Archaeological watching brief at Foxton Locks, Leicester Line, Grand Union Canal, Leicestershire

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Introduction

An archaeological watching brief was carried out at Foxton Locks (SAM 1018832), Leicester Line, Grand Union Canal, Leicestershire (SP 69244 89605; Fig 1) at the request of Mr Phil Emery, Senior Heritage Advisor, Canal & River Trust. This work was undertaken in compliance with a written scheme of investigation provided by Martin Cook BA MCIfA in response to the scheduled monument application document and a heritage assessment (C&RT 2017) submitted with the application for this consent, dated 11th November 2017.

Summary

An archaeological watching brief was carried out at Foxton Locks (SAM 1018832), Leicester Line, Grand Union Canal, Leicestershire. It recorded superficial modern deposits associated with the restoration of the upper canal arm of the Inclined Plane and an access shaft believed to be part of the foundation for the Inclined Plane itself.

The documentary material

General

A documentary study (Cook 1999) took in five sources. These were the Sites and Monuments Record held by Leicestershire County Council and archives held by Leicestershire County Record Office, archives held by the Foxton Inclined Plane Museum and the British Waterways archives, then held at the National Waterways Museum, Gloucester. Also consulted was engineering literature held by Birmingham University and other archaeological and historical literature as appropriate or as available. The Foxton Inclined Plane has been a popular subject of study and there are several publications that deal exclusively with it (eg Gardner 1979, Goodwin 1988, 1992, Matts 1970 and most recently Carden 2012). A documentary study for a watching brief cannot improve on this wealth of research and considered opinion. A brief summary of the construction and history of the Foxton complex has therefore been given. This was with the objective of identifying above and below ground features that have or are likely to have survived.

Written sources

Pre-Inclined Plane construction

In 1793 the Leicester and Northampton Union Canal Company received its Act of Parliament to construct a canal from Leicester to Braunston where it would join the Grand Junction Canal and thus give access to London and Birmingham. The canal was built southwards from Leicester and by 1797 had reached Gumley Debdale Wharf near Foxton. Here construction ceased due largely to lack of funds and, apart from an extension of the canal to nearby Market Harborough (reached in 1809), the original company carried out no further construction work. In 1799 James Barnes investigated the possibility of continuing the canal south to Braunston and later a second survey was carried out by Thomas Telford. However, it was not until 1810 that the 'old' Grand Union was granted an Act to built an extension to Braunston *via* Watford. Benjamin Bevan engineered the route, adopting the line originally surveyed by Barnes (Labrum 1994).

The new canal branched off the old Leicester and Northamptonshire Union Canal at Foxton and was immediately faced with a steep ascent of 75 feet to reach the summit level. To achieve this a series of ten locks was constructed in two flights of five, with a short pound in between the staircases to allow boats to pass.

In staircase locks the lower gates of one chamber form the upper gates of the next lower chamber. At Foxton the gates are double-mitred throughout, except for the topmost gates of each staircase which are of single leaf design. Side ponds are provided on the east side of the staircase and each lock chamber has two ground paddles set in the lock wall to control the flow of water between the lock chamber and the side ponds. The locks were opened in 1814 and were used until 1900 when the Inclined Plane was brought into commission.

Inclined Plane construction

In 1893 the carriers Fellows, Morton and Clayton Ltd informed the Grand Union Canal Company that trading under the existing conditions (ie with flights of narrow locks at Watford and Foxton) was impossible. However, if the canal company would widen the two flights of narrow locks and dredge the waterway to take 'wider boats with a heavier carrying capacity", Fellows, Morton and Clayton would run large steamers which would enable them to compete with other forms of transport (Hadfield 1970). The scheme adopted at Foxton was for an inclined plane capable of taking 70 ton barges. The issue of Watford locks was left for further consideration.

A pamphlet issued by the canal company during or soon after the construction of the Inclined Plane (Thomas *c* 1900; Leicestershire Record Office DE 215/6: 25/78) describes the principal features of the site in a typical Victorian manner and is reproduced below more or less *verbatim*.

The Thomas Lift, which is of very simple design, is an apparatus constructed for the purpose of transferring barges and other vessels from one level to another on canals and other waterways, in lieu of an ordinary lock or flight of locks, its object being to minimise the loss of water from the higher to the lower level, which is inseparable from the ordinary system of lockage, and to provide for the passage of vessels simultaneously in both directions at a single operation between levels of widely different altitude, whereby the loss of time incidental to the passage through a flight of locks is in a great measure reduced.

