

**WOLVERTON AQUEDUCT LOCKS,  
WOLVERTON,  
MILTON KEYNES**

**ARCHAEOLOGICAL  
FIELD EVALUATION**

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## **Preface**

*Every effort has been made in the preparation of this document to provide as complete a summary as possible within the terms of the specification. All statements and opinions in this document are offered in good faith. Albion Archaeology cannot accept responsibility for errors of fact or opinion resulting from data supplied by a third party, or for any loss or other consequences arising from decisions or actions made upon the basis of facts or opinions expressed in this document.*

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## **Structure of the Report**

After the introductory Section 1, a summary of the earthwork survey is presented in Section 2, followed by the trial excavation results in Section 3, with a brief conclusion in Section 4.

## **Key Terms**

Throughout this document the following terms or abbreviations are used:

<i>MKAO</i>	Milton Keynes Archaeological Officer
<i>Client</i>	Milton Keynes Council
<i>IFA</i>	Institute of Field Archaeologists
<i>Procedures Manual</i>	<i>Procedures Manual Volume 1 Fieldwork</i> , 2 <sup>nd</sup> edn, 2001 Albion Archaeology
<i>The site</i>	<i>Area of archaeological investigation</i>



## **Non-Technical Summary**

*At Old Wolverton, the Grand Union Canal crosses the valley of the River Great Ouse on an embankment and aqueduct. A temporary canal (with locks) was built so that the waterway could still be used while the aqueduct was under construction. Albion Archaeology was commissioned by Milton Keynes Council to undertake an archaeological evaluation of the line of the, now infilled, temporary canal on the southern side of the river valley. The purpose of the evaluation was to help inform an interpretation project on this component of Milton Keynes' industrial heritage.*

*Situated near the northern edge of Milton Keynes, the linear study area lay to the north-west of Old Wolverton, extending from Old Wolverton Wharf (NGR SP (4/2) 80328 41532) in the south-east to the River Great Ouse (NGR SP (4/2) 80015 41729) in the north-west. It was approximately 400m long and 55m wide at its widest point to the north-west.*

*The Milton Keynes Archaeological Officer (MKAO) specified that the archaeological evaluation should comprise earthwork survey and trial excavation. Following discussions with the MKAO and the Canalside Project Officer, Albion Archaeology formulated a Method Statement, defining the scope and methodology of the investigation.*

*The temporary canal was opened in late 1800, crossing the Great Ouse with flights of locks on both sides of the valley. The major engineering works associated with the embankment included diverting the course of the river further south. The embankment opened in late 1805, replacing the temporary canal. However, it suffered a series of structural failures, with a section north of the current site collapsing in early 1806. Originally the embankment incorporated a series of culverts for the diverted river. However, in early 1808 these also collapsed. The present iron trunk aqueduct, supported by a central pier was opened in early 1811. Initially, the temporary canal was in use until 1805, but was subsequently reused while the embankment was repaired. By 1881, when the first edition Ordnance Survey map was printed, no trace of the temporary canal was apparent.*

*Only one historic map depicts the temporary canal, though detail is sparse. Both routes of the canal, together with the original course of the River Great Ouse, are shown. The map depicts a structure within the embankment, which would correspond to the diverted course, though the map only shows the old course of the river, north of its present (diverted) course. The temporary canal diverged from the present embankment at the northern end of the wharf at Old Wolverton. Three of the four sets of locks that would have been built are depicted, together with three associated wide basins, which take the canal to the bottom of the valley. Four sets of lock and three basins took the canal up the north side of the valley where it rejoined the main waterway.*

*The earthwork survey was undertaken to map and interpret surviving above ground elements of the temporary canal. It was possible to subdivide the site into two areas: an embanked section of canal on the valley side, and a cut section on the valley floor. Within the embanked section one lock was indicated by a reduction in width compared to the associated basin to the south. Possible traces of a second lock at the south-east end of the site were also identified. Towards the diverted course of the*



river, the canal was cut below the adjacent ground level. The earthworks were better preserved towards the river. Later disturbance comprising an old hedge line and a modern track obscured the junction of the cut section of canal and the northern edge of the lock, which delineated the start of the embanked section.

Several other features associated with the canal were defined, including an oblique ditch emanating from the southern end of the lock earthworks. This drained towards the lowest area of ground between the canal and the aqueduct - possibly acting as a side pond. Adjacent to the river were traces of a large platform with associated ditch.

A series of fan-like deposits extended down the western side of the main embankment. Research suggests that these are dumps of material dredged from the embanked canal rather than ramps associated with construction of the embankment.

The results of the earthwork survey were used to formulate a trenching strategy in conjunction with the Canalside Project Officer and the MKAO. This investigation was undertaken in two stages between 24<sup>th</sup> February and 4<sup>th</sup> March 2005. Initially, Trenches 1-4 focused on the lock and associated basin in the embanked section of the canal. During a second phase of investigation Trenches 2 and 4 were extended and three additional trenches were used to test other elements of the canal earthworks.

Investigation of the embanked section of canal, which survives up to 1.5m above the adjacent ground level, indicated that the path on the eastern side was a later feature laid along the crest of the canal bank. The eastern bank was revealed to be a substantial feature at least 1m high, composed of a series of horizontal bands of material. It would appear that the adjacent ground level between the bank and the aqueduct had been raised significantly, presumably after the embankment was constructed.

Investigation of the lock revealed systematic removal of the structural elements of the canal, once it was no longer required. Only the clay lining defined the western side of the canal. A series of narrow 'shoulders' or 'steps' in the clay lining, together with discrete dumps of brick fragments in the backfill of the canal indicate that originally some elements of the canal had a red brick facing. The base of the canal appears to have been lined with blue Oxford clay. Below gravel backfill, Trench 4 identified features associated with a lock gate including a concrete and brick structure forming part of the base. The robbed out remains of a ground paddle channel, which would have diverted water around the lock were also defined. The full width of the lock could not be determined due to the modern trackway, though it extended at least 7.9m from the lining on the western side. A fall in height of approximately 1.1m (3' 7") between the base of the canal in Trench 4 and Trench 3 (within the lock) is equivalent to the draft of a fully loaded barge. This suggests that the boats were not operating at full load as the draft would be 3' 6". Contemporary documents suggest that water loss was a significant problem on this segment of canal, preventing maintenance of an optimum water level.

Investigation of the oblique ditch extending north-east of the lock indicates that it was an associated channel rather than a later boundary ditch.

The cut section of the canal had a sloping side, contrasting with the stepped, vertical edges of the embanked section. The fills of this section of canal suggest that it



*remained open for a longer period of time after it went out of use. It was filled with organic deposits, probably derived from the river. Two paths were identified on the eastern canal side; the lower one probably served as a tow-path. The apparent constriction in the canal near the junction with the diverted course of the river was due to later dumps of material, rather than being an original feature of the canal.*

*On the basis of its location and alignment, a large platform at the north-western end of the site would appear to be associated with the canal. An associated ditch to the west was probably dug to provide material for construction of the platform, rather than serving as a drain. The presence of both local and imported bricks suggests that the platform was in use when the main canal was opened. A gravel surface was exposed, though no traces of a building were revealed.*

*There is a reasonable correlation between the historic map and the results of the archaeological evaluation. To the south-east of the site, on the upper valley side, the upper locks with small associated basin would have provided the greatest fall. The lower locks apparently contributed perhaps a 10 foot fall in water level. The investigation has suggested that, at least parts of the embanked section of, the canal had a red brick facing with puddle clay base. This contrasts with recorded accounts which referred to 'timber inverts' or lining, implying that bricks were not used. The width of the canal in the lock indicates that double gates would have been used. Associated channels indicate that the water management system was important at this low point on the canal. In Trench 4, the clay lining on the side of the canal continued below the concrete canal base. The gravely fill below the concrete may have been associated with construction of the embankment, to achieve the desired basal level, rather than indicating a deeper, original canal.*

*The site archive, which contains all records of the project (Project number WA 1080) is currently stored at the offices of Albion Archaeology and will be transferred to Buckinghamshire County Museum on completion of the project.*

**It is essential that the above summary is read in conjunction with the main body of the report**



## 1. INTRODUCTION

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### 1.1 Background

Albion Archaeology was commissioned by Milton Keynes Council to undertake an archaeological evaluation of the line of the temporary canal at Old Wolverton. The latter was utilised prior to the opening of the adjacent embankment and aqueduct, which now take the Grand Union Canal across the valley of the River Great Ouse.

The investigation was undertaken as part of an interpretation project for the site, which forms a component of Milton Keynes' industrial heritage. The Milton Keynes Archaeological Officer (MKAO) issued a *Brief* for the work. The investigation was conducted in accordance with a Method Statement, formulated by Albion Archaeology in consultation with the MKAO and the Canalside Project Officer, which defined the scope and methodology of the investigation.

The evaluation was undertaken between 27<sup>th</sup> January and 4<sup>th</sup> March 2005. It comprised an initial earthwork survey, the results of which were used to formulate a trial excavation strategy.

### 1.2 Site Location and Description

Situated near the northern edge of Milton Keynes, the linear site is located to the north-west of Old Wolverton (Figure 1), on the southern side of the Great Ouse valley. The area of investigation was approximately 400m long and 55m wide at its widest point to the north-west. It extended from NGR SP (4/2) 80328 41532 in the south-east to NGR SP (4/2) 80015 41729 in the north-west, where it intersected with the current course of the river. The segment of temporary canal under investigation descended from approximately 74m AOD to c.63m AOD at the base of the valley.

The valley contains a sequence of geological deposits, the latest being river borne alluvial deposits, which cover its floor. This material overlies 1<sup>st</sup> terrace river gravels, which in turn overlie bluish grey mudstones. The southern margin of the site comprises variegated mudstones of the Upper Estuarine Series. Further south, beyond the river valley, Oolitic Limestone is present.

At the time of the investigation the south-eastern limit of the site was masked by an extension to the builder's yard occupying the Old Wolverton Wharf. Large amounts of material had been dumped onto the line of the former temporary canal to create a flat yard area, level with the wharf itself. Beyond the south-eastern end of the site, it was, however, possible to trace the continuation of the line of the canal as a rapidly diminishing triangle of land.

A substantial ramp extending from the northern limit of the builder's yard further obscured the earthworks at the south-eastern end of the site. This was associated with a recently constructed track, which serves a pumping station on the riverbank (Figure 1). The track had been built directly on the canal earthworks, obscuring much of its eastern side. Immediately prior to the





archaeological evaluation, a significant amount of scrubby vegetation had been removed to open up the site.

To the south-east, the western boundary of the site comprised a modern fence. However, towards the centre of the site a well established hedge was associated with a water-filled ditch, which drained the low-lying land to the west into the river. Overhead power lines crossed the site. An overflow pipe for the present-day canal followed the line of the southern, embanked part of the temporary canal. It emerged at a concrete outflow, feeding into the water-filled ditch. To varying degrees, these features (together with the modern track) restricted the investigation.

### **1.3 Historical and Archaeological Background**

The temporary canal was opened in late 1800 as a route across the river valley. It required a flight of locks on each side to overcome the 34 feet drop to the valley floor. This route was intended to operate whilst an embankment and aqueduct were constructed to take the canal across the valley without the delays or complexity associated with locks. The major engineering works associated with the embankment included diverting the river to the south onto its present-day course.

The embankment was opened in late August 1805. Concerns about the stability of the structure were confirmed in January 1806 when a section near Cosgrove (north of the current site) collapsed, closing the canal. In February 1808 two of the three culverts which spanned the diverted course of the river collapsed. A temporary aqueduct was opened in mid 1808, though the present iron trunk aqueduct, supported by a central pier was not opened until early 1811. In the intervening period the temporary canal was re-opened. No trace of the temporary canal was apparent on the first edition Ordnance Survey map, published in 1881.

Only one historic map from the records of the Grand Junction Canal Company depicts the canal. Detail is sparse, though both the modern-day and the temporary canal, together with the original course of the River Great Ouse, are shown (Figure 2). The map depicts a structure within the embankment, which would align with the diverted course of the river. However, the map only shows its original course, indicating a pre-1808 survey. The temporary section of canal is shown diverging from the present embankment at the northern end of the wharf at Old Wolverton. Three sets of locks are clearly shown, although a fourth set at the junction with the wharf must also have been built. The locks were associated with three wide basins taking the canal to the bottom of the valley. The two basins on the upper valley side were considerably smaller than the bottom basin within the site. A wide linear segment of canal crossed the valley floor. Four sets of lock and three basins took the temporary canal up the north side of the river valley where it rejoined the main waterway.

It is possible roughly to estimate the lengths of the components which are within the site (Figure 2). The map indicates a large section of canal on the valley floor approximately 170m long with a constriction at its south-eastern end, associated with the lowest lock (C). The exact length of the lock is



difficult to define on the map, though it would appear to be approximately 33m long. This is followed by a wide (bottom) basin (**B**) approximately 90m long, leading to an intermediate lock (**A**) of similar length to the lowest lock. The south-eastern end of lock (**A**) marks the extent of the current site.

On the upper valley side, beyond the south-eastern end of the site, the upper basin, though partly obscured by other features, would appear (on the basis of the historic map) to have been lentoid in shape, approximately 32m long and 10m wide. It was similar in size and shape to the middle basin, though this was c.12m wide. These basins were considerably smaller than the bottom basin (**B**).



## 2. EARTHWORK SURVEY

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### 2.1 Introduction

The earthwork survey was undertaken to map and interpret the surviving, above ground elements of the temporary canal. However, for the southern 90m of the site, all but part of the western side of the canal's embanked section was buried beneath modern dumped material. This restricted characterisation of the earthworks to a section approximately 310m long.

The route of the canal occupies the western part of the site, with possibly associated features to the east. It was possible to subdivide the canal into two sections comprising an embanked section on the valley side, and a cut section occupying the lowest ground on the valley floor. The two sections of canal together with associated features are discussed sequentially below, with reference to Figures 3 and 5 for the hachured plans and Figures 3a and 5a which show contour information.

### 2.2 Embanked section of canal and associated features

This section of canal was some 250m long, orientated north-west to south-east. It continued beyond the limits of the survey area, where it converged with the modern builder's yard and access ramp. The embanked section within the site comprises at least two and possibly three components. At the south-eastern end of the site, a poorly defined constriction probably defines a lock (Figure 3: (A)) possibly 33m long, which merges into a wide basin (B), with a well-defined lock (C) to the north-west, where there is a discernable reduction in width. The precise maximum width of the embankment is hard to determine due to the presence of the modern track. It would appear to range from c.18m at lock (C) to 25m at the wide basin. The size of the embankment indicates that a substantial volume of material was required for its construction.

The embanked section was up to 1.5m above the adjacent ground level with a well-defined western side (Figure 4: photograph 1 and Figure 6: profiles 1 and 2). To the south-east, a slight depression at the base of the western side of the embankment was identified (Figure 6: profile 1). However, further to the north-west this was less clearly defined (cf Figure 6: profile 2). This depression may indicate the presence of an associated ditch.

#### 2.2.1 Possible lock (Figure 3 – (A))

Only the western side of the lock is clearly defined; the eastern side merges into the adjacent ground as well as the extension to the builder's yard and access ramp. The western side survives up to 1.5m above the adjacent ground level (Figure 6: profile 1). The canal appears to narrow to a width of possibly 7m, in contrast to the adjacent basin (B), suggesting the presence of a lock. It is possible that some 33m of this lock survives. Its north-western end roughly corresponds to the position shown on the historic map (Figure 2).

#### 2.2.2 Wide basin with path (Figure 3 – (B))

The north-western end of this basin is well preserved. Earthworks delimit both sides of the canal embankment, with a defined 'shoulder' on the eastern side, at



the point where ditch (E) emerges (see section 2.2.5). This basin is approximately 90m long (very similar to the estimated length derived from the historic map). The south-eastern end is defined by a constriction further to the south (lock (A)) and a now buried path, which was revealed by probing during the earthwork survey (Figure 3). This compact surface was a short distance below present ground level. It is modern in date but is clearly separate from the modern track, situated further to the west. It seems to have been constructed along the top of the eastern bank of the temporary canal, before it was obscured by presumably later dumping near the ramp.

