CALDEW AND CARLISLE CITY FLOOD ALLEVIATION SCHEME

DENTON STREET FOOTBRIDGE and CORPORATION DAM INTAKE CARLISLE, CUMBRIA

HISTORIC BUILDING RECORD

April 2008

Prepared for:	By:
Environment Agency	*The Archaeological Practice Ltd.*

Project code:	*Stage*:	*Compiled by*:	*Control*:	*Completion date*:
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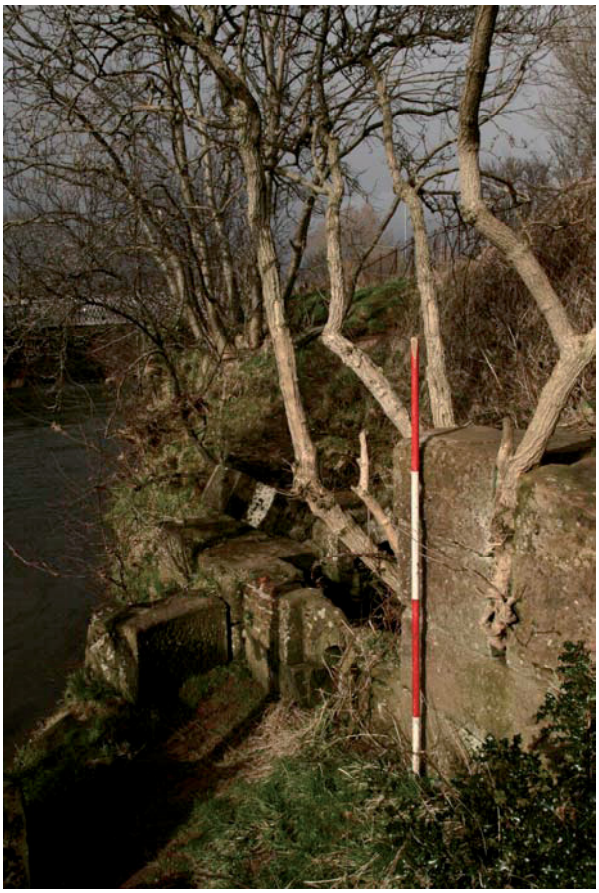
DENTON STREET FOOTBRIDGE
and
CORPORATION DAM INTAKE
CARLISLE, CUMBRIA

HISTORIC BUILDING RECORD
for the
Caldew & Carlisle City Flood Alleviation Scheme



***Frontispiece**: The Intake for Corporation Dam*

Prepared for Environment Agency *by:*

The Archaeological Practice Ltd.
Newcastle upon Tyne

Date: 08 April 2008
NGR: NY 39835 54550
Planning Application Ref: 1/07/1473

Project Code: AP08/31

CONTENTS

ILLUSTRATIONS

SUMMARY

A photographic record and associated background research was carried out in relation to the Denton Street Footbridge and the adjacent intake for the former millrace known as Corporation Dam. This recording was undertaken as a mitigation exercise during March 2008, in advance of proposals for the demolition and replacement of the footbridge and blocking of the intake as part of works associated with the Caldew and Carlisle City Flood Alleviation Scheme (FAS), the features having previously been identified as being of some historic interest

The structures are both located on the River Caldew, in the southern part of Carlisle City. The footbridge straddles the Caldew at NGR NY 39835 54550, below Holme Head. The Corporation Dam intake is located just upstream of the bridge, immediately below the river's confluence with the Wire Mire Beck.

The Denton Street footbridge, which spans the River Caldew a short distance downstream from Holme Head Weir, is a late Victorian building of cast iron construction, carried by abutments of red sandstone ashlar. The date of construction, 1885, is provided by an inscription on the fallen capstone from the north-east pier. The structure replaced an earlier footbridge, built c. 1839-40.

Although the Corporation Dam millrace dates back to the Middle Ages, and originally may not even have been connected to the Caldew, the surviving intake structure is much later in date, probably having been built no earlier than the last decades of the 18th century. An earlier weir serving Corporation Dam was rendered redundant when the river channel changed course in 1771 and was replaced by a new weir between 1771 and 1781, located further upstream nearer Holme Head. Contemporary historic maps suggest that the replacement weir and intake lay in the same general area as the surviving structures recorded here. The two may therefore be cautiously identified with one another, although the cartographic evidence is not conclusive, in large part because of the difficulty of correlating the positioning of the features shown on the late 18th-century maps with the Ordnance Survey.