This consists of a system of wet docks, wherein vessels to be transferred are water-borne. The docks are mounted on wheeled carriages sufficient to support them horizontally, and to run on inclined railways extending between the higher and lower water levels; such railways being transverse to the length of the docks which travel broadside on so as to admit of a short length of wheel base and a steep grade. The docks are provided with end gates which open and close for the ingress and egress of vessels by rising or falling in a vertical plane, suitable grooves being provided for the gates to work in, and means are provided for making a water tight closure. The end of each dock when in position at the top of its inclined railway makes a practically water tight joint with the standing work of the extremity of what may be termed the head bay or upper pond. The dock then forms a continuation of the upper canal, there being also a similar gate provided at the end of each of the upper bays to retain the water in the upper level of the canal when the docks are absent.

The contact between the connecting end of each movable dock with the standing work of the upper bay is by means of a direct butt joint between properly faced surfaces at the bottom and sides of the end of the dock which is closed by a direct butting motion of the dock against corresponding surfaces on the standing work. The butting motion to the dock is obtained by hydraulic pressure rams acting on the reverse end of the dock, thereby causing the dock to move towards the permanent work upon the axles of the wheels carrying the dock, sufficient traverse upon the axles being provided. The pressure rams also retain the dock in its proper position of contact with the permanent work for such length of time as is necessary for manipulating the vessels.

The planes continue below the level of the water in the tail bay, which is on a level with the lower canal, so that the dock, with or without floating vessels, descends into the water and so establishes a connection both as regards level and alignment with the water in the lower canal. This allows vessels to be passed either in or out of whichever dock may be in position in the lower canal.

The two inclined planes are placed side by side, and although at the same inclination and extending between the same levels, they are not in the same plane, but echeloned so that one extends from the right side of the head bay to the right side of the tail bay, while the other extends from the left side of the head bay to the left side of the tail bay.

In order to compensate for the alteration of the balance between the ascending and descending docks consequent on the immersion of the descending dock in the lower pond, the normal gradient of the railways at the upper ends of the inclines is gradually diminished so as to avoid the necessity of providing for the great variation of haulage power which would otherwise be necessary in order to overcome the unbalanced weight of the ascending dock when the descending dock is immerced in water.

So that the dock shall preserve its horizontality whilst travelling on the part of the incline of which the gradient is gradually varied as above mentioned, each of the carriages upon which the dock is supported is provided at the side towards the top of the incline with duplicate sets of wheels, the wheels of the two sets being in different vertical planes, and at the upper part of the incline separate sets of rails are provided for each set of wheels, the said duplicate set of rails gradually deviating to equal extents from the normal plane of the incline, the deviation of the two sets of rails being however at such different points in the length of the incline that the parts of the incline on which the leading and trailing wheels of the carriage may be situated at the same moment during any part of their travel are always of equal gradient and at equal degrees of deviation from the normal gradient. This is accomplished by the provision of duplicate sets of rails and wheels as above described, so that when the leading wheels of the dock in ascending reach the point of deviation of gradient for the trailing wheels, the second or outside set of leading wheels enter and travel upon the duplicate set of rails, whilst the the first set of leading wheels quit the rails on which they were travelling and on which the trailing wheels continue to travel. The same description is conversely applicable to the dock in descending.

The two docks are connected by a balance rope acting independently, and two hauling ropes to each dock are provided passing around a winding drum in opposite directions, so that the two ropes attached to the dock to be raised are hauled in whilst the two ropes attached to the dock to be lowered are payed out. Motion to the drum is imparted by a worm wheel attached to the drum and is actuated by engine power.

The quantity of water raised on the average equals that lowered between the two levels so that there is practically no loss of water, and as the vessels transported by the lifts are water-borne, the weight of the load carried by the dock is always the same whether the vessel be loaded or not, and whether the dock contains a vessel or not.

The lift was believed to have cost £250,000 and took three years to build (VCH **V**). Contemporary opinion regarding the Foxton Inclined Plane was optimistic and enthusiastic. A report on the recently constructed Plane commented in part:

It is remarkable how long the old staircases of canal locks, often comprising as many as a dozen, still exist in spite of the much more effective mechanical means of raising and lowering boats which are now available. It seems as if the managers of canals considered time of no value and, therefore made no effort to expedite traffic, allowing the railways to secure much which they might carry quite well if they valued quick delivery more highly (Anon 1901).

In spite of this early optimism the Foxton Locks were reinstated to pass traffic at night when the Incline was not working. On 26th October 1910 instructions were given to cease working the Incline after a fortnight and to revert to the locks for all traffic although the Incline was used occasionally in 1912 and perhaps later when the locks were being repaired. The machinery for the Incline was dismantled in 1926 and sold in 1928 for £250.