Overall, the embankment at this point has a maximum width of 25m. However, some 35m south-east of the northern 'shoulder' the bank merges into the adjacent ground level. Only the western bank is defined, with hints of a constriction further to the south-east. This corresponds to an interruption in the earthworks, which is at least partly due to modern disturbance; it also roughly corresponds to the junction with the intermediate lock (A).

### 2.2.3 Lock (Figure 3 - (C))

Defining the north-western end of the embanked section, the earthworks in this area are well-defined, with the modern track following the undulations of the eastern bank. The limits of the lock were defined by a thickening of the earthworks indicating a maximum length of 45m (though an element of this is likely to be beyond the actual lock gates). The width of the lock was difficult to determine due to the concave inner edges of the earthworks and proximity of the modern track. A width of c.7.5m is possible, considerably narrower than the basin. The historic map suggests that the distance between the two sets of lock gates was approximately 34m.

Within the depression of the infilled lock, the survey defined a shallow ditch aligned parallel to the modern trackway. At the northern limit of the lock a modern concrete outflow indicates that an overflow for the present-day canal has been dug along the infilled temporary canal.

### 2.2.4 Debris tails (Figure 3 - (D))

Three distinctive spreads of material extend down the western side of the present-day canal embankment. The central example is the most extensive, some 30m long, c.11m wide at the top of the slope and 26m wide at the bottom (Figure 4: photograph 2). The deposits are at least 0.3m thick. Burrowing animals have revealed whole bivalve shells of the zebra mussel, which rapidly spread throughout the canal network in the later 19<sup>th</sup> century. The nature of the deposits suggests that they represent semi-liquid dredgings from the embanked canal rather than ramps associated with its construction.

Aerial photographs of the site, taken in the 1940s, reveal no trace of these deposits, confirming that they accumulated in the post-war period.

### 2.2.5 Associated ditch

At the south-eastern end of lock (C), a ditch (Figure 3: (E)) emerges from the 'shoulder' marking the junction with the wide basin (B). This oblique ditch was traceable for approximately 17m to the north. It drains towards the lowest



ground between the temporary canal and the embankment. It may have acted as an overflow channel feeding a side pond to control the water level.

### **2.3 Cut section of canal**

For 160m, from the junction with the lower lock (C) to the diverted course of the river, the temporary canal is cut into the adjacent ground surface (Figure 5, 5a and Figure 7: photograph 3). Generally, the earthworks are better preserved towards the river, though a modern, water-filled ditch truncates the western side of the canal. The south-eastern 60m of this section of canal has effectively been backfilled, as can be seen by the contrast between profiles 3 and 4 (Figure 6). Poor definition of the canal in this area was exacerbated by traces of an old hedgeline and the modern track.

The eastern edge of the canal displays a c.45° slope. The waterway is at least 8m wide, though its full extent is obscured by the modern ditch to the west.

The north-western end of the canal comprises a well-defined earthwork (F) which appears to reduce its width by approximately 5m. This would appear to correspond to a narrow channel, c.4m wide, visible in the riverbank as a clay filled feature. The nature of this earthwork was difficult to interpret. Its form and location suggested it was contemporary with the canal. However, subsequent trial excavation demonstrated that it was the result of later infilling.

### **2.4 Platform**

Situated north-east of the canal, close to the diverted course of the river, is a roughly square platform, 23m across (Figure 5 (G) and Figure 7: photograph 4). Recent activity including a riverside footpath, the modern track and the pumping station has affected the interior of the platform. The south-eastern and south-western sides were well-defined, while the north-eastern side merges into the present-day canal embankment. Its extent towards the river is less certain. An irregular ditch, up to 9.4m across and 1.5m below the platform, defined its south-western side (Figure 6: profile 4). This ditch was deeper away from the river, suggesting it was not a drain. It was probably dug to provide material to create the platform and to separate it from the temporary canal.

Two clusters of stone blocks, including chamfered pieces were identified to the east of the cut section of the temporary canal (Figure 5). The fact that they were sitting on the present ground surface suggests that they were moved to their current locations relatively recently. The chamfered blocks suggest they were part of an architectural façade rather than associated with the temporary canal.



### 3. TRIAL EXCAVATION

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Two phases of excavation were undertaken. Trenches 1-4 focussed on lock (C) and associated basin (B) in the embanked section of the canal. During a second phase of investigation Trenches 2 and 4 were extended and three additional trenches were used to test other elements of the earthworks, including the cut section of the canal. A total of 7 trenches were opened (Figure 8). The objectives of the individual trenches are listed in Appendix 1.

#### 3.1 Methodology

- The trenches were opened using a mechanical excavator fitted with a 1.6m toothless bucket. The operation of this machine was supervised by an experienced archaeologist;
- The trenches were set out by hand, using earthwork survey grid points;
- Modern overburden was removed by machine down to the top of the uppermost archaeological deposit;
- All spoil was scanned by eye for artefacts;
- Backfilling of the trenches only occurred after the MKAO and client had been given a report on the results and opportunity to inspect the open trenches.

#### 3.2 Results of the Trial Excavation

All archaeological and geological deposits (contexts) were assigned an individual number in a single sequence, commencing at (100). Numbers in brackets within the text refer to the context number issued on site. Within this report context numbers referring to cut features are expressed [\*\*], layers or deposits within cut features are expressed (\*\*).

Each trench was issued with a unique block of numbers. For example (101) identifies a pathway in Trench 1, whilst [407] identifies the cut for robbing the canal facing in Trench 4. Details of all contexts are given in Appendix 2.

##### 3.2.1 Basin, path and eastern bank (Trenches 1 and 2).

Two trenches were opened to investigate the path detected during the earthwork survey (Figure 9). Situated approximately 20m apart, on the eastern edge of wide basin (B) the two trenches revealed a pathway (101), (201) composed of loose blue/grey angular gravel and chert, situated a short distance below the present turf (Figure 10: photograph 5). The path was up to 1.3m wide, but only 0.08m thick. The nature of the material indicates that this was a recent feature, laid along the top of the earthwork bank, which represents the eastern edge of the temporary canal.

Trench 1 was subsequently extended to the south-west to the modern track. It was deepened to investigate the structure of the earthwork and to try to locate the eastern edge of the canal. A buried topsoil (102) contained the handle, mount and body fragments from a galvanised iron bucket, dating to the 19<sup>th</sup> century or later. Below (102) a second, earlier path (104) was revealed, extending from the south-western limit of the trench, at a depth of 0.26m below the present ground level (Figure 11: section 1). The compact brown sandy gravel would appear to have been an earlier version of the modern track.



Deposits (103) to (109) define a series of generally horizontal alternating bands of sandy gravel (103), (106), (107), varying from 0.12 to 0.22m and thick and compact mid blue grey clay (105/108) each c.0.4m thick (Figure 10: photograph 6 and Figure 11: section 1). A kick-base fragment from a machine-made colourless glass bottle was recovered from layer (105). The nature of these deposits indicates bank construction rather than infilling of the canal, with the form of (105/108) suggesting that the edge of the canal was close by. The bank was at least 0.8m thick indicating a substantial feature, though the ground to the east shows no change at the surface. This may suggest later dumping of material in the area between the old canal and the embankment. The bank deposits would seem to have been deliberately laid to create a series of impermeable barriers to prevent the movement of water.

### 3.2.2 Lock (C) and associated features (Trenches 3-5)

Trenches 3 and 4 were opened to investigate the form of the lock, with Trench 3 seeking to obtain a full profile of the canal (Figure 12). By defining the canal's width, the size and, therefore, form of the lock gates could be determined. Trench 4 was to investigate the location of the uphill (top) lock gate on the western bank, whilst Trench 5 investigated a possibly associated ditch (E) to the east.

Later activity including a field boundary, a modern pipe trench and root disturbance affected the area. However, investigation revealed a sequence of activity. The intrusive, post-canal features will be summarised, followed by discussion of the construction of the canal and its subsequent dismantling.

#### 3.2.2.1 *Post-medieval to modern activity*

The modern track, which occupied the eastern bank of the lock, prevented the full profile from being examined. Trees, which until early 2005 had colonised the area, had generally only resulted in superficial disturbance of the upper deposits. However, the investigation revealed that the infilled canal had been a focus of later activity.

A narrow well-defined linear feature [416] delimited the cut for the overflow pipe for the embanked canal. This was clearly defined against the fills of the old field boundary [414] (see below 3.2.2.1.2) into which it had been cut. However, further north in Trench 3, it was not possible to distinguish the fill of the pipe trench from the earlier ditch fill.

A wide ditch [303] and [414] orientated north-west to south-east had been dug along the eastern side of the canal (Figure 12; Figure 11, section 2). The feature was well-defined. Its fills of mixed grey brown silty clay, with lesser yellowish brown mottling, contrasted with both the gravel backfill of the canal in Trench 3 and the concrete structure in Trench 4 (Figure 13: photograph 7). This probably served as a field boundary utilising the canal earthworks.

Extension of Trench 4 to the east revealed further disturbance east of the field boundary (Figure 12). At a depth of 0.35m below the present ground level at the eastern limit of the trench adjacent to the modern track, part of a brick rubble-filled feature [418] of uncertain function was revealed. This was at least 1.8m



long north-west to south-east by 0.6m wide. It clearly cut deposits associated with the canal, though there was no relationship with the old field boundary.

### 3.2.2.2 *Embanked canal*

The investigation revealed that building materials had been systematically salvaged from the canal before it was infilled. Traces of the original canal will be discussed followed by evidence for the subsequent robbing.

#### 3.2.2.2.1 Form and Structure

Trenches 3 and 4 indicate that the canal was at least 7.9m wide, extending from the clay lining on the western side. The presence of the modern track prevented investigation of the eastern extent. Trench 3, within lock (C), revealed a relatively shallow canal. The base was 1.1m below the present ground level at 61.3m AOD (Figure 11: section 2). This was 1.6m below the top of the western bank.

Trench 4, upslope of the lock, revealed a more complex sequence of deposits. A concrete/brick structure (411) defined a basal level comprising a wide upper 'shelf' at c.62.24m AOD (c.1.1m below the top of the adjacent bank), with a well-defined deeper channel close to the western canal edge (Figure 12 and Figure 13: photograph 7). This 'shelf' is almost 1.1m above than the base in Trench 3, the high difference roughly corresponding to the depth of a full loaded barge.

In Trench 3, the base of the canal was composed of an intermittent thin band of compacted blue grey (301) with dark brown clay (305) containing brick rubble forming the exposed part of the western bank (Figure 13: photograph 8). The blue clay (301) suggests that puddled Oxford clay had originally formed the base of the canal, laid on to redeposited gravel. It would appear that most of the blue clay had been removed for re-use prior to infilling of the canal.

In Trench 4, yellow brown clay (404) had been used to form the clay lining of the majority of the western side of the canal (Figure 14: photograph 9). The extension to the north-west indicated that a brown clay similar to that in Trench 3 was also used (Figure 15: photograph 11). There had been little attempt to key the postulated brick face (as indicated by brick fragments in the canal backfill) into the clay lining, though there were occasional possible examples (Figure 14: photograph 10).

Sixteen hand-made, unfroged, moulded brick fragments weighing approximately 9.0kg were collected from robber trenches [307] and [407], and layer (411). The fragments range between 56-70mm in depth, (average 63mm), and 103-118mm in width. A complete example recovered from structure (411) measured 230 x 110 x 70mm, consistent with the dimensions for a mid-18<sup>th</sup> to early 19<sup>th</sup> century brick (Harley 1974, 76). All fragments occur in a locally manufactured oxidised sand tempered fabric. A few examples are brittle and overfired, and may be either seconds or wasters, which would still have been usable for facing the clay lining. Several fragments have traces of a white residue (probably limescale rather than





mortar) adhering to surfaces and broken edges. The brick recovered from (411) is encased in a layer of light yellow-grey sandy mortar.

Initially it had been hoped to determine the location of the lock by identifying the recess for the gate in the canal sidewall, though this would have been constructed in the facing of the lock, beyond the lining. Once it had been determined that only the clay lining had survived, it was necessary to revise the strategy and look for other features associated with the lock. Trench 4 was extended to establish whether elements such as a ground paddle channel (which diverts water around a lock gate) or a sill (the structure against which the lock gates close) still survived.

The side of the canal had two distinctive ‘shoulders’ or narrow steps (Figure 11: section 3, Figure 13: photograph 7 and Figure 15: photograph 11). The upper shoulder corresponded to the base of the channel for the ground paddle (see 3.2.2.2.2 below). The side of the canal in this area had a defined inwards curve to the north-east (Figure 12). A lower ‘shoulder’ was at a depth of 1.4m below the present ground level (61.54m AOD), the canal extending at least 0.4m below this level (Figure 16: photograph 13). However, at this point water inundation was too severe to enable further investigation. The levels indicate that the base was lower than the lock in Trench 3, suggesting that this was associated with the construction of the embanked section of canal rather than indicating a deeper, early phase of use.

Within Lock (C), Trenches 3 and 5 exposed segments of bank construction deposits. In the west the upper bank material, behind the lining was a dark grey clay (309), which contained gravel and small brick fragments. In contrast the 3m segment of the eastern bank in Trench 5 varied from blue grey clay to light grey brown silty clay and compacted brick fragments (502-504 respectively). Excavation of ditch [505] (see section 3.2.2.3 below) indicated that the clay deposits forming the bank were substantial. Although no section was cut through this bank, the nature of construction would appear to contrast with the excavated section though the bank of basin (B) (see section 3.2.1). An undiagnostic sherd (43g) of 17<sup>th</sup>-18<sup>th</sup> century fine glazed earthenware (fabric type PM8<sup>1</sup>) was recovered from bank deposit (503).

#### 3.2.2.2.2 Ground paddle

An extensive spread of slabby limestone rubble was revealed in Trench 4. The trench was subsequently extended to allow further investigation of this feature. Investigation indicated that the band of limestone (405) was at least 1.8m east-west by 1.6m wide, sloping down into the backfill of the canal. This deposit contrasted sharply with the canal backfill, from which only a few fragments of limestone were recovered. Investigation indicated that the limestone filled a vertically sided, flat based cut [406], 0.86m high. The limestone had been compacted to fill this void, with a sequence of bands being discernable (Figure 11: section 4 and Figure 15: photograph 12). This feature is interpreted as the robber cut for the channel associated with the lock’s ground paddle. This would have been used to move water in the upper part of the lock, with paddles or openings on the lock gates opened

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<sup>1</sup> Defined in accordance with the Milton Keynes post-Roman pottery type series (Mynard 1992).



subsequently to adjust the water level further, thereby avoiding excessive turbulence.

The mechanism for the ground paddle and any lining for the associated channel would appear to have been removed. A lining would have been necessary to avoid erosion by the fast-flowing water. It is possible that the channel was originally lined with limestone – a local raw material which outcrops on the higher ground a short distance to the south of the site.

### 3.2.2.2.3 Concrete structure

At a depth below ground level of between 1.1m in the west and 0.45m in the east, the northern extension to Trench 4 revealed an extensive area of concrete tempered with small stones (411). It measured c.4.9m east-west by 2.9m and was up to 0.25m thick (Figure 12, Figure 16: photograph 14 and Figure 17: photograph 15). In the west a deeper ‘channel’ orientated north-west to south-east was at least 1.2m long, 1.4m wide and 0.28 m below the wide ‘shelf’ to the east, which was at c.62.24m AOD. Towards the northern limit an off-white concrete incorporating whole bricks as well as smaller fragments was defined. This had a good edge with a more friable yellowier mortar/concrete in the area to the south. The yellowier material was softer and had suffered from disturbance associated with later activity.

