through. The advent of motorised boats as steamers and subsequently with diesel engines in the late 19th Century, and the ability of the carriers to subsequently operate boats in pairs (a motor and butty) rather than singly as horse-boats, led in places to the widening of many locks to 14' to allow breasted narrowboats and widebeam boats to pass. Foxton Inclined Plane allowed two pairs of boats to ascend and descend simultaneously, with a greatly improved time of just 8 minutes. Foxton Inclined Plane was opened in 1900, but was closed by 1911. It was not until the late 1920s that major phases of demolition occurred.

3. Archaeological Background and Potential

3.1 Foxton Inclined Plane is located between the villages of Foxton and Gumley, Leicestershire, (Figure) and was opened in 1900 (Figure). Foxton Inclined Plane is an exceptionally rare and relatively complete example of late Victorian canal engineering that has remained undeveloped. A full description and assessment of the Monument from the Scheduled Monument Register is appended to this document (Appendix 3 p.29)

3.2 The construction of the plane involved substantial excavations in the area of the lower docks, and embankment for the upper arm and docks, the extent of the made ground is indicated on, although no clear record of the Upper Arms construction other than that adjacent to the Lift entrance has been found.

3.3 The brick built stop lock (Figure) was located at the southern end of the arm. The stop lock gates were balanced such that rapid water-flow past the gates would cause them to shut automatically. The purpose of the stop-lock was to prevent the draining of the pound in the event of rapid accidental water-loss from the upper arm of the inclined plane.

3.4 A condition survey of the stop-lock has been recently completed by Halcrow (Dwg WN/CAAX/091/21) and is reproduced below (Appendix 1 p.18 Figures 3 and 4). This survey provides a clear basis for the further detailed recording of features and anomalies exposed in the course of the restoration.

3. Aims

3.1 Through archaeological control and supervision of works undertaken in the restoration and investigation of the stop-lock:

1. To identify the presence/absence of any archaeological deposits (including unidentified structural features).
2. To establish the character, extent and date range for any archaeological deposits to be affected by the proposed ground works.
3. To record any archaeological deposits to be affected by the ground works.
4. To produce an archive and report of any results.

4 Methodology

4.1 Archaeological Supervision and Recording

4.1.1 The project will involve the presence on site of an experienced professional archaeologist during the dismantling and exposure of the lock walls and the excavation of the lock floor and the northern terminals of the lock walls.

4.1.2 During groundworks, if any archaeological deposits are seen to be present, the archaeologist will halt the excavation process and record areas of archaeological interest. The archaeologist will co-operate at all times with the contractors on site to ensure the minimum interruption to the work. Potentially a second archaeologist may be required dependant upon the size and nature of the archaeological remains.

4.1.3 The Condition Survey (Halcrow Dwg WN/CAAX/091/21) will be used as the basis of further detailed recording, and should not be duplicated as part of the archaeological record.

4.1.4 Any archaeological deposits located will be hand cleaned and planned as appropriate. Samples of any archaeological deposits located will be hand excavated. Measured drawings of all archaeological features will be prepared at a scale of 1:20 and tied into an overall site plan of 1:100. All plans will be tied into the National Grid using an Electronic Distance Measurer (EDM) where appropriate.

4.1.5 Archaeological deposits will be excavated and recorded as appropriate to establishing the stratigraphic and chronological sequence of deposits, recognising and excavating structural evidence and recovering economic, artefactual and environmental evidence.

4.1.5 All excavated sections will be recorded and drawn at 1:10 or 1:20 scale, levelled and tied into the Ordnance Survey datum. Spot heights will be taken as appropriate.

4.1.6 Any human remains encountered will be initially left *in situ* and only be removed under a Home Office Licence and in compliance with relevant environmental health regulations. The Client, Leicestershire County Council, English Heritage and the coroner will be informed immediately on their discovery.

4.1.7 Internal monitoring procedures will be undertaken including visits to the site from the project manager. These will ensure that professional standards are being maintained. Provision will be made for monitoring visits with representatives of the Client, Leicestershire County Council and English Heritage.