By the 1920s it was apparent that these techniques had not been as successful as had been hoped and, in a report of The International Navigation Congress, the following more cautionary statement appeared:

Mr Preston summed up the position (regarding locks and elevators for canals) to the effect that locks were still the best method of overcoming differences of level, especially when the lift was not great and the water supply ample. If the lift was considerable and the water supply deficient, lifts or inclines would probably prove more satisfactory. In the latter case, if the ground were steep and the boats less than a 100 tons, a lift would be best. No really satisfactory system of transporting loaded cargo boats had been introduced. Expeditious locking was dependant upon suitable location and alignment of the locks, ample basins for waiting boats, ample sluices and conduits with small openings into the lock to minimise local disturbance of the water, ample dimensions, good lighting at night (Anon 1923).

In retrospect, the reasons for the failure of the Foxton Inclined Plane are difficult to ascertain. It certainly had its teething problems although these seem insufficient to explain its demise. The answer is probably to be found in the failure of trade to increase. Indeed, the through trade, especially in coal, decreased considerably. This may have been a direct result of the reconstruction of Watford locks, between November 1901 and February 1902, as narrow locks, thus preserving a bottleneck on the canal (Hadfield 1970).

Historic mapping

The 1st edition Ordnance Survey map of 1886 shows the Foxton flight of locks in its original configuration, before the Inclined Plane was built (Fig 2.1). It shows the size and number of the side ponds and buildings at the top and bottom of the flight. The top lock-keeper's cottage on the west side of the canal is present as are various buildings at the foot of the flight.

By the time of the revised Ordnance Survey map of 1904 (Fig 2.2) the Inclined Plane had been built. The buildings at the foot of the flight were substantially unaltered, although two small structures on the eastern side have disappeared. At the top of the flight is an additional building to the south-east of the lock-keeper's cottage, which itself appears substantially unaltered. The side ponds serving the middle part of the flight were dramatically altered, one being removed entirely.

The Ordnance Survey map of 1931 (not reproduced) shows the Inclined Plane in a semi-derelict condition. The building to the south-east of the lock-keeper's cottage has disappeared and the canal arm leading to the site of the Inclined plane had been dammed. The engine house at the top of the Plane is still extant and some modifications had been made to the pound between the two staircases of locks.

The fieldwork

General

Fieldwork took place on the 18th and 19th April 2018. It comprised monitoring of the excavations for the dipping platform and access shaft whose locations are shown on Fig 1. A full description of the contexts is given in Appendix 1. Contexts are described in summary form below.

Description

The dipping platform

After removal of a mid-grey brown sandy loam (context 001) a number of deposits were exposed at or near the level at which excavation terminated (Figs 3 and 5). From north to south these were a light grey, small angular stone (context 002), a dark grey brown sandy clay (context 003), a dark reddy brown sandy gravel (context 004) and a buff yellow tenacious clay (context 005). All these deposits lay on top of a layer of geotextile.

The access shaft

A thin topsoil and turf a couple of centimetres thick was scrapped away from around the access shaft in order to provide a level base on which to install the new steel cover (Fig 6). This was not contexted. The interior of the access shaft was photographed (Fig 7). The remains of a steel lining and an access ladder were apparent.

The finds

There were no finds from the excavations.

Interpretation

The dipping platform

It is understood that the arm linking the top of the Inclined Plane to the canal to the south was restored in 2008. The recorded deposits were of a very mixed nature and all lay on top of a layer of geotextile, presumably installed during the course of the restoration. A photograph (Carden 2012; 170) shows the restored upper canal arm before re-watering.

The access shaft
The Inclined Plane needed very substantial earthworks in order to provide the appropriate levels. The upper part of the Plane required a great deal of material to build-up the level. There is a brief account of this in Carden (2012; 81):

The earthworks needed to constructed the plane were an enormous undertaking. To stabilise the filling works the escarpment slope was terraced in order to expose relatively strong geological strata. As a consequence of the terraced construction procedure and the 1 in 4 slope, the depth of excavation required in places was as much as 30 feet. The filling and concrete foundations had to be of similar depths. Arches were incorporated into the track foundations, so that they were supported by undisturbed material and, therefore, would not be subject to settlement.

These arched foundations were stabilised by being tied together by by means of steel ducts that ran laterally across the plane. It is possible that the access shaft recorded by this project was part of one such shaft.

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Acknowledgements

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Archive

The physical archive consists of:

5	Context sheets
1	Drawing
1	Hard copy of the report
1	Hard copy of the report illustrations
1	Hard copy of the WSI

It will be deposited at the Waterways Trust upon approval of the report.