Although this structure would appear to be associated with the canal (it is sealed by the gravel backfill), its function is uncertain. Disturbance associated with the ground paddle removed the junction with the western canal edge. The form of this material in plan is unusual, apparently having an off-centre curve defining a deeper segment near the western canal edge – though later disturbance had severely affected the area to the east. A deeper channel extended from the deeper area to the north-west, with a higher area or ‘shelf’ to the east. The concrete was directly above loose gravel deposit (413) in the west, similar to that which sealed the structure. In the east, the continuation of (411) was above a brown clay (421/422). Investigation against the western edge of the canal indicated that (413) sealed a continuation of the wall lining, extending below the level of the concrete structure with a lower ‘shoulder’ being revealed (Figure 11: section 3). Significantly no facing survived at this lower level, which was below the concrete, though a band of red brick dust was revealed in the lining (Figure 16: photograph 13). The off-white component of the concrete and brick structure (411) was up to 0.25m thick. An excavated section at the junction with the later field ditch indicated that this component of the structure was carefully constructed.

This structure would appear to have been associated with the use of the canal, though its purpose is uncertain. If paired mitred locks were used this structure would have hindered opening, indicating that it is not a typical sill structure behind a lock gate. The side wall of the canal continued below the level of the concrete structure. Whilst this may indicate two phases of use, it would suggest that the basin segment above the lock had a lower basal level than the area within the lock, which would nullify the purpose of lock (C). Rather than identifying two phases, the lower gravel (413) may be part of the



construction of the embankment being used to raise the base to the required level prior to lining.

#### 3.2.2.2.4 Dismantling of the canal structure

It would appear that originally some elements of the canal had been faced with red bricks, behind which was a watertight clay lining (404). This facing appears to have been systematically robbed [307] and [407]. Trenches 3 and 4 indicated that the bulk of the canal had been backfilled with gravelly material, which ranged in colour from red brown to dark grey brown (304) and (402). This would appear to have been derived locally, possible from the river. Within the gravelly backfill, discrete clusters of brick fragments, generally smaller than half bricks were recovered. The clustering suggests that bricks were sorted in the vicinity, with any discard being tipped back into the canal during backfilling. There was little mortar present suggesting that this was also retained. Only traces of blue clay remained in the base of the cut, indicating that the clay floor had also been removed.

A gravel path (403/409) at least 3m wide had been laid along the western bank. At least the later element (409) had been used to assist in backfilling of that side of the canal. This material extended beyond the lining of the canal (Figure 11: section 5), indicating that it was only associated with the disuse of the canal. A small fragment of narrow bore clay pipe stem of probable 19<sup>th</sup> century date was recovered from (409).

At an early stage in the systematic dismantling of the canal structure, the ground paddle had been demolished [406] and filled with limestone rubble (405) – see section 3.2.2.2.2.

#### 3.2.2.3 Ditch

Situated on the eastern side of the lock earthworks, Trench 5 was opened to investigate the junction of the linear feature (E) with the canal bank (Figure 12). The ditch was well-defined, contrasting with different bank materials to the east and west (Figure 17: photograph 16). The cut was up to 0.85m wide tapering to 0.64m to the north. In section the cut had a distinctive U-shaped profile up to 0.5m deep, filled with a mid grey brown silty clay (Figure 11 section 6). Further north the feature was much shallower at 0.2m. The fill (506) contained ten red brick fragments (2.0kg), similar to those recovered from Trenches 3 and 4.

### 3.2.3 Cut section of canal (Trench 6)

This irregular trench was opened to investigate a well-defined section of the canal together with a constriction further north (Figure 18 (F)), whilst avoiding established trees.

#### 3.2.3.1 Upper path

The trench revealed a well-defined gravel path (601) on the top of the earthwork (Figure 19: photograph 17). It was at least 1.8m wide, composed of small-medium stones in a grey brown silty clay material. There were frequent small-medium brick fragments in the surface. This material sloped down the convex eastern edge of the canal. The location of this path suggests that it was not a



tow-path, as it would have been both a considerable height above and a considerable distance from the canal.

### 3.2.3.2 *Lower path*

A second possible path was defined by a c.1.1m 'shoulder' within the sloping eastern side of the canal, (606) (Figure 18 and Figure 20: section 1). It is possible that (605) a gravely deposit up to 0.4m thick in this area may have included part of an associated surface, which could not be differentiated from material eroded from the upper path.

### 3.2.3.3 *Canal*

The eastern side of the canal [608] had a c.45 degree slope and a roughly level base (Figure 19: photograph 18 and Figure 20: section 1). A yellow brown clay (609) up to 0.20m thick lined the cut. Below this was a stiff mid grey brown clay up to 0.18m thick (611), which had a horizontal boundary with (609). This deposit was directly above the yellow gravel (610) which formed the river terrace in this area. It is not clear if (611) was also part of the lining for the canal, rather that a naturally accumulated river-borne deposit. However, as a clay lining of 18 inches (c.0.46m) was often used, the yellow clay would appear to have been too thin on its own to form an adequate lining.

Trench 6 indicated that the top of the undisturbed terrace gravel was at 60.50m AOD, with the base of the canal being 2.1m below the top of the bank and 1.0m below the lower path. The top of the lower clay (611) which may define the lower canal lining was at 60.62m AOD, while the top of the yellow clay lining (609) was at 60.80m AOD. In comparison the base of the canal within Lock (C) was c.61.3m AOD – a relatively insignificant fall of between 0.68 and 0.52m possibly 2 feet, compared to the total fall of 34 feet from the top of the valley.

The canal contained a sequence of fills (603), (604) and (607). The upper fills (603 and 604) comprised mid to dark grey brown silty clays. These were separated by gravely material, slumping down the eastern side of the canal (605). This would indicate that the upper fills accumulated gradually from natural erosion. In contrast the lowest fill (607) was a dark blue grey clay, up to 0.3m thick. This deposit contained organic material, particularly small twig fragments as well as complete bivalve shells. There was some evidence for banding within the clay. A sample of the deposit <1> was taken to investigate the inclusions. This material accumulated in wet though variable conditions, resulting in banding within the deposit. Whilst this may have been caused by material washed down from the locks, the thickness would suggest it accumulated once the canal was abandoned, with material derived from intermittent flooding of the adjacent river. This would suggest that this segment of canal was left open. Unlike the vertically faced segment of canal upslope, there was limited potential for the reuse of the building material used in this segment.

Investigation of the apparent constriction (Figure 18 (F)) identified in the earthwork survey indicated that it was a later, extensive spread of gravel (602), which overlay the distinctive upper fill (603) of the canal. The former yielded a



largely complete, oxidised sand tempered moulded brick, measuring 225 x 103 x 65mm.

#### **3.2.4 Platform (Trench 7)**

The trench was opened to investigate the undisturbed western area of the roughly square platform (**G**). Below a shallow topsoil (700) and subsoil (701) a series of deposits including a gravel surface composed of a mid grey brown clay gravel (702) and several smaller spreads of probably underlying material (705-707) were revealed (Figure 18 and Figure 21: photograph 19). A variety of materials, including both local (red) and imported (yellow) brick fragments had been used to raise the level of the ground to form the platform with (702) defining an associated surface. The only trace of activity associated with the platform was a severely truncated posthole [703] roughly circular in plan, 0.3m across but only 0.06m deep (Figure 20: section 2). The function of the platform remains uncertain; no evidence for the presence of a substantial building was recovered.



## 4. CONCLUSION

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The evaluation has assisted in interpreting the form and function of the temporary canal. An embanked section of canal was used to overcome the steep slope of the southern valley side, a drop of approximately 10.5m (34 feet). There is a reasonable correlation between the historic map and the results of the earthwork survey, identifying at least one and possibly two locks, an intermediate wide basin and the segment of canal on the valley floor. The upper locks beyond the present site would have been responsible for the main part of the descent. This probably explains the relatively small size of the associated basins, compared to the example within the site. Within the site the combined results of the earthwork survey and trial excavation suggest a relatively slight fall in the canal, equating to possibly 3.5 metres (10.5 feet).

The investigation has suggested that the locks had a red brick facing and a puddled clay base. This contrasts with recorded accounts which referred to 'timber invert' indicating a timber lining, as well as references implying that bricks were not used. In contrast the cut section of the canal was of simpler construction, with sloping sides. The width of the canal in the lock indicates that double gates would have been used. A concrete and brick structure was identified upslope of the lowest lock. The unusual form suggests that it was not a typical sill, against which the mitred lock gates would have closed. In this area the clay lining of the side of the canal continued below the level of the concrete and brick structure. It is possible that it was part of the construction process rather than an earlier form of the lock. If it had defined an earlier phase of use, this would indicate a basal level below that of the lock. This is at odds with the purpose of the lock, which was to lower the base of the canal. The canal would appear to have been relatively shallow, with canal company records suggesting that barges were not fully laden. A shortage of water in this area prevented maintenance of an optimum water level.

Several associated features were identified, including channels associated with a water management system for this low-lying area of the canal. The location of the platform near the river would suggest that it was associated with the canal, though its purpose remains uncertain.

After the temporary canal was no longer needed, a concerted programme of removal of all material which could be re-used was undertaken. It is possible that this only occurred after 1811, as following the collapse of the embankment of the main canal, the temporary canal was said to be in a poor state of repair. The lack of artefacts in the backfill of the canal would suggest that despite the concentration of activity in the river valley, it was not the site of a navy camp. This may have been due to the risks of flooding.

Reuse of the canal following the collapse of the culverts in the embankment would have been problematic, as by this time the course of the river had been diverted, truncating the canal. No evidence was found to indicate how boats crossed the diverted course of the river. Whilst the apparent constriction near the river in Trench 6 was the results of post-canal activity, examination of the



southern bank of the river did indicate the presence of a very narrow cut for the canal.

The evaluation has indicated that despite robbing of the canal and later disturbance, the site still has potential to reveal important aspects of its construction and use.



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## APPENDIX 1

### TRENCH STRATEGY

<b>Trench</b>	<b>Objective</b>
1	To investigate possible line of tow-path and eastern canal bank of basin <b>(B)</b> .
2	To investigate possible line of tow-path on eastern bank of basin <b>(B)</b> .
3	To characterise the profile of the chamber of lock <b>(C)</b> .
4	To investigate the vicinity of the 'top' gate of lock <b>(C)</b> .
5	To investigate ditch <b>(E)</b> , possibly feeding side pond adjacent to lock <b>(C)</b> .
6	To investigate constriction in canal <b>(F)</b> , and to characterise construction of the cut section of the canal.
7	To investigate platform <b>(G)</b> .



## **APPENDIX 2**

### **TRENCH SUMMARY**

**Trench: 1****Max Dimensions: Length: 5.20 m. Width: 1.60 m. Depth to Archaeology Min: 0.1 m. Max: 0.1 m.****OS Co-ordinates: Ref. 1: SP8022141592 Ref. 2: SP8021841589****Reason: To investigate possible line of tow-path and eastern canal bank of basin (B).**

<b>Context:</b>	<b>Type:</b>	<b>Description:</b>	<b>Excavated:</b>	<b>Finds Present:</b>
100	Topsoil	Loose dark grey brown silty clay moderate small stones Turf and topsoil layer overlaying modern pathway was only 0.05m thick.	<input type="checkbox"/>	<input type="checkbox"/>
101	Pathway	Firm mid blue grey silty gravel occasional small stones Modern pathway 1.2m wide with a thickness of only 0.08m, constructed using imported blue grey coarse gravel / chert. Aligned roughly north-west to south-east, the path extended perpendicular to trench, along top of the eastern bank of the canal.	<input type="checkbox"/>	<input type="checkbox"/>
102	Buried topsoil	Firm dark grey brown silty clay occasional small stones Earlier topsoil 0.2m thick, predating the present trackway and disused chert path (101).	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
103	Make up layer	Firm light yellow brown sandy clay occasional small ceramic building material, occasional small stones Horizontal layer below buried topsoil (102) tapering to the west at least 1.35m wide and 0.15m thick. Interpreted as part of the east bank of the canal. This contained occasional brick fragments and part of an iron bucket.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
104	Pathway	Compact mid grey brown sandy gravel occasional small ceramic building material Horizontal layer of sandy gravel containing small fragments of crushed brick. At least 0.8m wide and 0.12m thick, tapering to the east. Appears under buried topsoil (102) and extends under present trackway. Interpreted as the edge of a precursor to the present trackway.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
105	Make up layer	Firm mid blue grey clay occasional small ceramic building material, occasional small stones Horizontal layer of firm blue grey clay 0.35m thick. Interpreted as bank material possibly deposited abutting shuttering on the east side of canal. This contained occasional brick fragments and a fragment of base from machine-made glass bottle.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
106	Make up layer	Loose mid orange brown sandy gravel frequent small stones Bank material composed of loose orange sandy gravel. The deposit was at least 1.8m wide and 0.25m thick, the base tapered upwards sharply through 45 degrees on the western (canal) side.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
107	Make up layer	Loose mid brown grey silty sand frequent small-medium stones Band of small to medium sized limestone fragments. The deposit was at least 0.6m wide and 0.7m thick, extending 0.4m from northern section. Interpreted as one of a series of deposits used to form the eastern side of the embanked canal.	<input type="checkbox"/>	<input type="checkbox"/>
108	Make up layer	Firm mid blue grey clay occasional small ceramic building material, occasional small stones Layer of blue grey clay containing some small brick fragments. It was at least 1.10m wide and 0.4m thick, having a horizontal profile in the east, becoming thicker to the west, merging into (105) above.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
109	Make up layer	Loose mid orange brown sandy gravel frequent small stones Layer of orange sandy gravel containing occasional brick fragments. This was encountered at a depth of 1.05m below the present ground level, at the limit of excavation. This would appear to be part of the series of deposits, used to create the eastern bank.	<input type="checkbox"/>	<input type="checkbox"/>



**Trench: 2**

**Max Dimensions: Length: 4.20 m. Width: 1.60 m. Depth to Archaeology Min: 0.2 m. Max: 0.2 m.**

**OS Co-ordinates: Ref. 1: SP8020241603 Ref. 2: SP2019941598**

**Reason: To investigate possible line of tow-path on eastern bank of basin (B).**

<b>Context:</b>	<b>Type:</b>	<b>Description:</b>	<b>Excavated:</b>	<b>Finds Present:</b>
200	Topsoil	Loose dark grey brown silty clay moderate small stones Thin turf and topsoil layer 0.05m thick.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
201	Pathway	Loose mid blue grey sandy gravel Modern pathway 1.3m wide and 0.08m, thick, constructed using an imported blue grey coarse gravel / chert. This was below the modern topsoil (200). Aligned roughly north-west to south-east along top of eastern canal bank.	<input type="checkbox"/>	<input type="checkbox"/>
202	Buried topsoil	Plastic mid grey brown silty clay occasional small stones Earlier topsoil 0.2m thick, predating both the present trackway and disused chert path (201).	<input checked="" type="checkbox"/>	<input type="checkbox"/>
203	Make up layer	Firm light blue grey silty clay occasional small ceramic building material, occasional small stones Light blue grey clay with occasional brick fragments. This is interpreted upper deposit forming the eastern canal bank. This may be equivalent to (105), though this deposit defined the limit of investigation.	<input type="checkbox"/>	<input type="checkbox"/>

**Trench: 3****Max Dimensions: Length: 10.00 m. Width: 3.20 m. Depth to Archaeology Min: 0.1 m. Max: 0.1 m.****OS Co-ordinates: Ref. 1: SP8015841617 Ref. 2: SP8015341608****Reason: To characterise the profile of the chamber of lock (C).**