No trace of a weir is shown at this point on mid-19th century maps – although the intake sluice is marked on some – and any weir here was presumably removed as Corporation Dam was taken out of use in this period. The channel of Corporation Dam was probably culverted and covered by the brick barrel vault at this stage.

It is intended to re-use some of the masonry from the existing bridge in the replacement structure, including the capstones of the piers, only one of which (on the south-west pier) is currently in place, the others having tumbled to the ground. Particular effort should be made to include the inscribed datestone which previously capped the north-east pier.

1. INTRODUCTION

1.1 Background

The subjects of this report are the Denton Street footbridge and the nearby intake for Corporation Dam, both located on the River Caldew, in the southern part of Carlisle City. The footbridge straddles the Caldew at NGR NY 39835 54550, below Holme Head. The Corporation Dam intake is located just upstream of the bridge, immediately below the river's confluence with the Wire Mire Beck.

As part of the Caldew and Carlisle City Flood Alleviation Scheme (FAS) it is proposed to demolish and replace the Denton Street footbridge and block the outlet for Corporation Dam immediately upstream of the footbridge, which features have been identified as being of some historic interest (Environment Agency 2006, 39-41, 44-5, Gazetteer site nos 68, 106). It is intended to re-use some of the masonry from the existing bridge in the replacement structure, including the capstones of the piers, only one of which (on the south-west pier) is currently in place, the others having tumbled to the ground.

In accordance with standard practice, a programme of recording was requested by the planning authority, Cumbria County Council Historic Environment Service (CCCHES), in order to provide a permanent record of the structures in response to proposals for its development. The work requested included a programme of *photographic recording* of the footbridge and the Corporation Dam intake plus an associated *desk-based survey* of the existing resource to set the structures in their historic context.

Execution of the recording work forms a condition of the planning consent granted to the flood alleviation scheme (Planning Application Ref: 1/07/1473).

1.2 Methodology

1.2.1 Desk-based survey

A desk-based survey was carried out during February 2008. This involved consultation of documentary and cartographic records, plans and pictorial matter and secondary sources relating to the structures under consideration, principally at Cumbria County Record Office, Carlisle. The documentary research was undertaken by Ian Caruana. The results of the study are set out in Section 3. This includes a map regression, reproducing Ordnance Survey and other relevant historic maps.