The digital archive consists of:

1	Digital copy of the report (.doc format)
7	Illustrations (.bmp format)

It will be deposited with OASIS upon approval of the report.

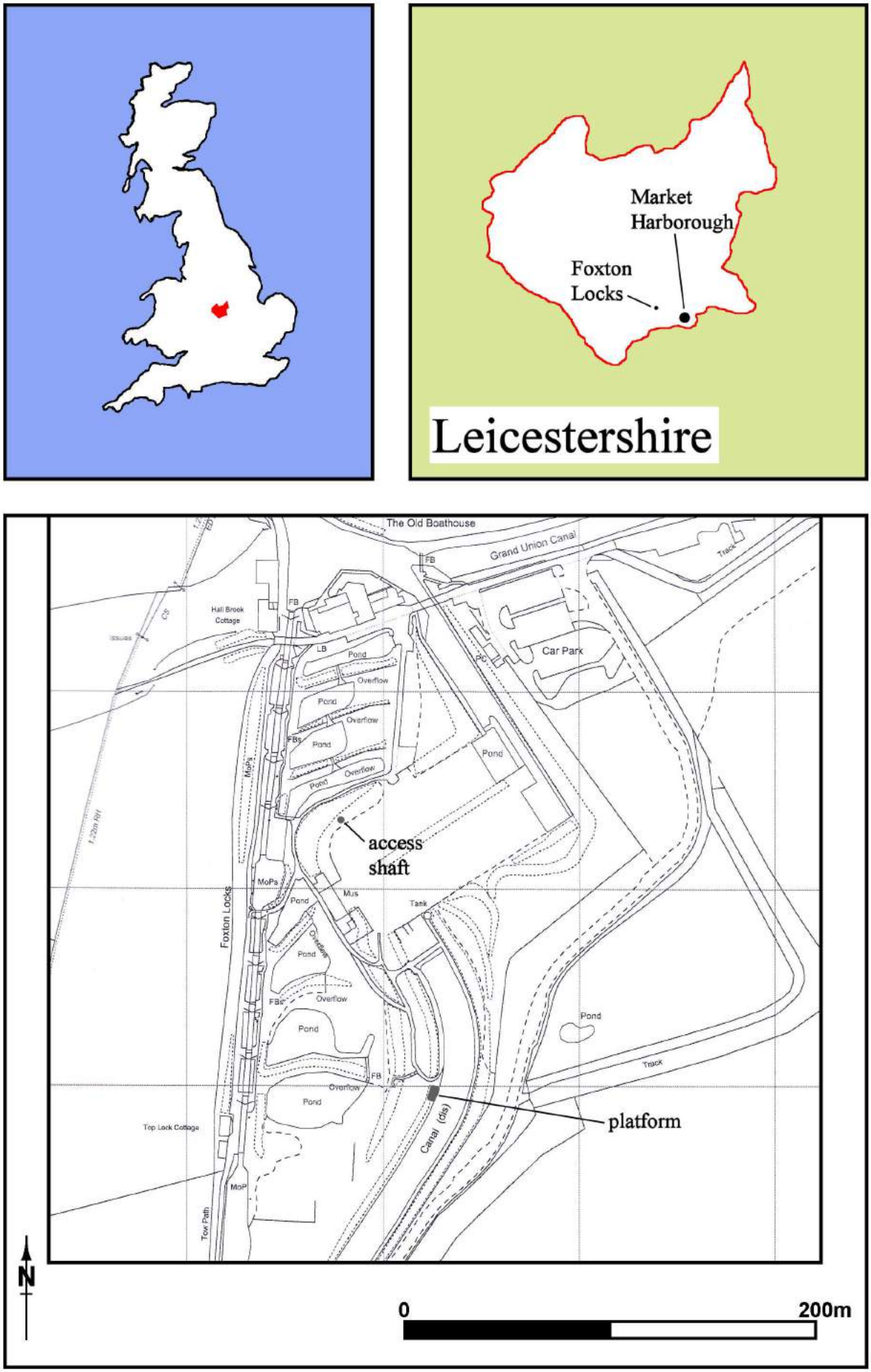