4.1.8 In the event of significant archaeological remains being located during the watching brief which will be affected by the proposals, the archaeologist will have the power to halt the works. The Client, the County Archaeologist and English Heritage will be informed immediately in order that discussions can take place with a view to securing the preservation of such remains *in situ*, or for the implementation of an appropriate programme of archaeological work to mitigate any damage that will take place.

5 Recording Systems

5.1 Individual descriptions of all archaeological strata and features excavated or exposed will be entered onto pro-forma recording sheets.

5.2 A site location plan based on the current Ordnance Survey 1:1250 map, (reproduced with the permission of the Controller of HMSO) will be prepared. This will be supplemented by a plan at 1:200 (or 1:100), which will show the location of the areas investigated.

5.3 Some record of the full extent in plan of all archaeological deposits encountered will be made on drawing film, related to the OS grid and at a scale of 1:10 or 1:20. Elevations and sections of individual layers of features should be drawn where possible. The OD height of all principal strata and features will be calculated and indicated on the appropriate plans.

5.4 An adequate photographic record of the investigations will be prepared. This will include black and white prints and colour transparencies illustrating in both detail and general context the principal features and finds discovered. The photographic record will also include 'working shots' to illustrate more generally the nature of the archaeological operation mounted.

5.5 This record will be compiled and fully checked during the course of the watching brief.

5.6 All site records and finds will be kept securely.

6 Report and Archive

6.1 A report on the watching brief will be provided following the groundworks.

6.2 Copies will be provided for the Client, English Heritage, the Sites and Monuments Record and Planning Authority. The copyright of all original finished documents shall remain vested in ULAS and ULAS will be entitled as of right to publish any material in any form produced as a result of its investigations.

6.3 A full copy of the archive as defined in the 'Guidelines for the preparation of excavation archives for long-term storage' (UKIC 1990), and Standards in the Museum care of archaeological collections (MGC 1992) and 'Guidelines for the preparation of site archives and assessments for all finds (other than fired clay objects) (Roman Finds Group and Finds Research Group AD 700-1700 1993) will be presented to Leicestershire County Council, Heritage Services normally within six months of the completion of analysis. This archive will include all written, drawn and photographic records relating directly to the investigations undertaken.

6.4 Any disk-based data will be provided for the Leicester City SMR.

7 Publication

7.1 The evaluation and watching brief report will be submitted to Leicestershire County Council for inclusion in the Sites and Monuments Record. A summary of the work will be submitted to the Transactions of the Leicestershire Archaeological and Historical Society. A larger report will be submitted for inclusion if the results of the works warrant it.

7.2 ULAS and the Leicestershire County SMR support the Online Access to the Index of Archaeological Investigations (OASIS) project. ULAS will complete the online OASIS form at <http://ads.ac.uk/project/oasis> on completion of the project and report. ULAS will contact Leicestershire County Council SMR prior to completing the form. Once a report has become a public document following its incorporation into

Leicestershire County Council SMR it may be placed on a web-site. The Client should agree to this procedure in writing as part of the process of submitting the report to Leicestershire County Council SMR.

8 Timetable and Staffing

8.1 It is intended that the work start as soon as it is possible. The duration of the watching brief will be dependant upon the time taken to dismantle and excavate the stop lock and the quantity and significance of the archaeological deposits revealed.

9 Health and Safety

9.1 ULAS is covered by and adheres to the University of Leicester Statement of Safety Policy and uses the ULAS Health and Safety Manual (2001) with appropriate risks assessments for all archaeological work. A draft Health and Safety statement for this project is in the Appendix. The relevant Health and Safety Executive guidelines will be adhered to as appropriate.

10 Insurance

10.1 All employees, consultants and volunteers are covered by the University of Leicester public liability insurance, £20m cover with St. Paul Travellers (policy no. UCPOP3651237). Professional indemnity insurance is with Lloyds Underwriters 50% and Brit Insurance 50%, £10m cover (policy no. PUNIO3605). Employer's Liability Insurance is with St. Paul Travellers, cover £10m (policy no. UCPOP3651237).

11 Bibliography

English Heritage: Scheduled Monuments Register: <http://www.magic.gov.uk/rsm/30248.pdf>

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Figure 1: Location of Foxton, Leicestershire.