<b>Context:</b>	<b>Type:</b>	<b>Description:</b>	<b>Excavated:</b>	<b>Finds Present:</b>
300	Topsoil	Firm mid grey brown silty loam occasional small stones Topsoil layer of woodland floor leaf litter 0.2m thick.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>303</b>	<b>Ditch</b>	<b>Linear NW-SE dimensions: max breadth 3.4m, min depth 0.4m, min length 3.2m Construction of substantial post-canal field boundary, which is equivalent to [414] to the south-east. Only the top of the ditch was exposed.</b>	<input type="checkbox"/>	<input type="checkbox"/>
302	Fill	Loose mid grey brown silty clay occasional small ceramic building material, occasional small stones Infilling of modern boundary, depositional process uncertain. It was not possible to distinguish the cut for the overflow drainage pipe, equivalent to [416].	<input type="checkbox"/>	<input type="checkbox"/>
<b>307</b>	<b>Robber trench</b>	<b>Linear NW-SE profile: vertical base: flat dimensions: min breadth 7.9m, max depth 1.3m, min length 3.m Robber trench created by removal of brick lining from redundant canal. The modern track to the east prevented the full width being determined.</b>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
304	Main fill	Plastic mid red brown clay silt frequent medium ceramic building material, frequent small-medium stones Main fill of canal. Very mixed comprising abundant gravel in a grey brown silt clay mixed with yellow sandy gravel. Two distinct lenses of material extended c.1m down west side at an angle of 45 degrees were defined. These contained brick rubble, and occasional angular stones. These are interpreted as tip lines suggesting infilling of the canal from the west side. The gravel may have been derived from dredging from the diverted river channel. The dumps of brick debris probably being discarded materials from the dismantling of the canal.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
306	Fill	Firm dark brown grey clay frequent small manganese staining Lens of grey clay dumped material within main infill of canal.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>308</b>	<b>Canal</b>	<b>Linear NW-SE profile: vertical base: flat dimensions: min breadth 7.9m, min depth 1.35m, min length 3.2m Original construction cut for canal. The vertical western side, possibly constructed by material being deposited against shuttering prior to being sealed with clay lining (305).</b>	<input type="checkbox"/>	<input type="checkbox"/>
309	Make up layer	Firm mid yellow brown silty clay occasional small ceramic building material, frequent small stones Exposed in the western end of the trench the deposit contrasted with lining (305). The deposit contained small brick fragments up to 0.05m across. Only the upper part of the deposit was revealed. This formed the uppermost surviving deposit on the western side of the embanked canal.	<input type="checkbox"/>	<input type="checkbox"/>
301	Lining	Firm mid blue grey clay gravel occasional small ceramic building material, moderate small stones Also containing yellow sandy gravel mixed with blue grey clay and occasional brick fragments. This is interpreted as the remnants of a puddled clay lining in base of canal, at a depth of 1.3m below the present ground level.	<input type="checkbox"/>	<input type="checkbox"/>
305	Lining	Firm dark brown grey clay frequent flecks manganese staining Vertical face of material 0.8m deep on west side of canal, abutted by canal infill. This is interpreted as a watertight clay lining to the canal, which would have originally been faced with bricks.	<input type="checkbox"/>	<input type="checkbox"/>

**Trench: 4****Max Dimensions: Length: 6.00 m. Width: 5.00 m. Depth to Archaeology Min: 0.1 m. Max: 0.1 m.****OS Co-ordinates: Ref. 1: SP8017341603 Ref. 2: SP8016841606****Reason: To investigate the vicinity of the 'top' gate of lock (C).**

<b>Context:</b>	<b>Type:</b>	<b>Description:</b>	<b>Excavated:</b>	<b>Finds Present:</b>
401	Topsoil	Spongy dark grey brown silty loam moderate medium ceramic building material, moderate small-medium stones Woodland floor leaf litter, forming thin topsoil up to 0.14m thick.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
403	External surface	Compact mid grey brown sandy clay moderate small-medium ceramic building material, frequent small-medium stones Layer of coarse angular stones and brick fragments situated on the western bank of canal, extending at least 1.6m north-west to south-east by 1.1m+. This is not considered to be a tow-path. Possibly deliberately laid to facilitate deposition of materials into disused canal. To the east finer gravel (409) probably represented a continuation of this path, extending eastwards into the partly infilled canal.	<input type="checkbox"/>	<input type="checkbox"/>
406	Robber trench	<b>Linear E-W profile: vertical base: flat dimensions: min breadth 0.6m, max depth 1.4m, min length 0.9m Robber cut for ground paddle channel. The feature was well defined with vertical sides and a flat base.</b>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
405	Fill	Compact mid grey brown silty sand frequent small-medium stones Compacted bands of limestone in silty sand. Good edges with clay lining [404].	<input checked="" type="checkbox"/>	<input type="checkbox"/>
407	Robber trench	<b>Linear NW-SE profile: stepped base: flat dimensions: min breadth 4m, min depth 1.2m, min length 6m Robber trench associated with the removal of the brick facing from the redundant canal.</b>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
402	Backfill	Plastic dark grey brown silty clay occasional small-medium ceramic building material, frequent small stones Main fill of canal. Very mixed material comprising grey brown silt clay with abundant gravel mixed with yellow sandy gravel. This deposit contained a distinct lens of material extending from west side and tapering to the east, comprising brick rubble and occasional angular stones. This is interpreted as tip line, indicate that infilling of the canal from the west side, possibly using material dredged from the river and waste materials from the dismantling of the canal.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
410	Fill	Friable light yellow grey sandy limestone occasional small stones Lens of decayed / weathered concrete tapering to the west from base of concrete structure (411).	<input checked="" type="checkbox"/>	<input type="checkbox"/>
420	Backfill	Yellow brown clay silt frequent small stones A mixed deposit up to 0.4m thick, comprising slightly yellowish mid brown gravelly clayey silt, with lenses of weathered concrete. This deposit was identified in a small test pit adjacent to the edge of concrete structure (411). Lower part of fill had a good boundary with (421). The deposit contained several large brick fragments.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
409	External surface	Loose mid yellow brown sandy gravel occasional small ceramic building material, frequent small stones Layer of fine gravel extending beyond the western edge of the canal, at least 4m long north-west to south-east by 2.2m wide. It contained occasional fragment of brick and part of the stem of a clay pipe. This is a variation in (403), having a finer gravel component and lacking the quantity of ceramic building material fragments.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
412	Canal	<b>Linear NW-SE profile: vertical base: flat dimensions: min breadth 5.2m, min depth 1.2m, min length 6m Construction of canal in area adjacent to lock gate. This would appear to be a single phase, with fill (413) defining a construction episode rather than a second phase of activity associated with creating a shallower canal.</b>	<input type="checkbox"/>	<input type="checkbox"/>
404	Lining	Compact mid yellow brown clay occasional small ceramic building material Stepped vertical face of material 0.86m+ high on west side of canal abutted by canal infill. This is interpreted as a watertight clay lining to the canal. Below step or narrow 'shoulder' continues as (408).	<input type="checkbox"/>	<input type="checkbox"/>
408	Lining	Compact mid yellow brown clay occasional flecks ceramic building material Arbitrarily separated from (404) at upper step, this deposit was at least 0.8m high, defining two steps or narrow 'shoulders'. The steps or narrow 'shoulders' suggest that this would have originally been faced with bricks, rather than having timber inverts. Step in lining of canal curves from west side and joins concrete base (411) forming a semi-circle c. 2.2m radius.	<input type="checkbox"/>	<input type="checkbox"/>

**Trench: 4****Max Dimensions: Length: 6.00 m. Width: 5.00 m. Depth to Archaeology Min: 0.1 m. Max: 0.1 m.****OS Co-ordinates: Ref. 1: SP8017341603 Ref. 2: SP8016841606****Reason: To investigate the vicinity of the 'top' gate of lock (C).**

<b>Context:</b>	<b>Type:</b>	<b>Description:</b>	<b>Excavated:</b>	<b>Finds Present:</b>
411	Concrete	Cemented light yellow grey sandy limestone occasional medium-large ceramic building material Concrete layer with occasional whole bricks still in situ. A semi-circular step, defining an area c. 2.2m across on the west side of canal forming a "bath" shaped deeper depression.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
413	Fill	Loose mid yellow brown sandy gravel occasional small ceramic building material, frequent small stones Gravel fill at least 0.6m thick, extending below the concrete structure (411). The levels suggest that this material was associated with the construction of the canal rather than indicating the backfill of a deeper, earlier form of the canal. This deposit merges into (402) beyond the concrete structure (411).	<input checked="" type="checkbox"/>	<input type="checkbox"/>
414	Ditch	<b>Linear profile: vertical dimensions: max breadth 1.3m, min depth 0.3m, min length 2.9m Post-canal field boundary, utilising associated earthworks. Small section opened, indicating vertical upper edge with concrete structure (411). The ditch was at least 0.3m deep. Continues to north-west as [303].</b>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
415	Fill	Loose dark grey brown silty clay occasional small ceramic building material, moderate small stones Good contrast with (417).	<input checked="" type="checkbox"/>	<input type="checkbox"/>
416	Drain	<b>Modern narrow pipe trench associate with concrete outflow to the north-west. Continuation not distinguished from ditch fill in Trench 3.</b>	<input type="checkbox"/>	<input type="checkbox"/>
417	Fill	Compact mid blue grey silty clay Unusual material contrasting with adjacent ditch fill (415).	<input type="checkbox"/>	<input type="checkbox"/>
418	Pit	<b>Linear dimensions: min breadth 0.6m, min depth 0.1m, min length 1.8m Only western edge revealed near limit of excavation with track. Well-defined post-canal disturbance, though purpose is uncertain.</b>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
419	Fill	Compact mid grey brown silty clay frequent small ceramic building material, frequent small-medium stones Mixed deposit with approximately 50% brick rubble. Good edges with continuation of weathered concrete (411).	<input checked="" type="checkbox"/>	<input type="checkbox"/>
421	Make up layer	Mid brown silty clay The deposit was identified in a small test pit. This deposit would appear to extend under concrete structure (411) in the east. This may be the same deposit as (422) further east. A possible make up layer for the lower part of the embankment.	<input type="checkbox"/>	<input type="checkbox"/>
422	Make up layer	Mid brown silty clay Only a small area exposed during investigation of [418]. This deposit is earlier than the post-canal brick filled feature [418], whilst also appearing to extend below the weathered continuation of concrete structure (411). Possibly same as (421) to the west, defining a component of the embankment construction.	<input type="checkbox"/>	<input type="checkbox"/>



**Trench: 5**

**Max Dimensions: Length: 4.00 m. Width: 3.00 m. Depth to Archaeology Min: 0.1 m. Max: 0.1 m.**

**OS Co-ordinates: Ref. 1: SP8017841615 Ref. 2: SP8017841611**

**Reason: To investigate ditch (E) possibly feeding side pond adjacent to lock (C).**

Context:	Type:	Description:	Excavated:	Finds Present:
500	Topsoil	Friable dark grey brown silty clay occasional small-medium stones The thickness varied from 0.05 to 0.15m at the base of the slope.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
501	Buried topsoil	Firm mid grey brown silty clay occasional small stones Appears to be the original ground surface prior to construction of the embanked canal. This was only exposed in the east of the trench.	<input type="checkbox"/>	<input type="checkbox"/>
502	Make up layer	Firm dark blue grey clay moderate small-medium ceramic building material, moderate small stones Layer of clay bank material above continuation of ditch [505].	<input type="checkbox"/>	<input type="checkbox"/>
503	Make up layer	Firm light grey brown silty clay frequent small stones Bank material through which the ditch [505] is formed. Contained piece of pottery. Not clear if this was actually truncated by [505] or was contemporary, being part of the same phase of construction.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
504	Make up layer	Firm mid red brown sandy silt frequent small-large ceramic building material Spread of brick rubble at least 1m long, with well defined limit against [505]. Appears to be truncated by ditch [505]. One of a series of deposit forming eastern bank of canal. Not clear if this actually predates the ditch or was part of same phase of construction.	<input type="checkbox"/>	<input type="checkbox"/>
505	Ditch	<b>Linear NE-SW profile: vertical base: concave dimensions: max breadth 0.85m, max depth 0.6m, min length 3.2m Situated at the junction of two distinct dumps of bank material, the ditch had a distinctive U-shaped profile. Overflow ditch for canal, possibly feeding side pond on low ground to north. This seems to be within the construction layers for the bank, suggesting that it is contemporary. There was no evidence to a lining or capping, with the junction of (502).</b>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
506	Fill	Firm mid blue brown silty clay frequent small-large ceramic building material, frequent small sand, frequent small-medium stones The fill contrasted with the adjacent bank deposits. Backfill of disused overflow ditch. There was no evidence to suggest that the original cut had an associated lining.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>





**Trench: 6**

**Max Dimensions: Length: 9.00 m. Width: 6.50 m. Depth to Archaeology Min: 0.1 m. Max: 0.1 m.**

**OS Co-ordinates: Ref. 1: SP8002041724 Ref. 2: SP8002741721**

**Reason: To investigate constriction in canal (F), and to characterise construction of the cut section of the canal.**

<b>Context:</b>	<b>Type:</b>	<b>Description:</b>	<b>Excavated:</b>	<b>Finds Present:</b>
600	Topsoil	Spongy dark red brown silty loam occasional flecks charcoal, moderate small stones Woodland floor leaf litter, up to 0.14m thick in hollow.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
601	Pathway	Compact mid grey brown silty clay frequent small-medium ceramic building material, frequent small-medium stones Band of compacted brick rubble and angular stones, at least 1.8m wide situated towards top of bank. Possibly a path along top of bank. It did not appear close enough to the canal, being c.3m to the west, to function as a tow-path.	<input type="checkbox"/>	<input type="checkbox"/>
602	Layer	Layer of sandy clayey gravel, at least 0.4m thick on east side of canal. This deposit contained a whole brick, as well as brick fragments and an unidentified iron object. Slopes down eastern side of canal cut to seal fill (603). Post-canal infilling, confined to the area near the river.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
605	Fill	Firm mid orange brown clay gravel occasional small ceramic building material A distinctive band of sloping down the upper eastern side of the canal. The deposit was up to 0.4m thick in the area of the horizontal step within (606). Separates fills (603) and (604). Probably material eroding from upper path (601).	<input checked="" type="checkbox"/>	<input type="checkbox"/>
606	Layer	Orange brown sandy clay occasional small stones A distinctive deposit defining the sloping eastern canal edge. This contained a step c.1.1m wide, located 0.8m from the top of the bank, which may define a possible tow-path. The step was filled by part of (605), though it was not possible to determine if a component of this formed an in situ surface. This deposit may defined river terrace material rather than canal lining. Despite contrasting colours, the relationship with (611) was vague.	<input type="checkbox"/>	<input type="checkbox"/>
<b>608</b>	<b>Canal</b>	<b>Linear ENE-WSW profile: 45 degrees base: flat dimensions: min breadth 4.m, max depth 1.2m, min length 4.m</b>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
603	Fill	Spongy dark grey brown silty clay occasional small stones Fibrous peaty material 0.25m thick.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
604	Fill	Firm mid grey brown silty clay occasional small ceramic building material, moderate small stones The deposit was up to 0.23m thick.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
607	Fill	Plastic dark blue grey silty clay The deposit was approximately 0.3m thick, containing fragmented of preserved twigs and complete bivalve shells. Investigation revealed traces of banding within the deposit. Sample <1> was taken to collect organic fragments and shells. The soft sticky deposit contrasted with the adjacent deposits. A disuse fill of the canal, probably forming in a water-filled depression following abandonment.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
609	Lining	Compact light yellow brown clay occasional small stones Layer of yellow clay 0.20m thick sealing (611) with which it had a clear boundary. This is interpreted as the lining for the canal. It is not clear if (611) also defined part of the lining.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
611	Lining	Firm mid grey brown clay occasional small stones In section this deposit was approximately 0.18m thick. This deposit contrasted with the gravel (610) below and canal lining (609) above. Not clear if this is the initial lining of the canal or a deposit associated with the river terrace. The relationship with (606) was vague.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
610	Natural	Compact mid yellow brown sandy gravel frequent small-medium stones Undisturbed gravel of river terrace, sealed by clay (611).	<input type="checkbox"/>	<input type="checkbox"/>