Fig 1: Location of site

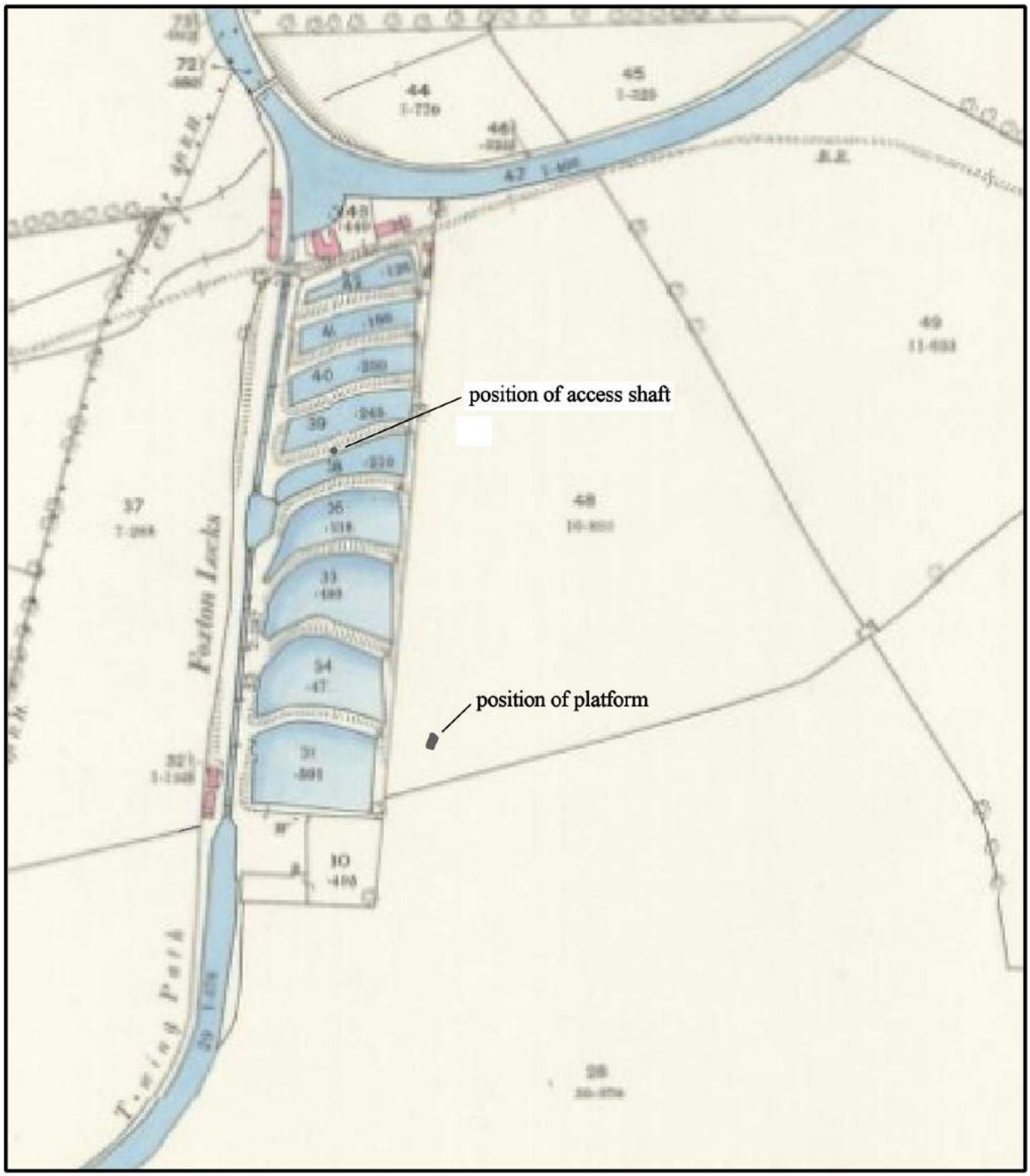


Fig 2.1: Ordnance Survey map of 1886