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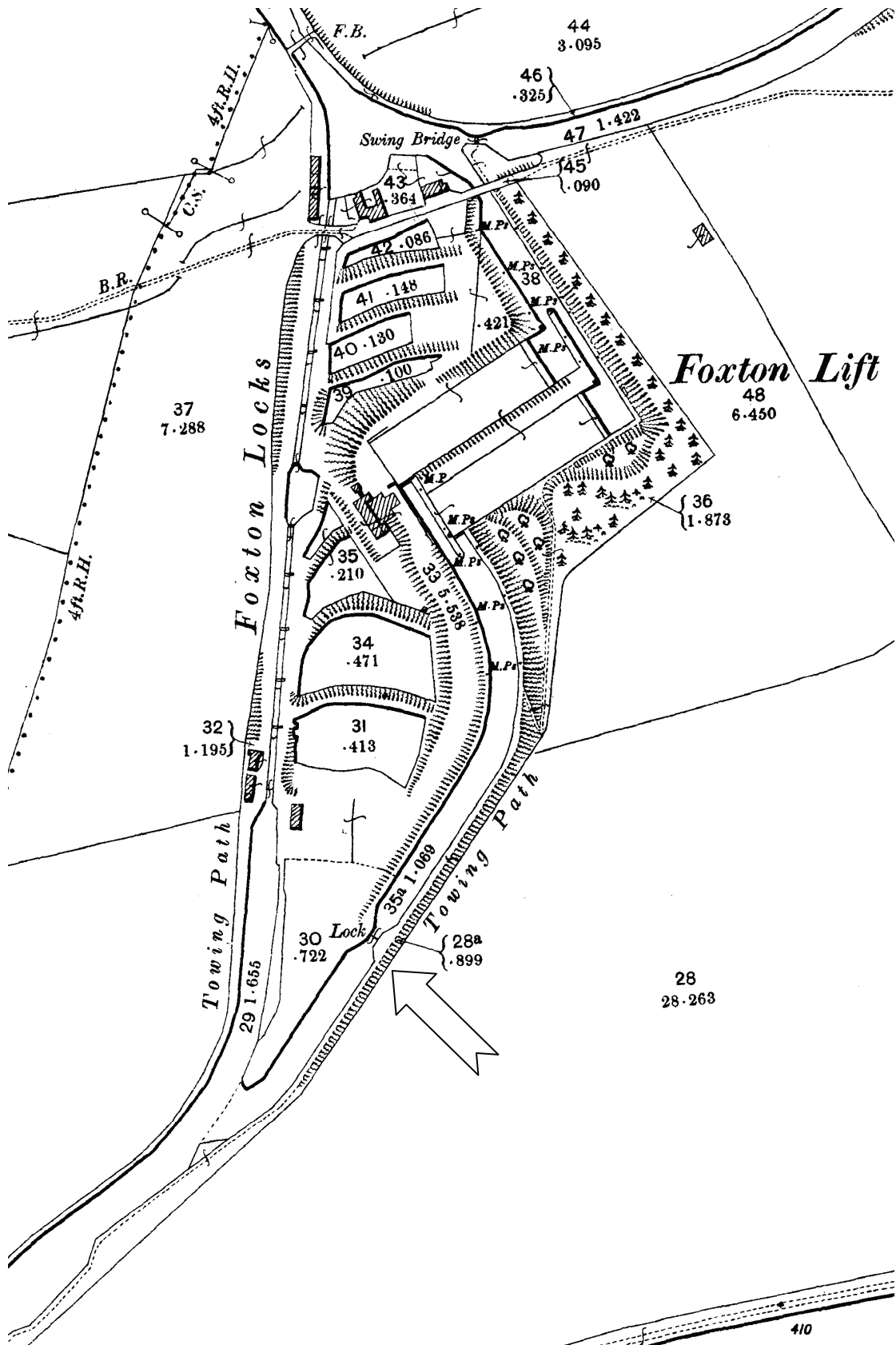


Figure 2: 1904 Ordnance Survey map showing the inclined plane. Stop Lock arrowed.