**Trench: 7**

**Max Dimensions: Length: 11.00 m. Width: 1.60 m. Depth to Archaeology Min: 0.1 m. Max: 0.1 m.**

**OS Co-ordinates: Ref. 1: SP8003941735 Ref. 2: SP8004841728**

**Reason: To investigate platform (G).**

Context:	Type:	Description:	Excavated:	Finds Present:
700	Topsoil	Plastic dark grey brown silty clay occasional small stones The deposit varied in thickness from 0.1 to 0.3m.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
701	Subsoil	Firm mid grey brown silty clay occasional small stones The deposit was thin, a maximum 0.06m thick.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
702	Surface	Firm mid grey brown clay gravel moderate small-medium ceramic building material, frequent small stones An extensive surface 11m long 1.6m wide, below the subsoil (701). This deposit contained moderate amounts of brick rubble. No evidence of any foundations for buildings was observed.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
703	Posthole	<b>Oval profile: concave base: flat dimensions: max depth 0.06m, max diameter 0.4m Very shallow ovoid feature on top of the platform. Possibly remains of very shallow post-setting, although no others were identified the trench. This was cut through a patch of subsoil (701) within a slight depression within surface (702).</b>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
704	Fill	Compact dark grey brown silty clay occasional flecks ceramic building material, moderate small stones Slightly darker than adjacent subsoil (701).	<input checked="" type="checkbox"/>	<input type="checkbox"/>
705	Make up layer	Compact mid grey brown silty clay frequent small-large ceramic building material, moderate small-medium stones Roughly linear spread of brick rubble, c.0.8m wide on top of the platform. This appears to be part of an dump of material below surface (702).	<input type="checkbox"/>	<input type="checkbox"/>
706	Make up layer	Compact mid grey brown silty clay frequent small-medium ceramic building material, moderate small-medium stones This appears to be part of an dump of material below surface (702).	<input type="checkbox"/>	<input type="checkbox"/>
707	Make up layer	Compact mid grey brown silty clay frequent small-large ceramic building material, frequent small-medium stones Roughly oval, 0.6m across. This appears to be part of an dump of material below surface (702).	<input type="checkbox"/>	<input type="checkbox"/>



## APPENDIX 3

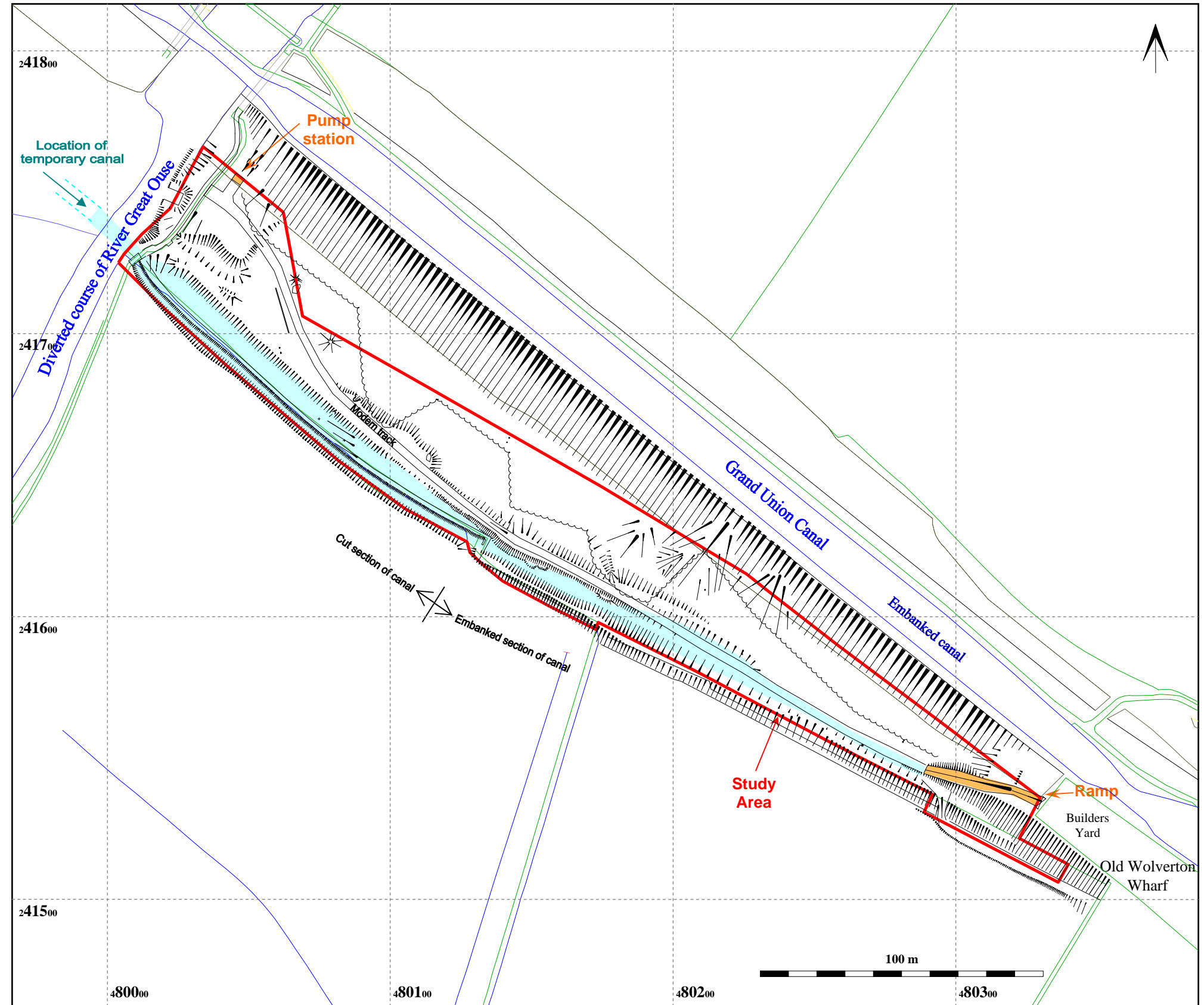
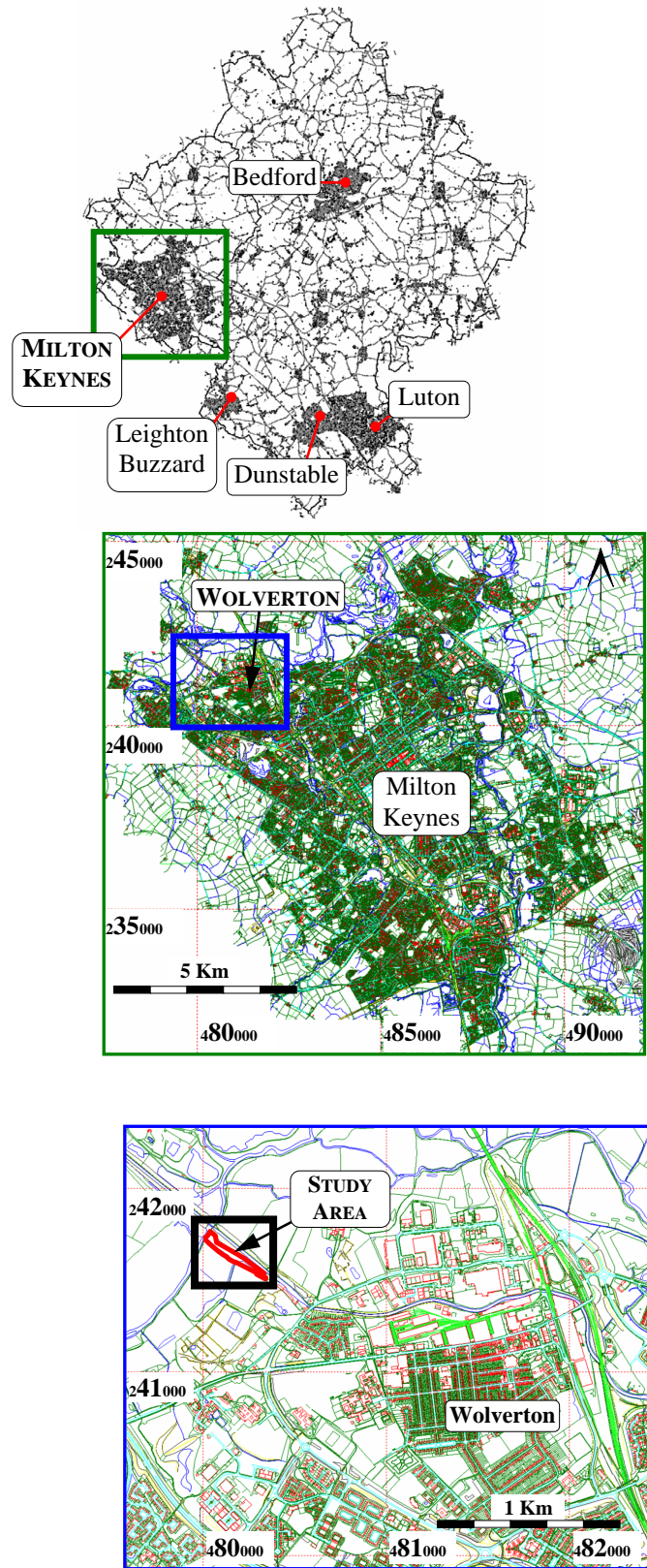
### FINDS SUMMARY

Tr.	Feature	Type	Context	Brick <i>Frag no:weight (g)</i>	Other finds
1	102	Buried topsoil	102		Iron bucket mount, body and handle fragments
	105	Make-up layer	105		Colourless glass bottle base with embossed illegible letters
3	307	Robber trench	304	10:2706	-
4	402	Canal backfill			Limestone fragment; c. 25mm thick
	407	Robber trench	402	5:4120	-
	409	Gravel path	409		Clay pipe stem fragment; 1mm bore
	412	Canal	411	1:3000	
5	503	Bank deposit	503		Type PM8 glazed pottery sherd (43g); base angle
	505	Ditch	506	10:2047	-
6	602	Gravel layer	602	1:3000	-
7	702	Gravel surface	702	6:2742	-
<b>Total</b>				<b>33:17615</b>	

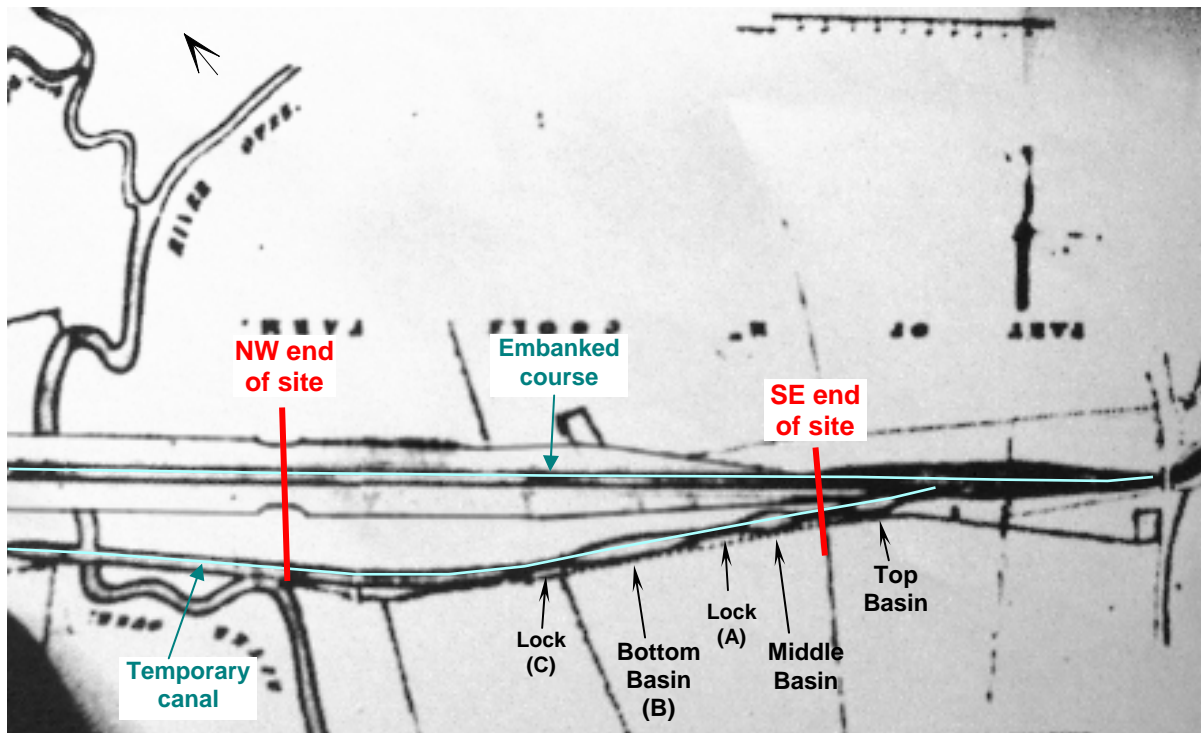
**Table 1:** Artefact assemblage by trench and context