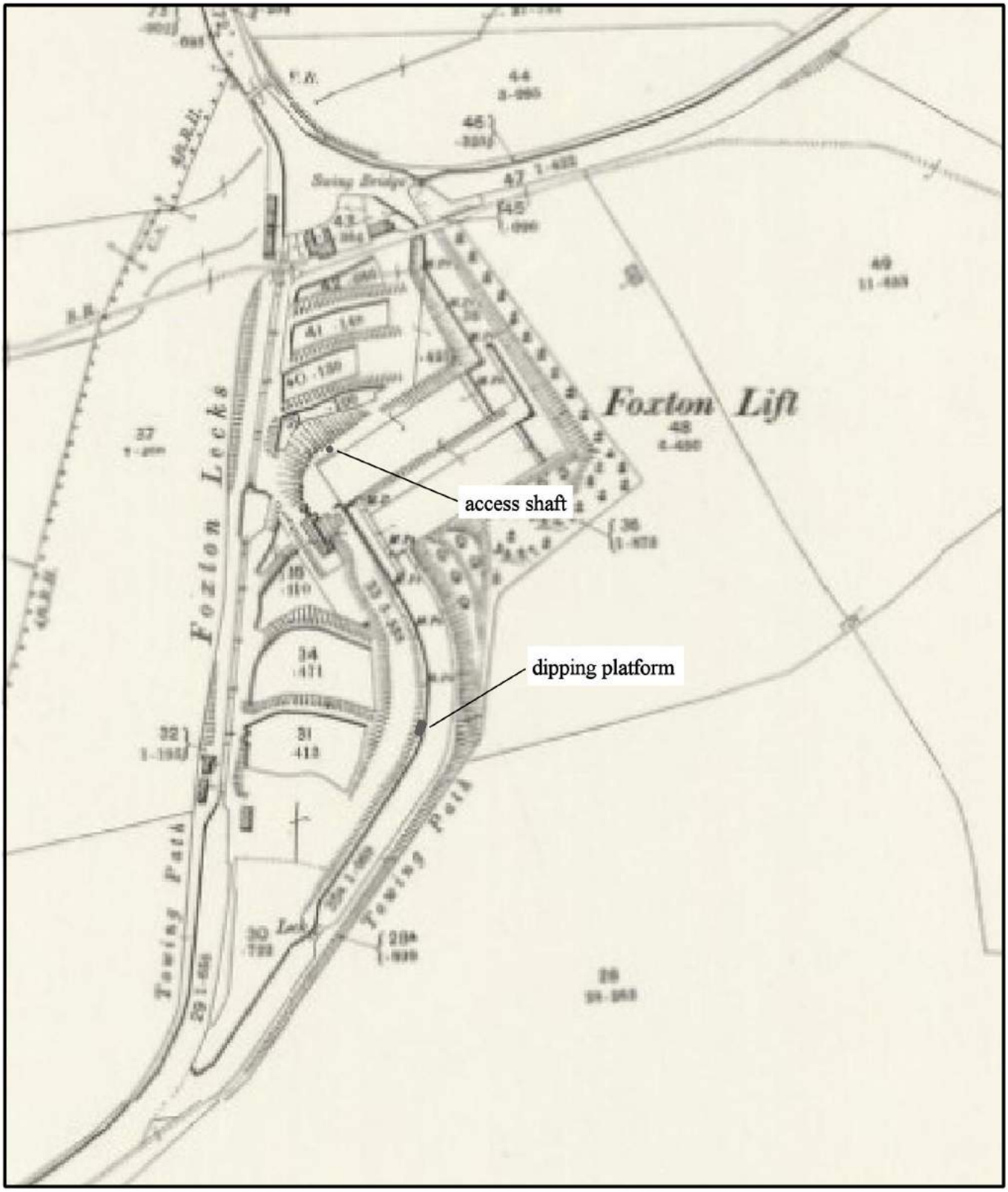
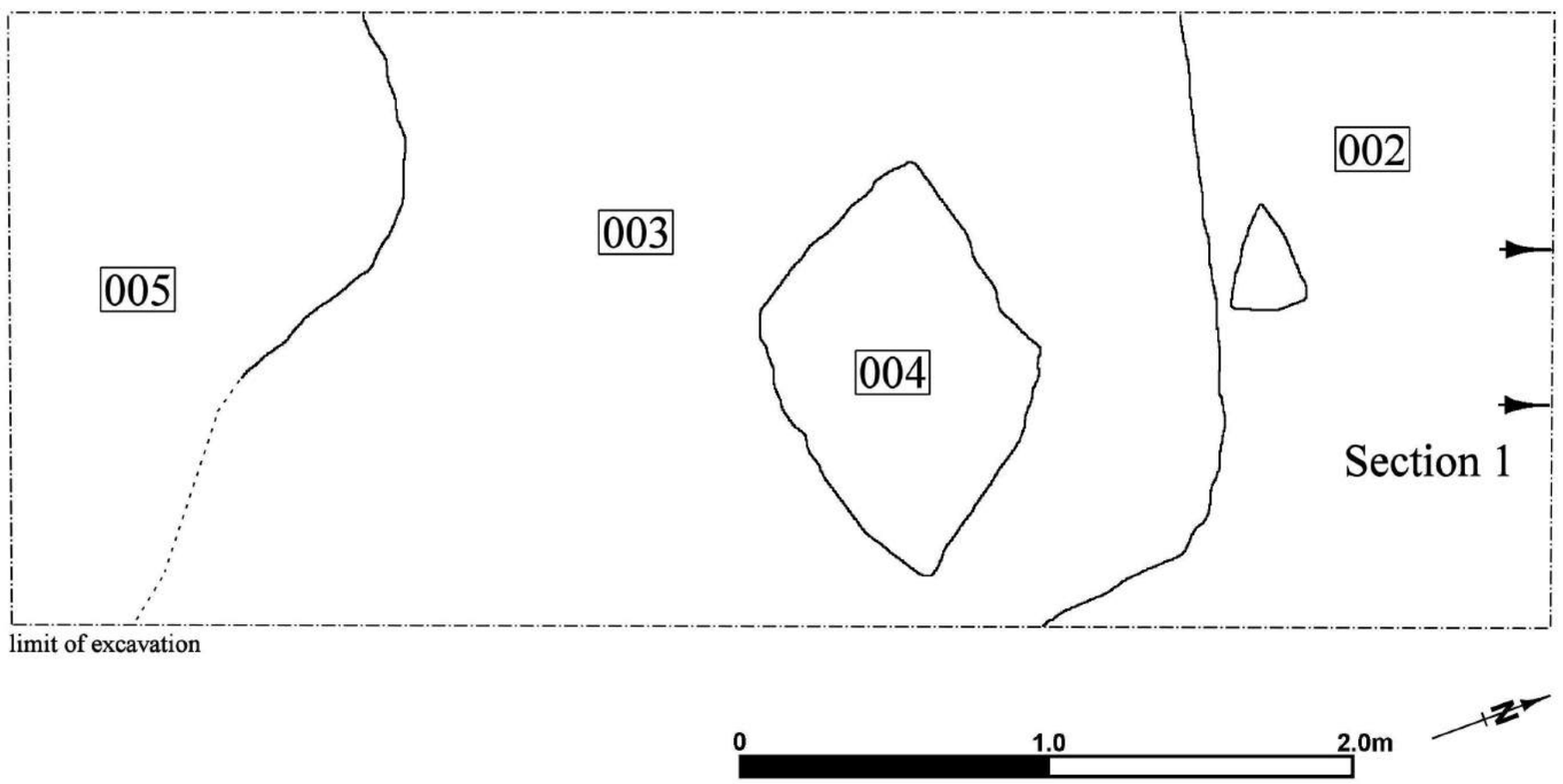
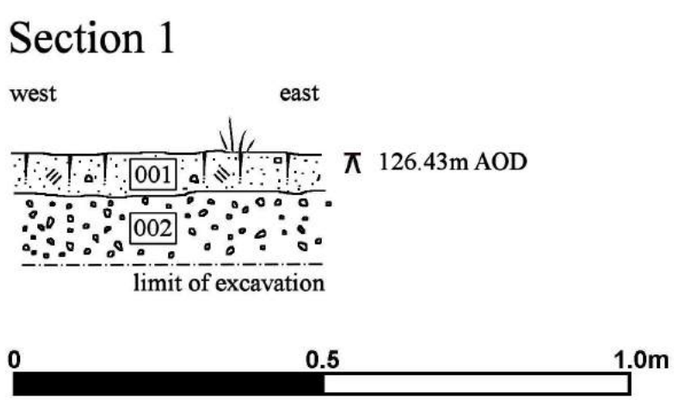