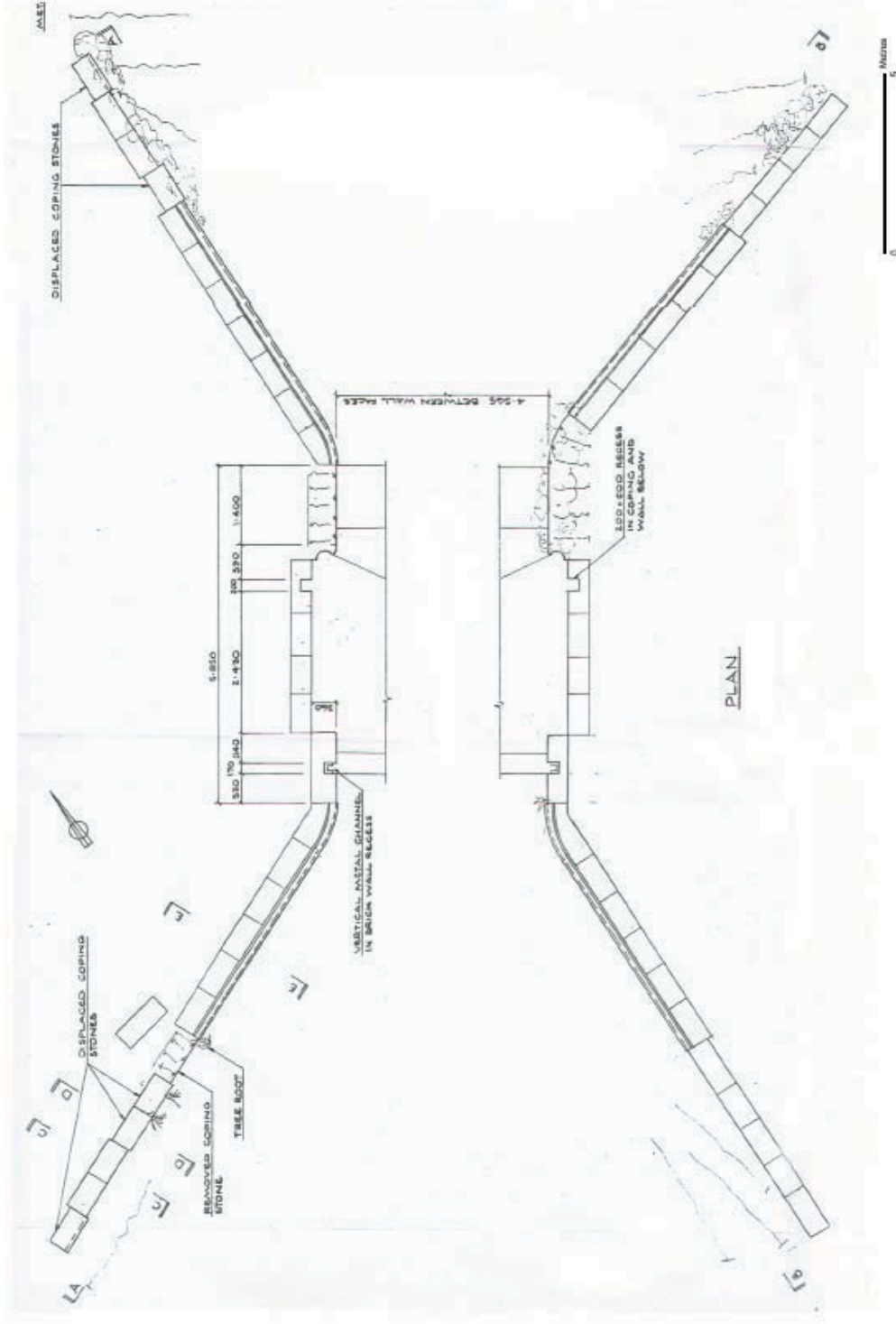


Figure 3: Plan of Stop Lock, WN/CAAX/091/21 06/12/2005