## FIGURES

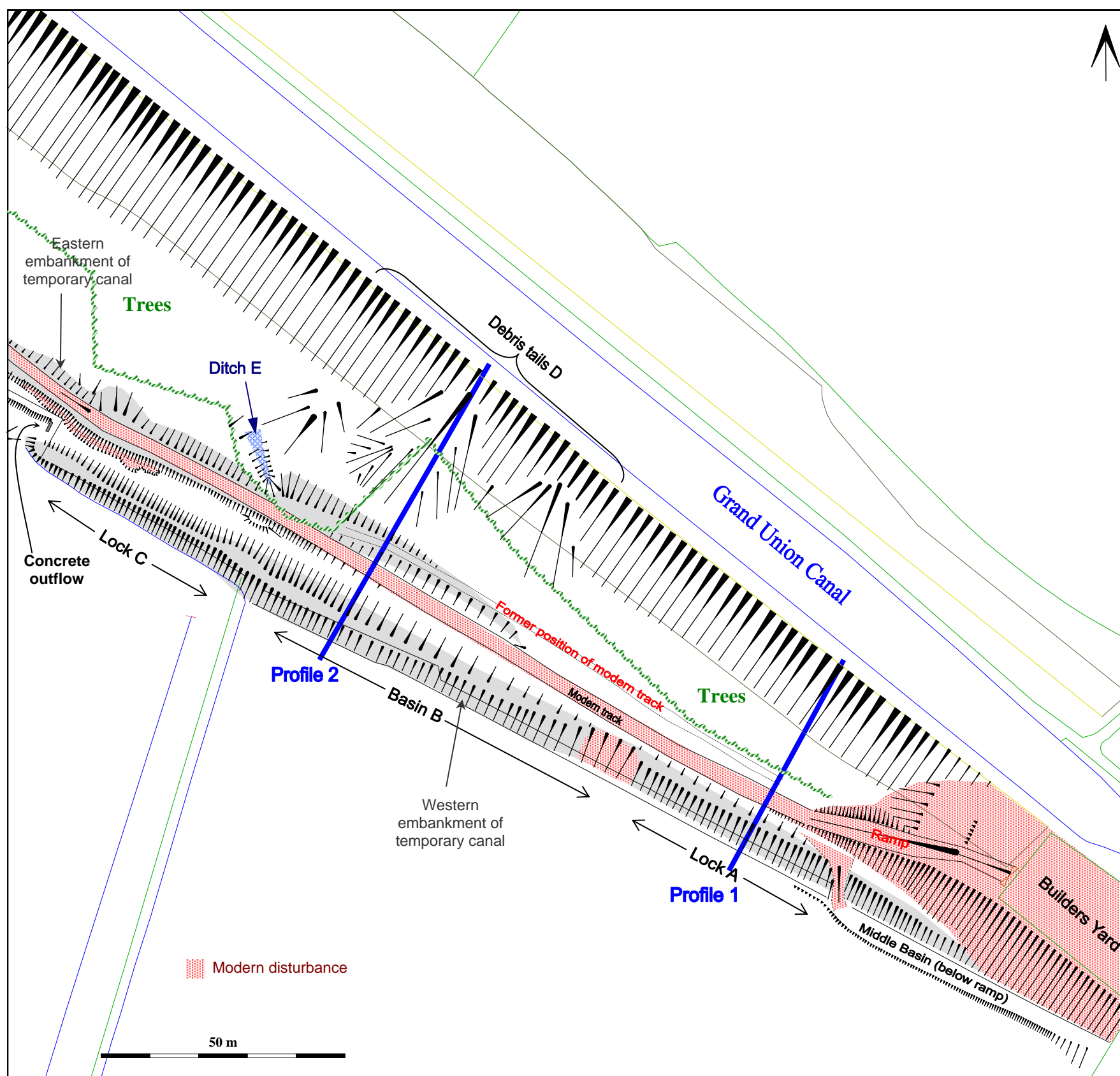


**Figure 1: Site location map**  
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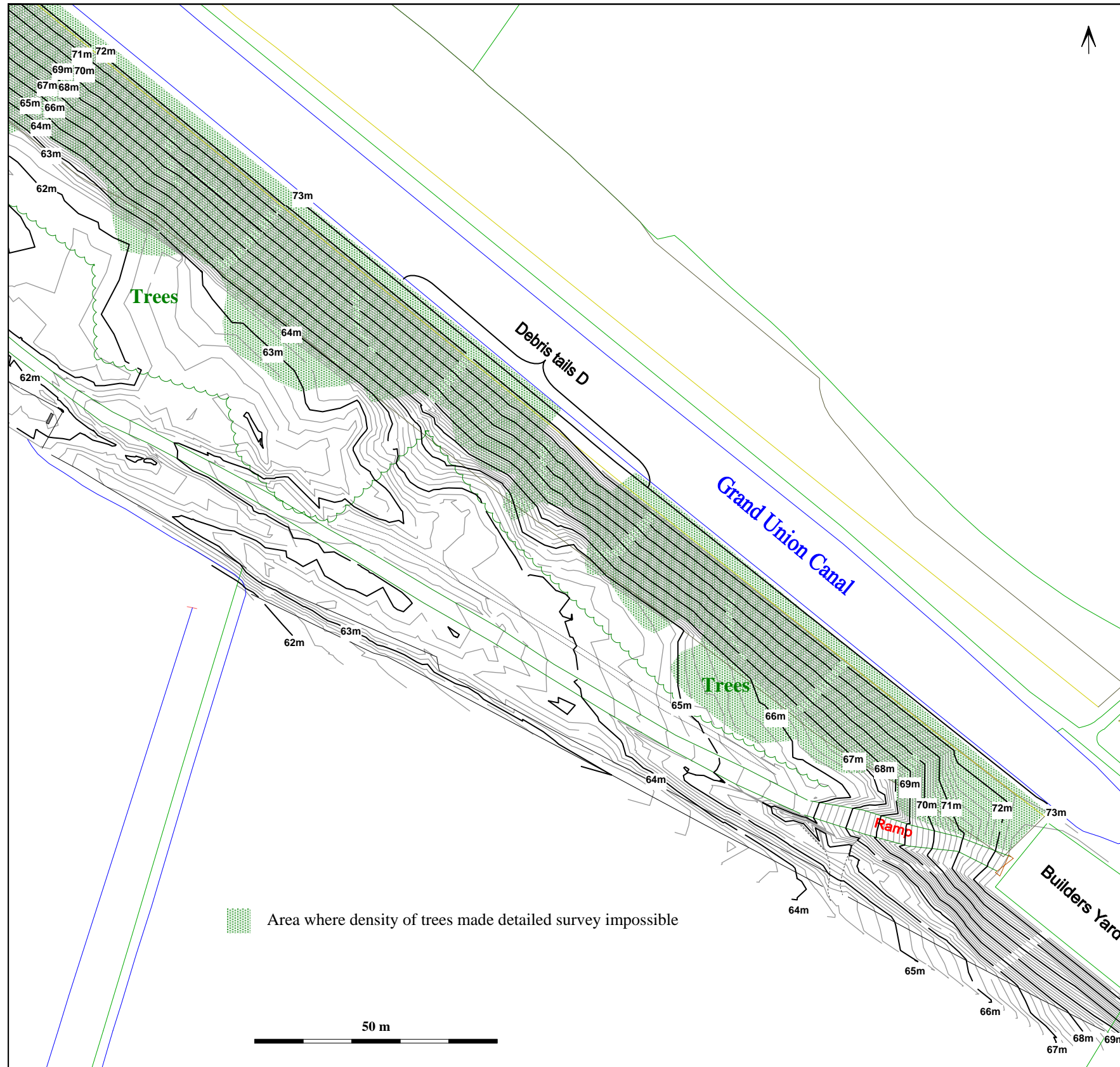


**Figure 2:** Detail from historical map showing both temporary canal and embanked course.

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**Figure 3: Embanked section of canal**  
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**Figure 3a: Embanked section; contours**  
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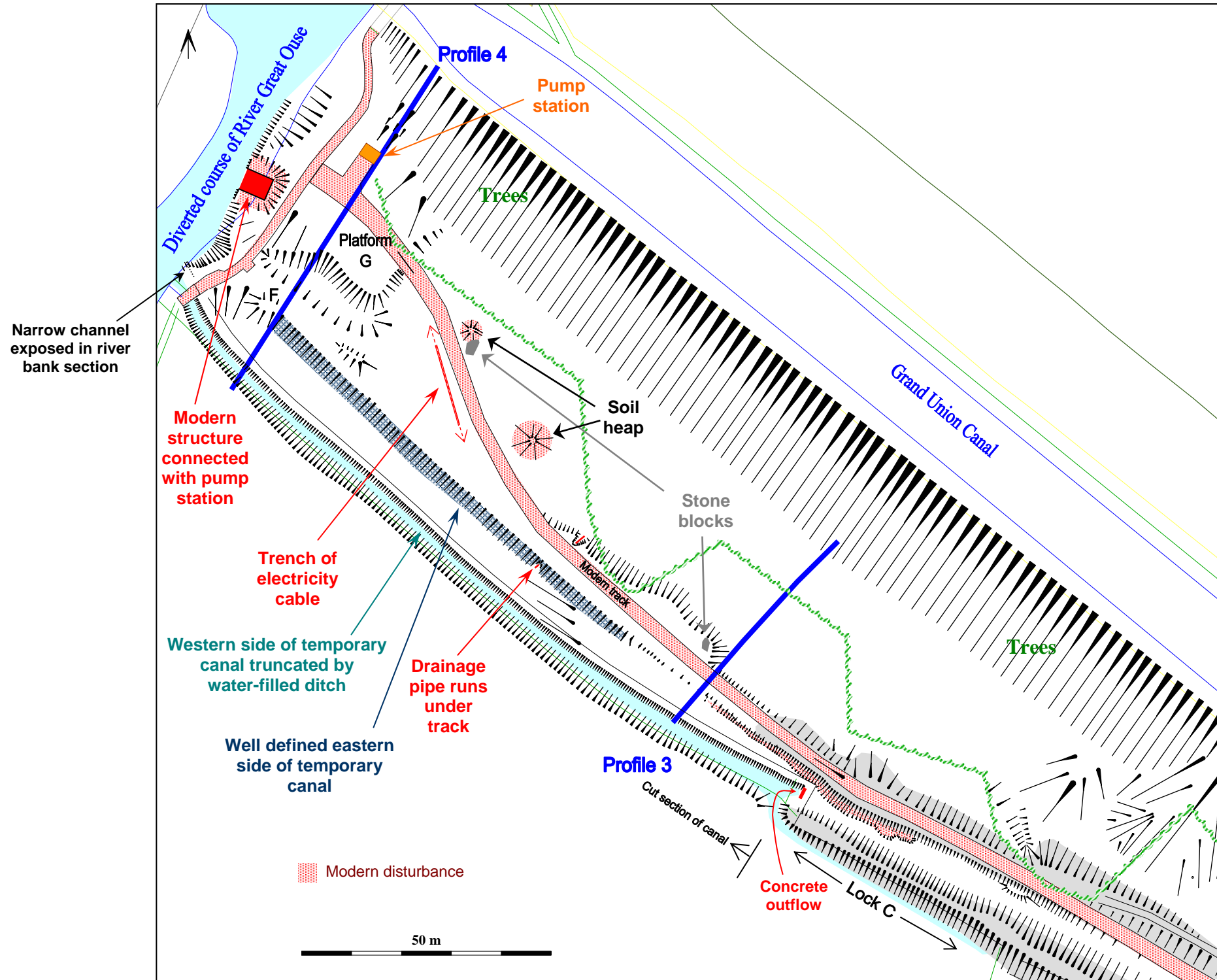


**Photograph 1:** Western side of embankment near modern ramp (looking north-west).



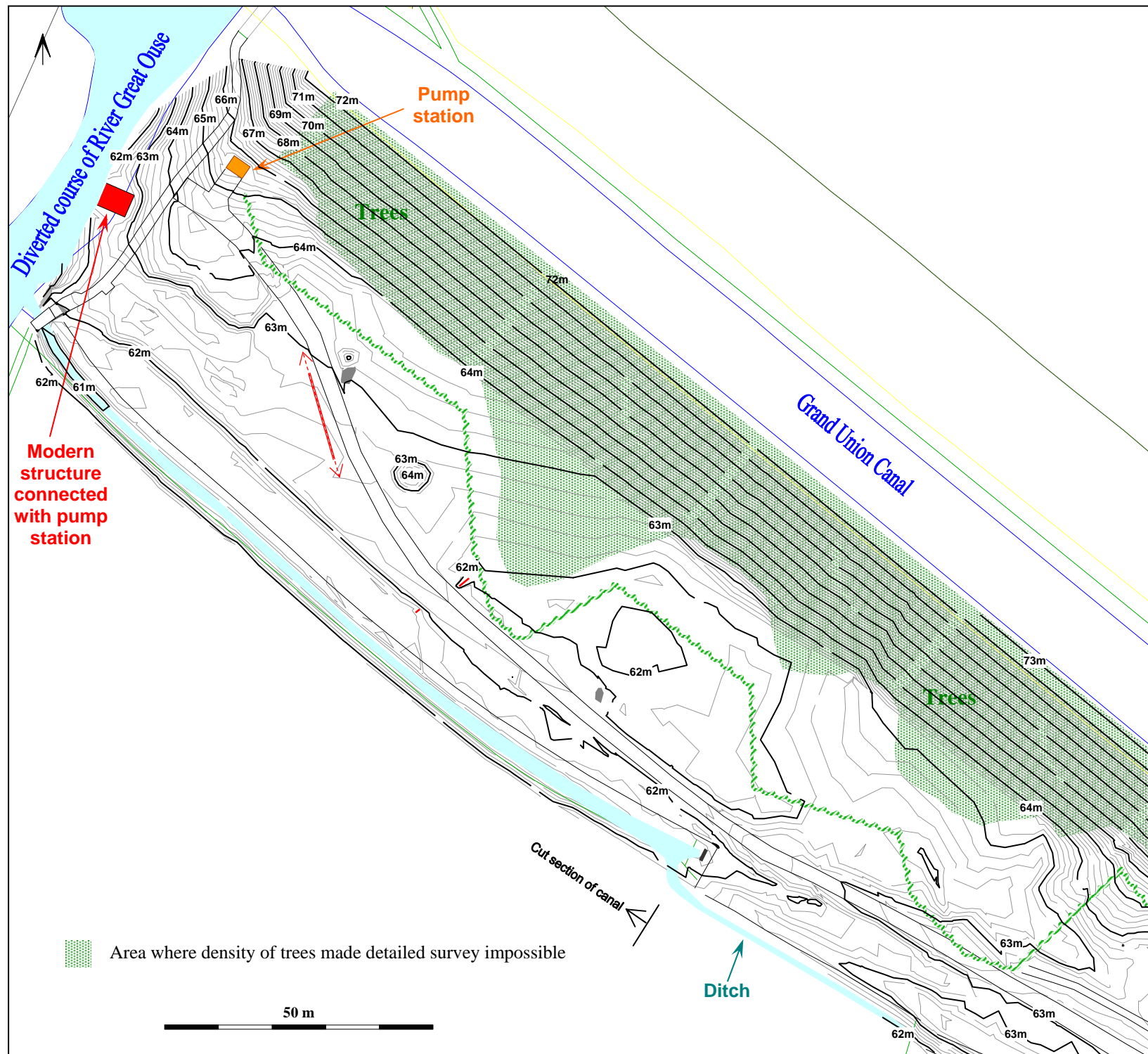
**Photograph 2:** Main debris tail (D) sloping down western side of embankment.

**Figure 4:** Selected photographs 1 and 2

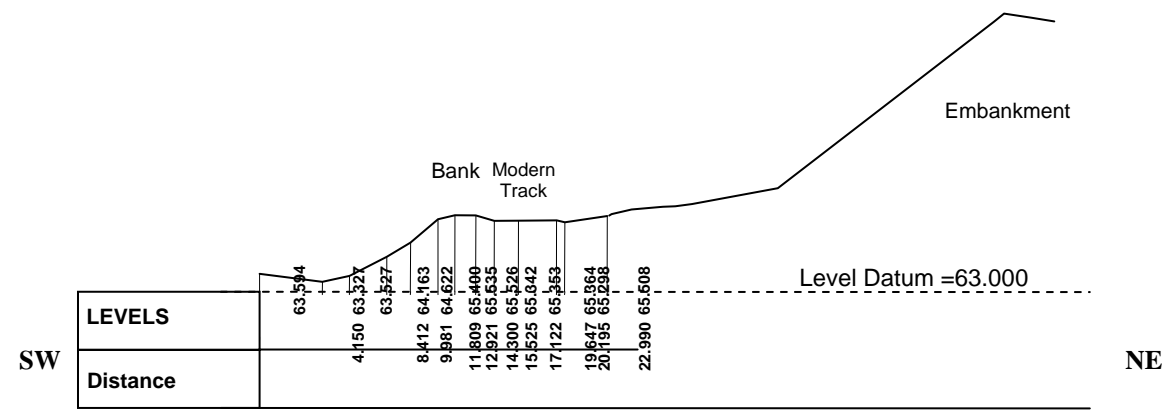


**Figure 5:** Cut section of canal

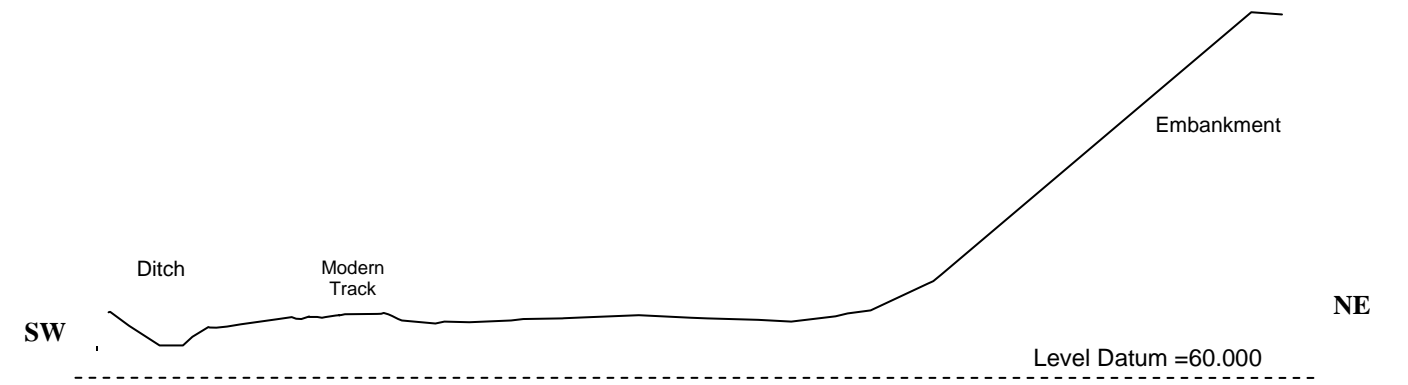
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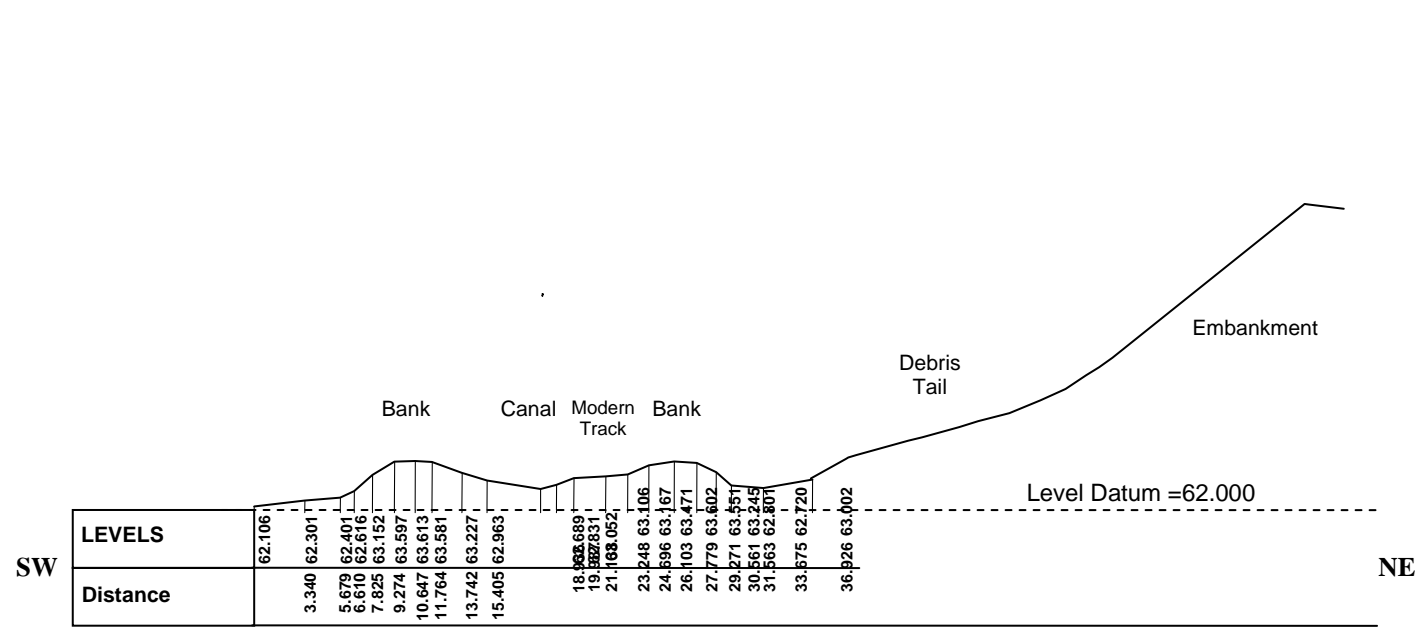
**Figure 5a: Cut section; contours**  
Base map reproduced from the Ordnance Survey Map with the permission of the Controller of Her Majesty's Stationery Office, by Bedfordshire County Council, County Hall, Bedford. OS Licence No. 076465(LA). © Crown Copyright.