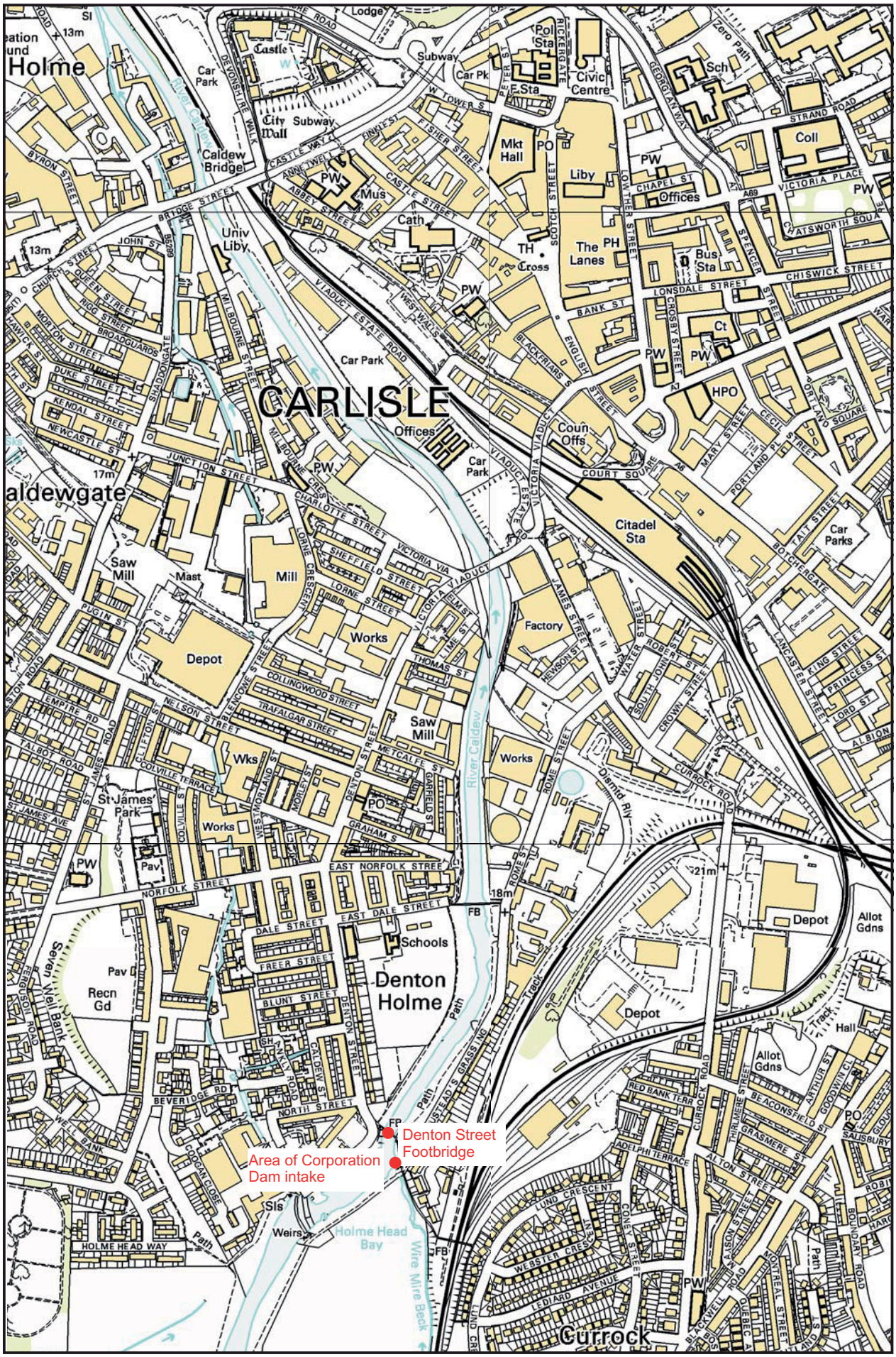
1.2.2 Photographic record

The photographic recording was undertaken on *8th March 2008* using black and white film stock and colour digital photography. Views included a scaled ranging pole. Whenever possible, elevations were photographed perpendicular to the major elevations of the structure. Where this was not possible because of the constricted nature of the sites and their riverine location, partial elevations were recorded along with an oblique overall view of the full elevation.

Peter Ryder, historic buildings specialist, carried out a visual inspection of the building and made notes in preparation for a full written description (below). Technical drawings were supplied by Jacobs, engineering consultants for the Caldew and Carlisle City Flood Alleviation Scheme (*Illus. 11-13*).

A catalogue of the record photographs in table format is provided in Section 5.

Illus 01: *Location of Caldew and Carlisle Centre FAS*



Illus 02: *Map showing the location of Denton Street Footbridge and the Corporation Dam intake in Carlisle*

2. BUILDING DESCRIPTION

2.1 Denton Street Footbridge

This footbridge (NY 39835 54550) crosses the Caldew c 1.5 km south of Carlisle city centre, and links the south end of Denton Street on the west bank with Boustead's Grassing on the east; the bridge is described as if set east-west, when the true orientation is nearer to south-west to north-east.

The footbridge is 26.2 m long by c 1.8 m wide, and of cast iron construction, painted grey carried by abutments of red sandstone ashlar. The concrete deck is set between openwork sides 1.57 m high consisting of nine bays; the three central bays simply have a single latticework panel on each side; the remaining bays are each divided into two square panels, which in addition to the lattice work have external diagonal braces. Between each bay lateral T-section members below the deck project beyond the faces of the bridge and are linked both to the ends of the intersecting diagonal bars that carry the deck, and to L-section hanging braces from the principal uprights. The principal girders are of T-section, and all members are secured by round-ended rivets.