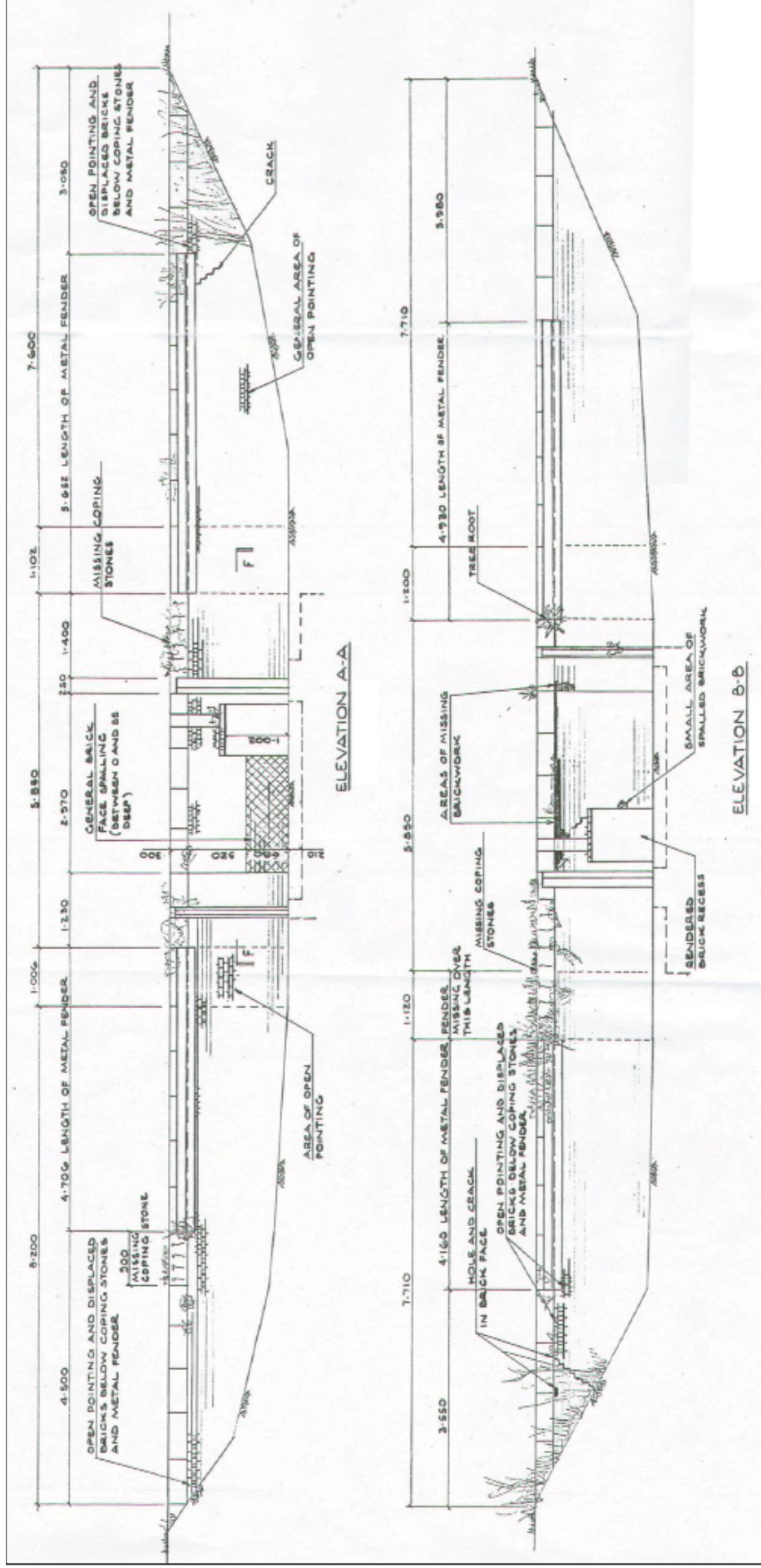


Figure 4: Elevations of Stop Lock WN/CAAX/091/21 06/12/2005 (see Fig 2 for locations)