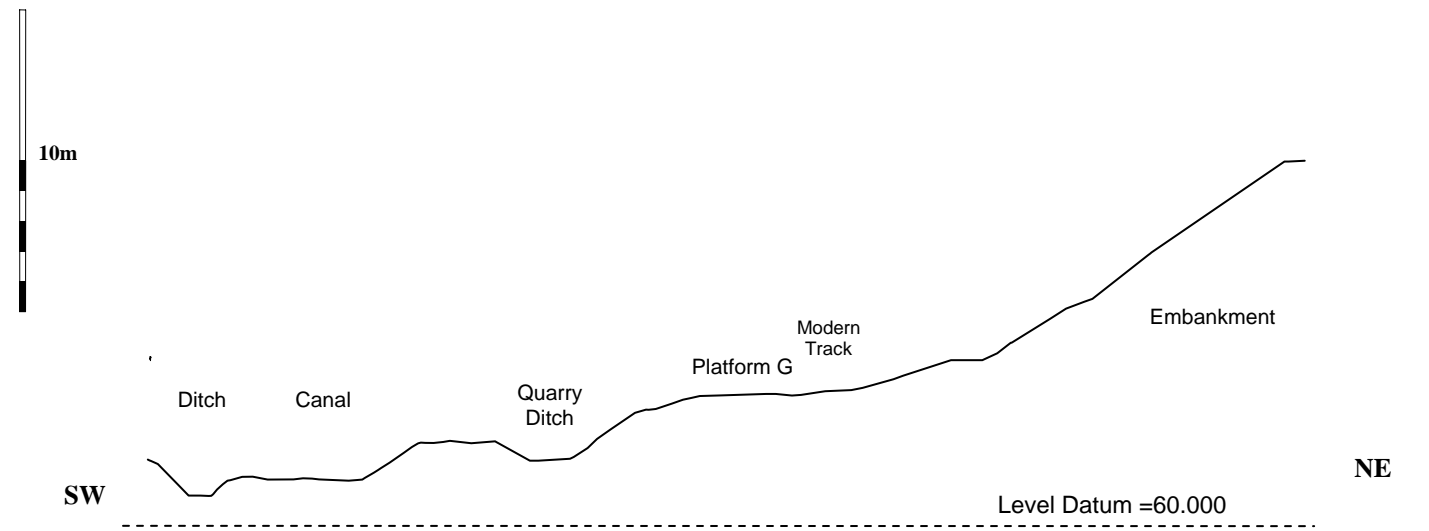
Profile 1; Combination of GPS survey and EDM survey



Profile 3; EDM survey



Profile 2; Combination of GPS survey and EDM survey



Profile 4; EDM survey



Figure 6: Profiles  
Vertical scale exaggerated to show detail



**Photograph 3:** GPS survey of cut section of canal near diverted course of river.



**Photograph 4:** Platform (G) from south-west with modern track and pumping station.

**Figure 7:** Selected photographs 3 and 4

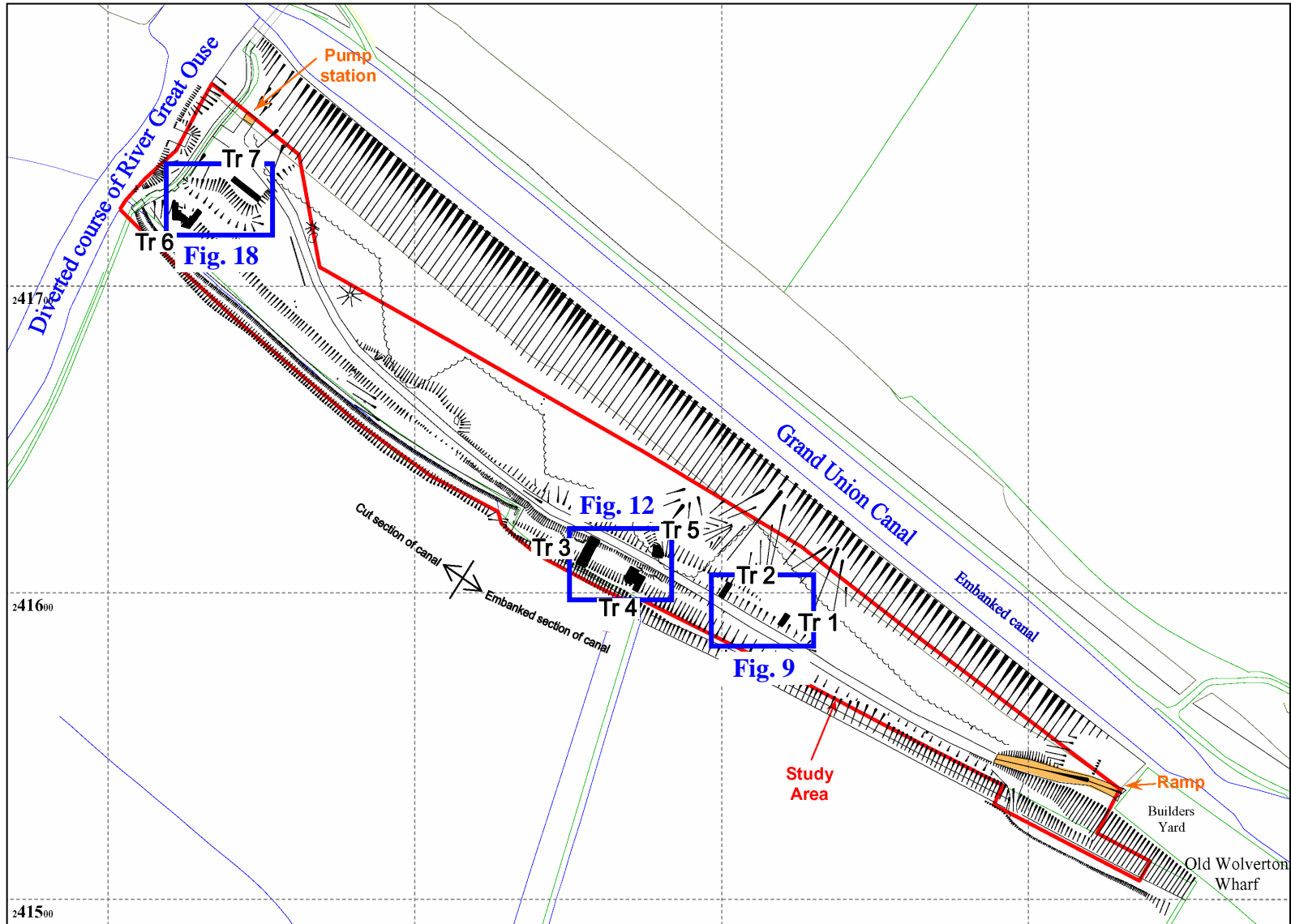
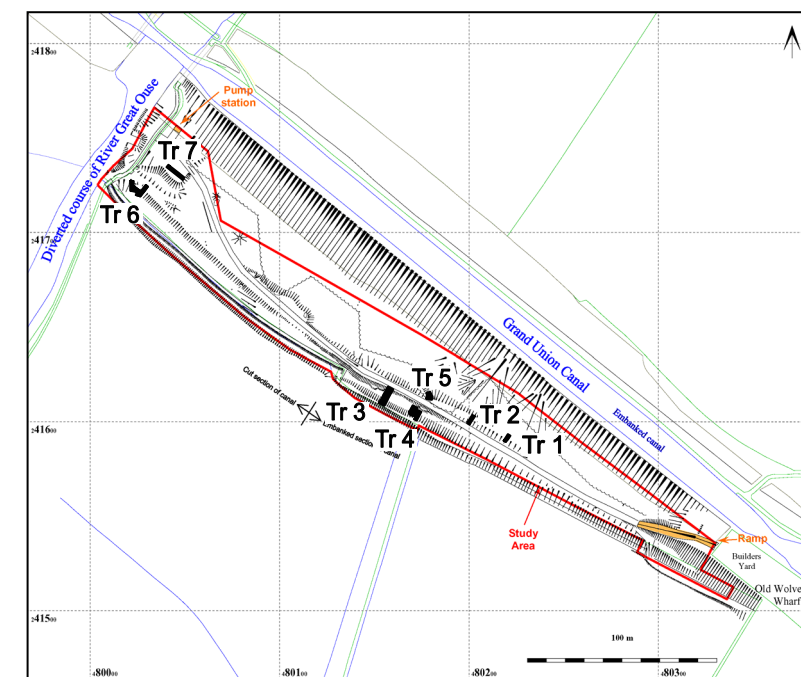
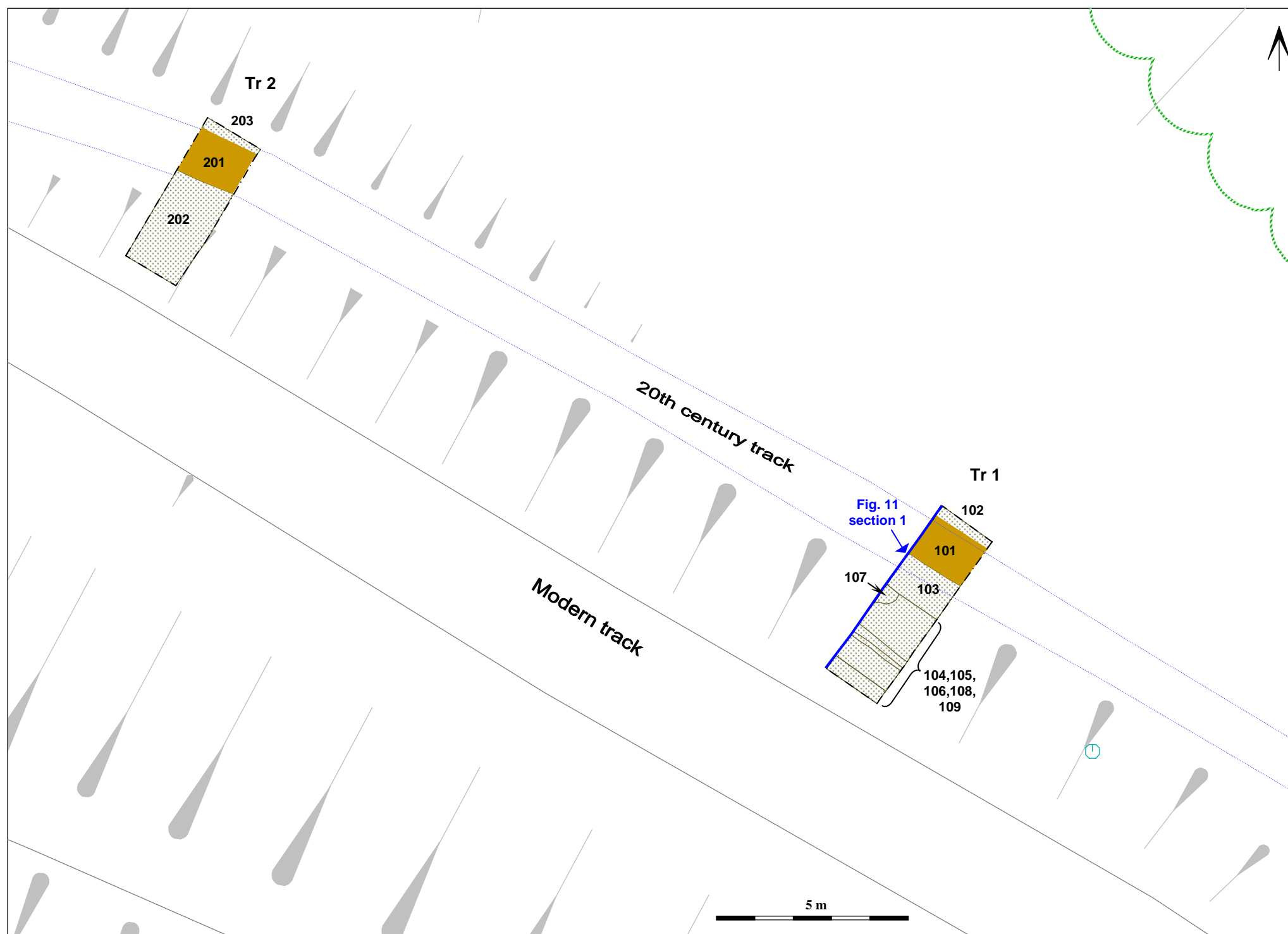