Fig 2.2: Ordnance Survey map of 1904





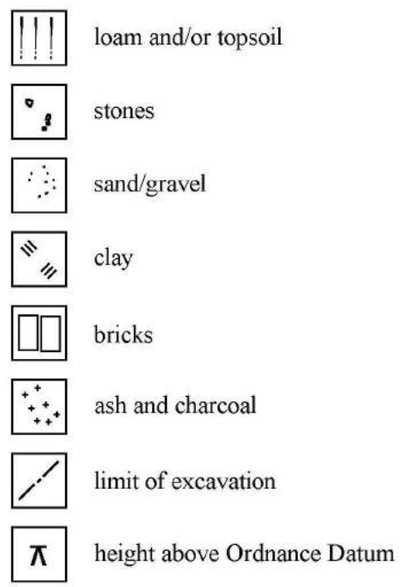


Fig 3: Plan and section of recorded features

Fig 4: Site of dipping platform before excavation

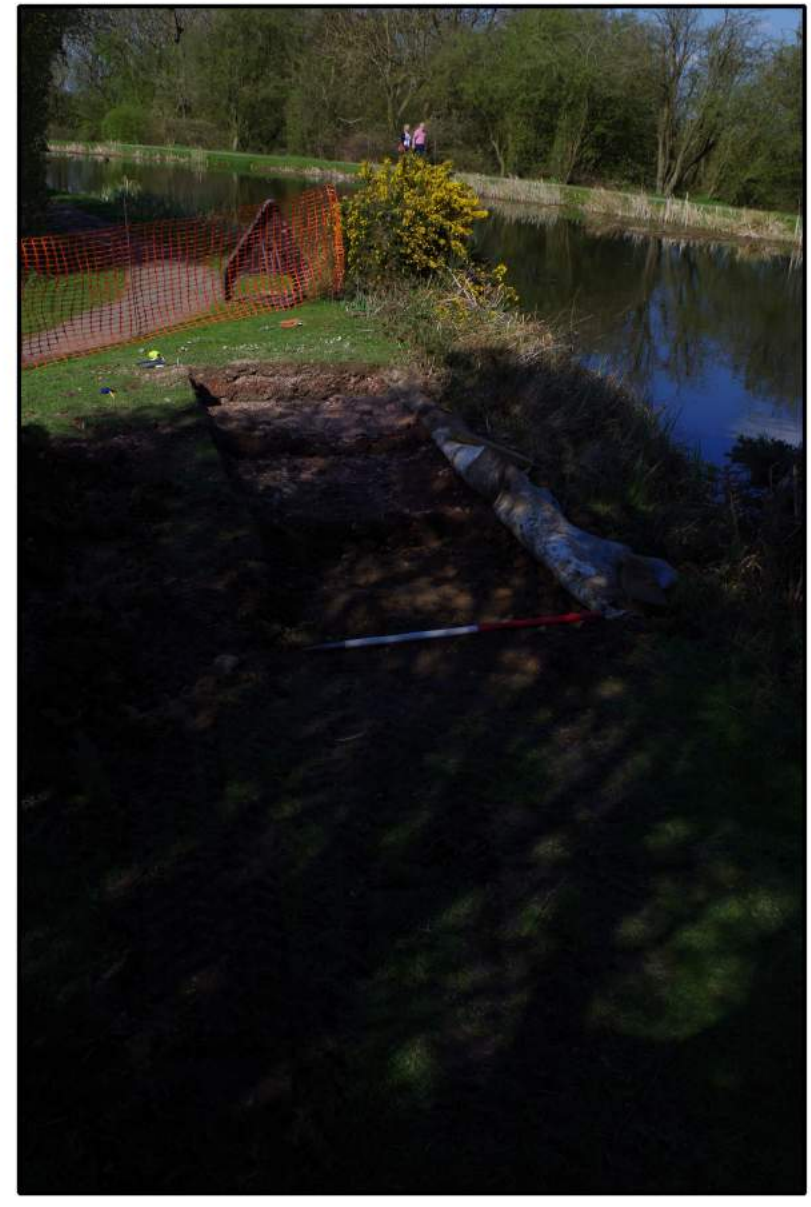


Fig 5: Site of dipping platform after excavation

Fig 6: Access shaft

Fig 7: Interior of access shaft

Fig 8: Access shaft covered by steel plate

Appendix 1: List of the contexts

Context number	Description	Interpretation
001	Mid grey brown sandy loam with occasional small stones	Topsoil
002	Light grey small angular stone	Pea gravel
003	Dark grey brown sandy clay	Mixed backfill
004	Dark reddy brown sandy gravel	Mixed backfill
005	Buff yellow tenacious clay	Mixed backfill

Appendix 2: The OASIS form

OASIS DATA COLLECTION FORM: England

Printable version

OASIS ID: martinco1-317940

Project details

Project name	Foxton Locks
Short description of the project	Watching brief at Foxton Locks
Project dates	Start: 18-04-2018 End: 23-05-2018
Previous/future work	Not known / Not known
Any associated project reference codes	SAM 1018832 - SM No.
Type of project	Recording project
Site status	Scheduled Monument (SM)
Current Land use	Other 14 - Recreational usage
Monument type	INCLINED PLANE Modern
Significant Finds	NONE None
Investigation type	"Watching Brief"
Prompt	Scheduled Monument Consent

Project location

Country	England
Site location	LEICESTERSHIRE HARBOROUGH FOXTON Foxton Locks
Study area	15 Square metres
Site coordinates	SP 69244 89605 52.49957828081 -0.979849451068 52 29 58 N 000 58 47 W Point
Height OD / Depth	Min: 0m Max: 0m

Project creators

Name of Organisation	Martin Cook BA MCIfA
Project brief originator	Canal and River Trust
Project design originator	Martin Cook BA MCIfA
Project director/manager	Martin Cook BA MCIfA

Project supervisor	Martin Cook BA MCIfA
Type of sponsor/funding body	Canal and River Trust

Project archives

Physical Archive Exists?	No
Digital Archive recipient	Waterways Trust
Digital Contents	"none"
Digital Media available	"Images raster / digital photography","Text"
Paper Archive recipient	Waterways Trust
Paper Contents	"none"
Paper Media available	"Report"

Project bibliography 1

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