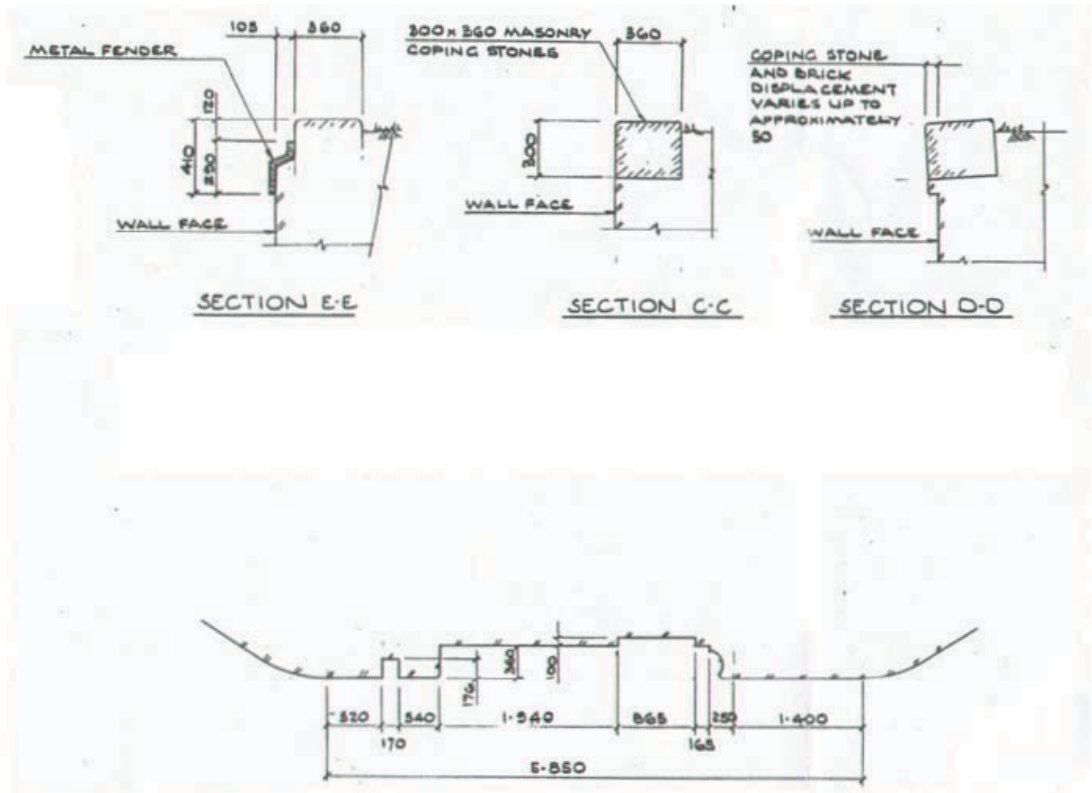


Figure 5: Stop Lock details WN/CAAX/091/21 06/12/2005 (see Fig 2 for locations)



Figure 6: Stop Lock from the North 15/05/2006

Appendix 2: Description of the proposed works (British Waterways)

Mechanically lift all stone copings and place carefully aside. Remove all sections of cast iron rubbing strip and place carefully aside. Remove and re-set, by hand, top 2 courses of brickwork with mortar to match existing, as per attached analysis test report. Replace rubbing strip and stone copings, including sections that have previously been removed and placed adjacent to the structure. Re-bed on mortar to match existing.

Cut out and rotate spalled brickwork as identified on drawing WN/CAAX1091121. Replace missing bricks, as identified on drawing WN/CAAX1091121, with new bricks to match existing.

Undertake patch pointing to areas of open pointing identified on drawing WN/CAAX/091121. Mortar to be 1 part cement to 4/5 parts mixed quartz sand (<5mm) to match existing, as per attached mortar analysis test report.

Treat tree roots and emerging vegetation, as identified on drawing WN/CAAX/091/21, with Glyphosate, or similar agreed with English Heritage, to prevent regrowth.

Undertake archaeological clearance of the lock bottom and the northern face of structural elements, under the supervision of an approved archaeological contractor, in order to inform the design of the interface between the lock structure and new waterproof membrane.

The archaeological investigation will establish whether the existing timber sill needs replacement with identical timber.