Figure 8: Trench locations



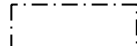


-  Trench limit
-  20<sup>th</sup> century track
-  Embankment

Figure 9: Detail of Trenches 1 and 2



**Photograph 5:** Recent path (201) in Trench 2. Scale 1 metre in 0.5m divisions.



**Photograph 6:** Alternating layers forming bank in Trench 1. Scale 1 metre

**Figure 10:** Selected photographs 5 and 6



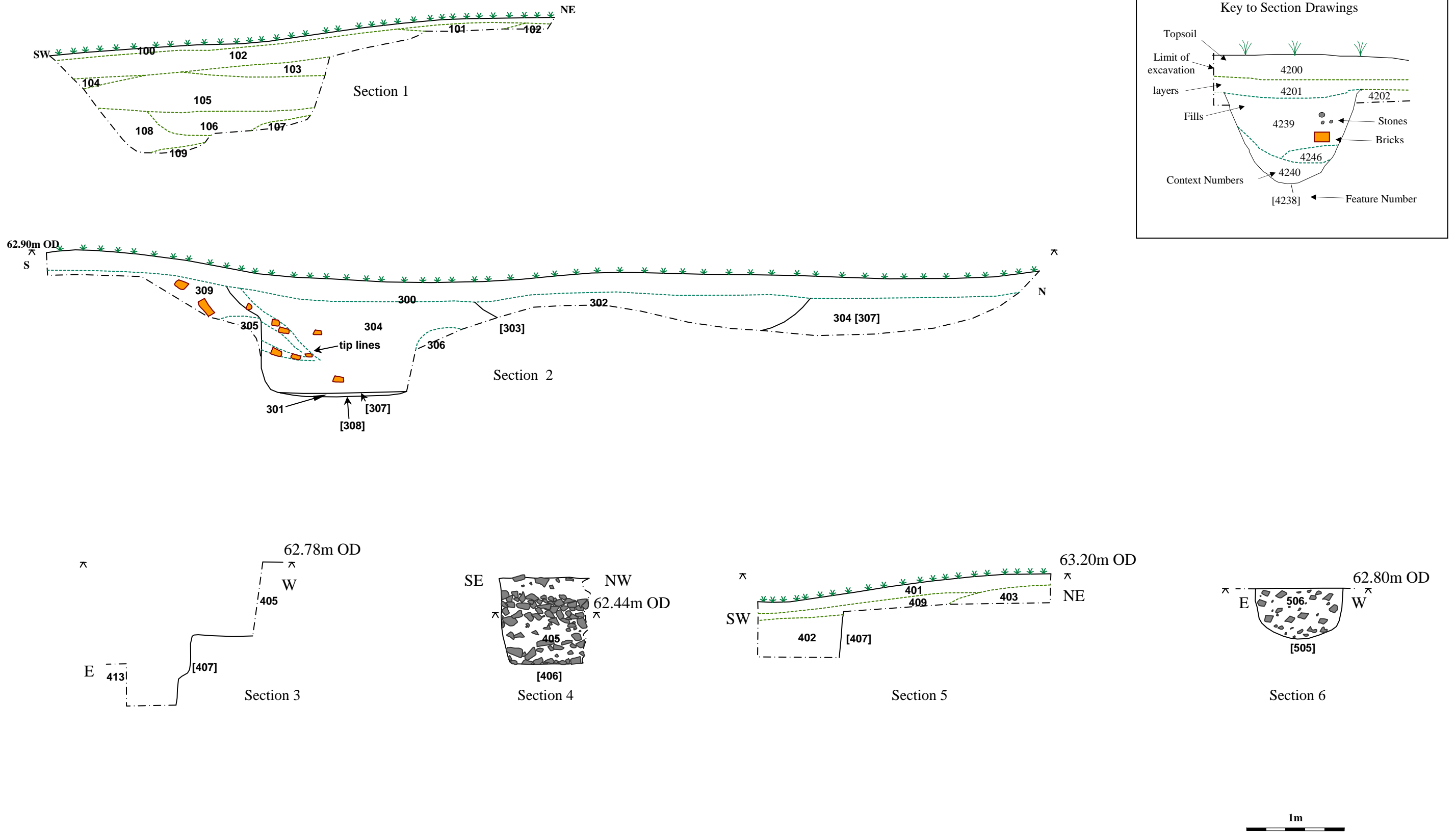
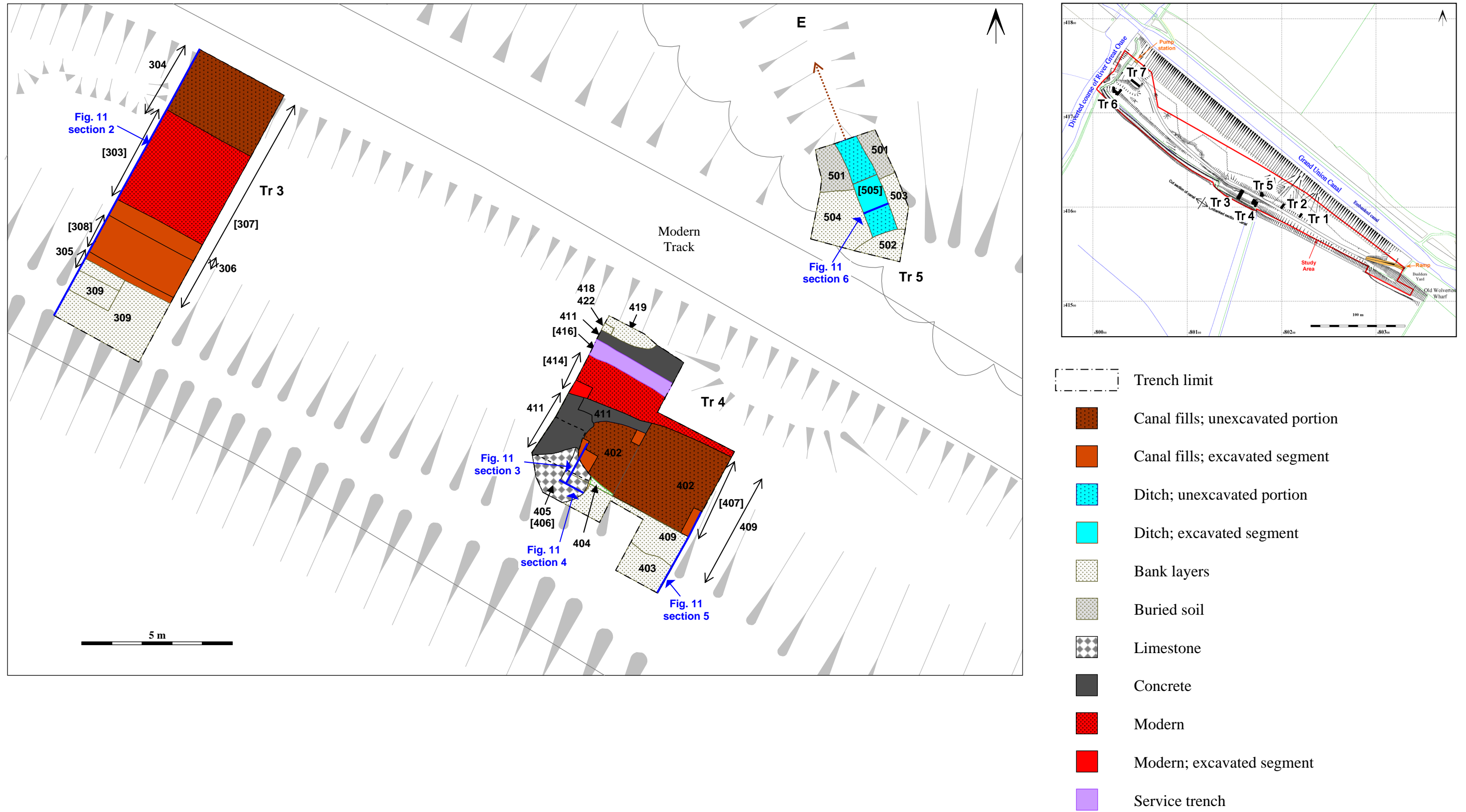


Figure 11: Selected sections



**Figure 12:** Detail of Trenches 3, 4 and 5



**Photograph 7:** General view of final northern extension of Trench 4, showing remnant lining. The dark bands define later disturbance comprising an old field boundary [414] and the cut for a modern overflow pipe [416] (narrow grey band).



**Photograph 8:** Clay lining (305) with gravel backfill (304) to right, base of lower part is full depth of canal in this trench. Scale 1 metre.

**Figure 13:** Selected photographs 7 and 8



**Photograph 9:** Gravel backfill of canal in foreground, revealing yellow clay lining (404) (looking west). Scale 1 metre.



**Photograph 10:** Detail of clay lining with impressed brick fragment – possible evidence for keying to original facing.

**Figure 14:** Selected photographs 9 and 10



**Photograph 11:** Investigation of ground paddle channel and form of canal in Trench 4. Two narrow 'steps' or 'shoulders' are clearly visible in the canal lining.



**Photograph 12:** Investigation of backfilled ground paddle channel, consisting of compacted limestone fragments.

**Figure 15:** Selected photographs 11 and 12



**Photograph 13:** The stepped edge of the canal is visible to the left with gravel fill (413) sealed beneath the mortar/concrete and brick structure (411).



**Photograph 14:** Detail of concrete structure (411) with truncation by old field boundary [414] in the foreground. Scale 10cm.

**Figure 16:** Selected photographs 13 and 14

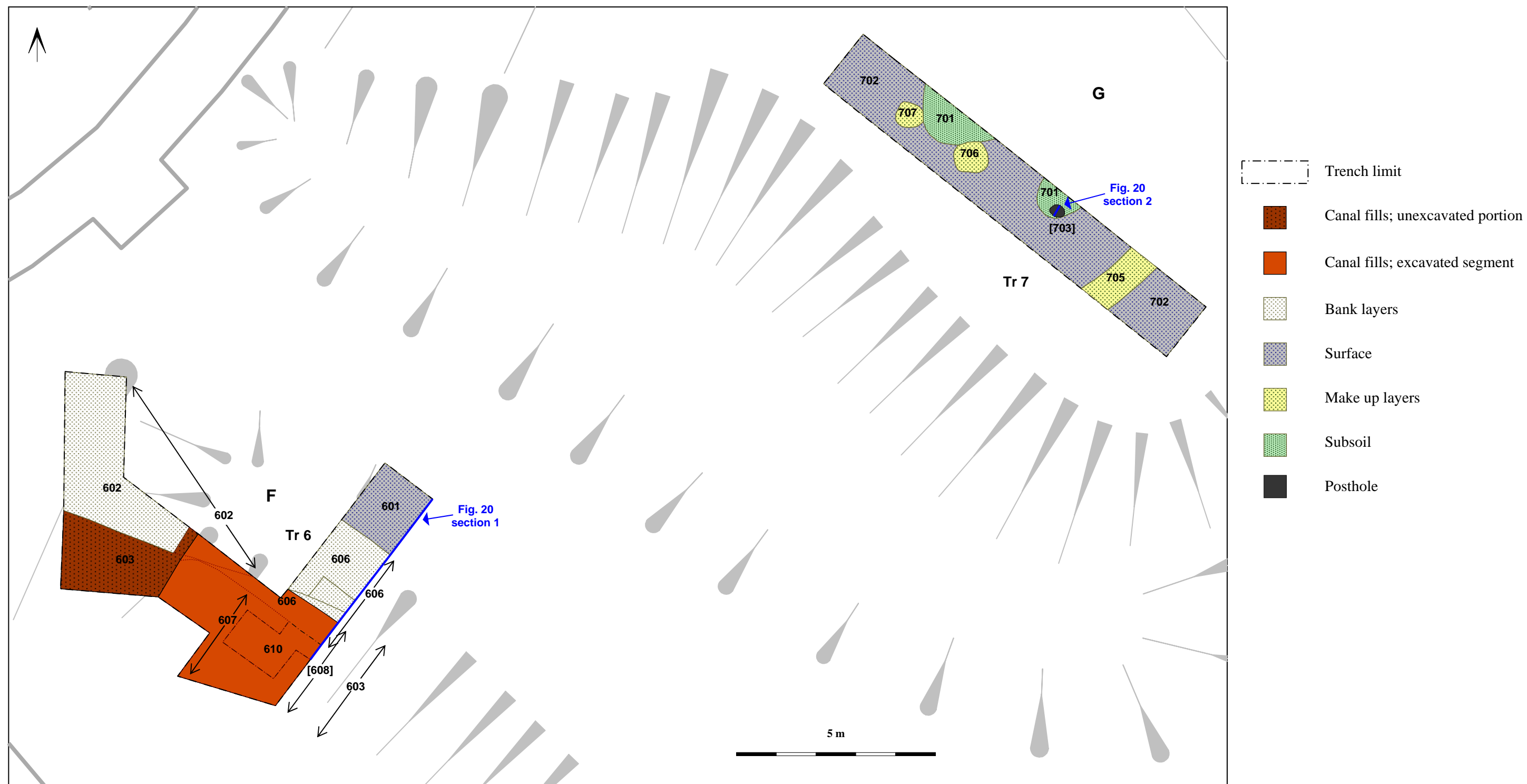


**Photograph 15:** Detail of concrete and brick structure (411) showing shelf to centre of image with deeper element to the left. The old field boundary [414] is the dark band on the right.



**Photograph 16:** Overflow ditch [505] prior to excavation.

**Figure 17:** Selected photographs 15 and 16



**Figure 18:** Detail of cut section of canal showing Trenches 6 and 7





**Photograph 17:** Upper path (601) associated with cut section of canal in Trench 6.



**Photograph 18:** Sloping edge of cut section of canal [608].

**Figure 19:** Selected photographs 17 and 18

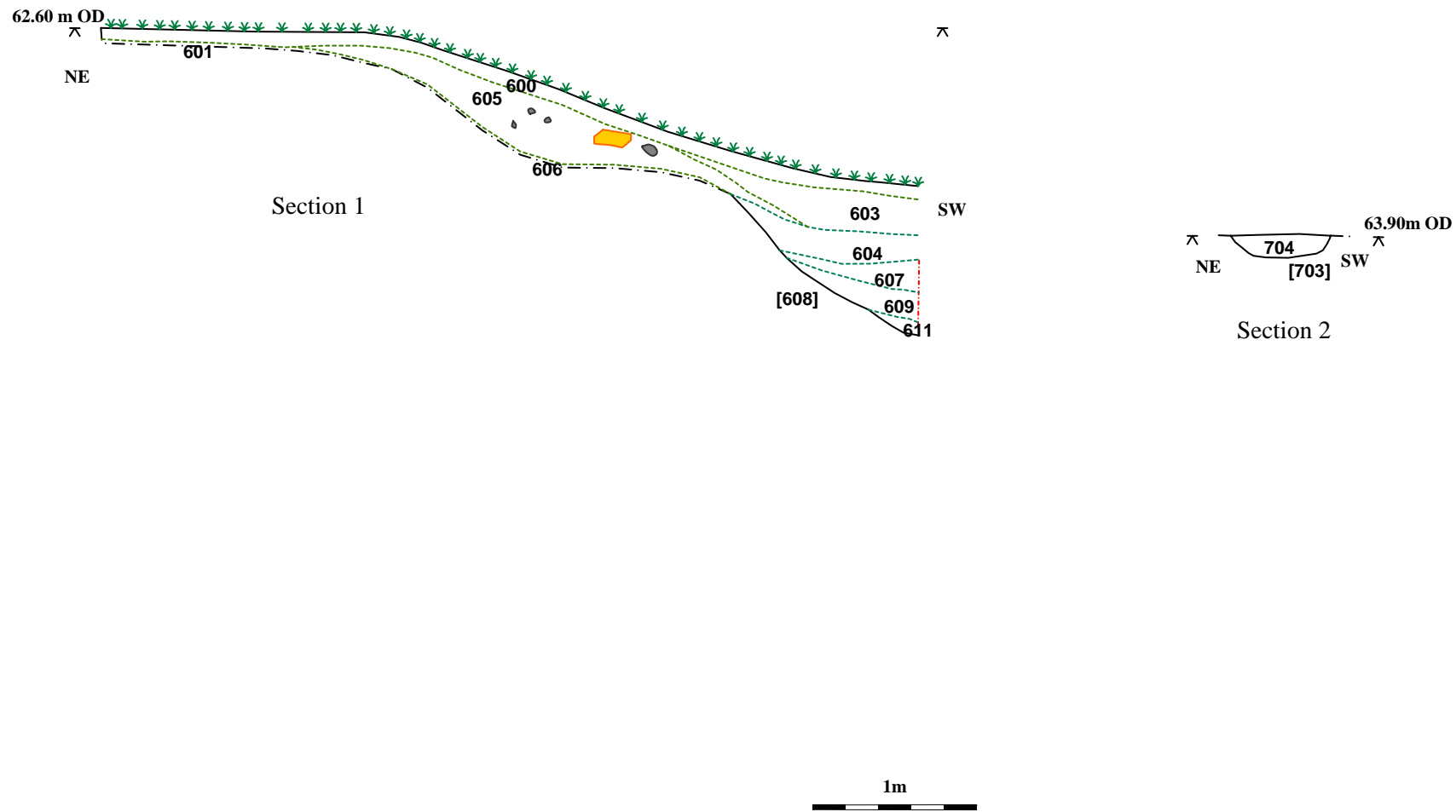


Figure 20: Selected sections



**Photograph 19:** Gravel surface (702) in Trench 7, with traces of underlying rubble associated with platform (G).

**Figure 21:** Selected photograph 19