Install new timber lock gates to original pattern (still on site) including replacement fittings.

Appendix 3: English Heritage Record of Scheduled Monuments

EXTRACT FROM ENGLISH HERITAGE'S RECORD OF SCHEDULED MONUMENTS

MONUMENT: Inclined plane immediately east of Foxton Locks

PARISH: FOXTON

DISTRICT: HARBOROUGH

COUNTY: LEICESTERSHIRE

NATIONAL MONUMENT NO: 30248

NATIONAL GRID REFERENCE(S): SP69238959

DESCRIPTION OF THE MONUMENT

The monument includes the standing, earthwork and buried remains of the inclined plane, the canal arm linking the plane with the canal summit and the bottom lift basin, situated immediately east of Foxton Locks. The bottom lift basin survives as a water-filled cutting up to 30m in width and 150m in length orientated on a NNW-SSE axis. Within the basin are the remains of the bottom docks which originally provided access to the northern and southern inclines. The docks survive as two sections of brick pier connected by a modern wooden walkway. The northern end of the dock consists of a semicircular island measuring approximately 4m in length and 3 m in width. The southern end of the dock is rectangular in shape, measuring approximately 19m by 12m, and projects from the base between the inclines. The inclined planes survive as two adjacent earthwork ramps on a gradient of approximately 1:4. The ramps are slightly staggered east to west but each measures approximately 100m in length and 28m in width with their long axes orientated ENE-WSW. The southern incline includes a blue brick revetting wall approximately 20m in length and a maximum of 2m in height along its south western edge at the junction with the earthwork bank forming the eastern side of the upper canal arm. Further sections of blue and red brick revetting wall and support piers immediately to the north and west originally provided the base for a steel aqueduct giving access to the northern incline. Eight parallel lengths of fragmentary concrete bases running the length of the inclines, four to each incline, mark the position of track beds for rails. Immediately south of the upper docks is the dry bed of the upper canal arm linking the plane with the canal summit. The canal arm survives as a waterlogged embanked depression up to 2m in depth and 13m in width, the banks of which are a maximum of 10m in width at their base. The banks are constructed of burnt clay and continue curving southwards for 250m up to the stop lock. The stop lock is constructed of brick with stone coping, the jaws or entry to which have been infilled with earth. Documentary records show the inclined plane to have been constructed by the Grand Junction Canal Company between 1898-1900 to a design patented by the Company's engineer, Gordon Calver Thomas. Copies of original blueprints for the design still survive. The incline was intended to offer a more efficient and flexible means of moving barges up the 23m between the upper and lower canals than the staircase flight of ten locks built by the Grand Union Canal in 1810 immediately to the west, which it temporarily replaced. Foxton provided an important junction between canals built by the Leicestershire and Northamptonshire Union and the Grand Union. Contemporary photographic records show barges being transported up the lift in two water-filled steel tanks, each mounted on wheels which in turn rested on guide rails. A steam engine situated in an engine house at the top of the plane provided the power via a system of pulleys and cables attached to the tanks. Contemporary documents indicate that by 1910 the incline had been deemed uneconomic, although this was due to less than expected traffic rather than any faults in the design. The incline was closed in 1911, the majority of demolition taking place between 1927 and 1928. Repair work on the lower basin in the 1980s indicated that the pulley wheels still remained in situ below water level. All fences, the surfaces of pathways and the dam within the stop lock are excluded from the scheduling, although the ground beneath these features is included.

ASSESSMENT OF IMPORTANCE

From the mid-18th century onwards the increasing need for the transport of heavy goods could not be entirely met by rivers. The road system was improving and being greatly extended, but a horse could draw only two tons in a cart, and between 50 to 100 tons in a barge, making water transport more economic. The requirement was fulfilled by the construction of a system of artificial

waterways or canals, with canal construction reaching its peak in the period between 1790 and 1810. Differences of level were overcome by locks. Sometimes flights of locks had to be built, and in a few places particular problems in transporting canal traffic from one level to another necessitated the construction of either vertical boat lifts or inclined planes. Lifts and inclines differed in that with the former, boats were hoisted vertically, whereas with the latter they were hauled up ramps. Documentary sources indicate that around 20 inclined planes were constructed in England, the first being built at Ketley in Shropshire in 1788. The largest was at Morwellham on the Tavistock Canal where barges were hauled up a slope of 72m. Few inclines functioned for any great length of time, the exception being that at Trench on the Shrewsbury Canal which was in use for 124 years and was the last to close in 1921. The Grand Union Canal between Foxton and Daventry was opened in stages between 1812 and 1814 and provided the final link in a chain connecting Leicester and London. From the 1830s onwards railways began to supplant canals as the principle means of goods transportation. The Grand Junction, the new owners of the Grand Union Canal from 1894, tried to compete but were hampered by their locks at Foxton and Watford, the width of which severely limited the cargo-carrying capacity of craft passing through. Anticipating increased revenue from the passage of coal between Nottingham and London, the incline at Foxton was constructed between 1898 and 1900. Foxton was the last and most sophisticated incline to be built in England. It was constructed utilizing steel rather than the cast or wrought iron employed on earlier designs and could lift weights of up to 240 tons, three times that of any of its predecessors. The remains of the inclined plane at Foxton represent an exceptionally rare and complete example of late Victorian canal engineering which have remained free of subsequent development. The location of the inclined plane in close proximity to the staircase flight of locks, themselves a tourist attraction, considerably enhances its potential as a public amenity. Opportunities for the interpretation of the site are further supplemented by the large amount of contemporary documentary and photographic material relating to its construction and use.

SCHEDULING HISTORY

Monument included in the Schedule on 24th January 1973 as:

COUNTY/NUMBER: Leicestershire 153

NAME: Foxton inclined plane

The reference of this monument is now:

NATIONAL MONUMENT NUMBER: 30248

NAME: Inclined plane immediately east of Foxton Locks

SCHEDULING REVISED ON 19th March 1999

Appendix 4: Draft Project Health and Safety Policy Statement

Groundworks at The Foxton Inclined Plane, Leicestershire

For: British Waterways

1 Nature of the work

1.1 This statement is for an archaeological watching brief.

1.2 The work will involve observation of groundworks, namely the excavation of a trench to receive welded mesh fencing, during daylight hours and recording of any underlying archaeological deposits revealed. Overall depth is likely to be a maximum of 0.40m. Where archaeological deposits are revealed they will be examined and excavated with hand tools (shovels, trowels etc). All work will adhere to the University of Leicester Health and Safety Policy and follow the guidance in the Standing Committee of Archaeological Unit Managers manual, as revised in 1997, together with the following relevant Health and Safety guidelines.

1.3 HSE Construction Information Sheet CS8 Safety in excavations.

HSE Industry Advisory leaflet IND (G)143 (L): Getting to grips with manual handling.

HSE Industry Advisory leaflet IND (G)145 (L): Watch Your back.

CIRIA R97 Trenching practice.

CIRIA TN95 Proprietary Trench Support Systems.

HSE Guidance Note HS(G) 47 Avoiding danger to underground services. HSE Guidance Note GS7 Accidents to children on construction sites

1.4 The Health and Safety policy on site will be reassessed during the evaluation .

1.5 All work will adhere to the contractors' health and safety policy.

2 Risks Assessment

2.1 Working adjacent to a building in a public area

Precautions. The site area will be fenced to prevent access from the public. The effect of excavations on the stability of adjacent standing structures will be assessed. Hard hats should be worn when working in the trenches in case of falling debris from the building. Loose spoil heaps will not be walked on. Protective footwear will be worn at all times. First aid kit, vehicle and mobile phone to be kept on site in case of emergency.

2.2 Working with chemicals.

If chemicals are used to conserve or help lift archaeological material these will only be used by qualified personnel with protective clothing (i.e. a trained conservator) and will be removed from site immediately after use.

2.3 Other risks

Precautions. If there is any suspicion of unforeseen hazards being encountered e.g. chemical contaminants, unexploded bombs, hazardous gases work will cease immediately. The client and relevant public authorities will be informed immediately.

Matthew Beamish

June 2006-06-21