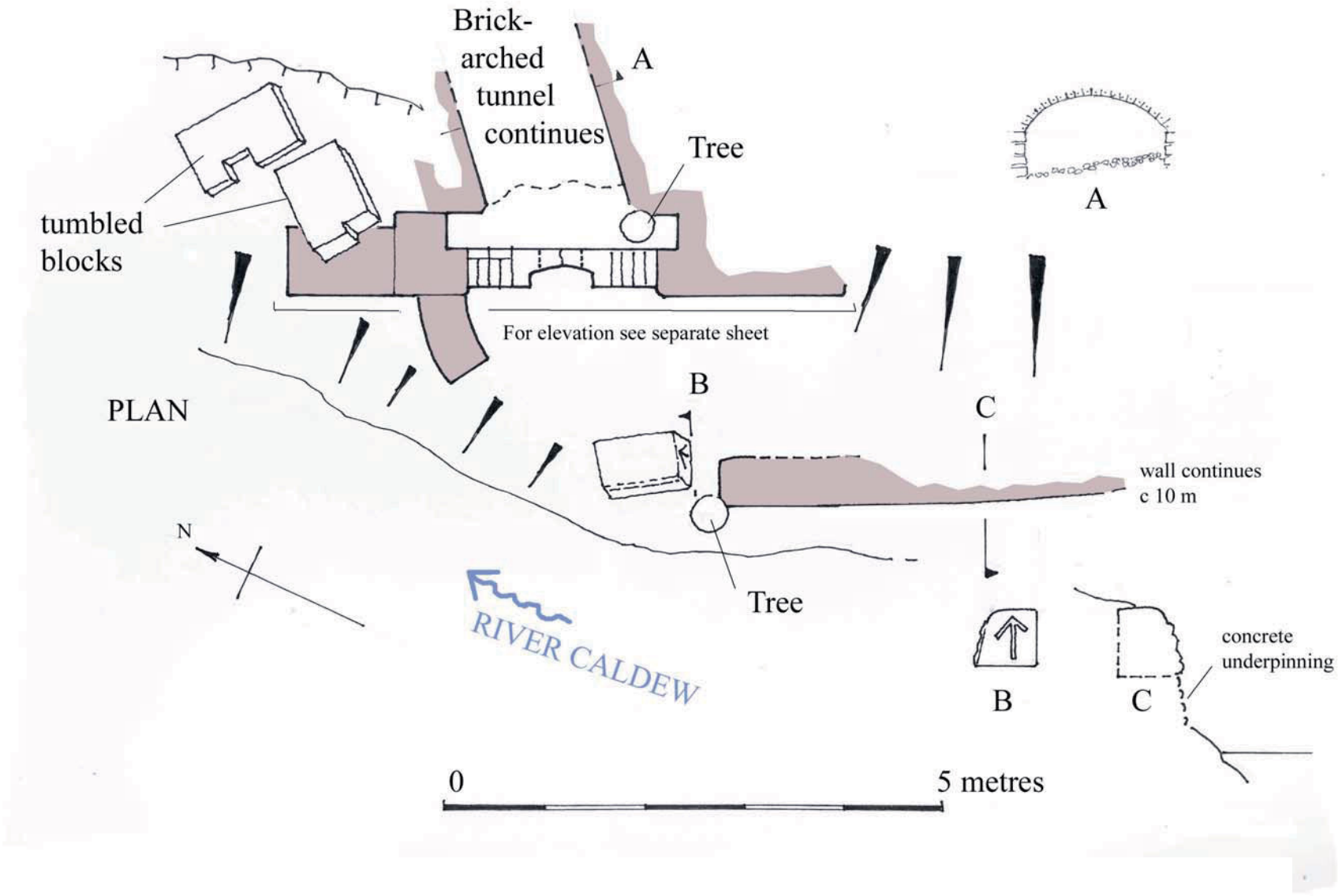
At each end of the bridge there are a pair of upright piers, 2.1 m high, 1.8 m long and 0.46 m thick, rebated at their inner angles to carry the cast-iron construction. Their inner faces are of diagonally-tooled sandstone ashlar, and their outer of rock-faced blocks; each has had an ashlar cap, chamfered on its upper angles, but only that of the south-western now remains in position. The cap of the north-eastern pier, now lying broken on the ground to the north, has the incised inscription '1885 / [BENJAMI]N SCOTT ESQUIRE'.

The western abutment is no more than a rectangular block of masonry. The eastern is more complex, with flanking walls on either side of the main abutment, canted so as to follow the line of the river bank. The northern extends for 3.8 m (beyond which a lower wall of much smaller masonry continues for a few metres) and the southern for 4.6 m to an angled return; both are battered walls of rock-faced masonry, c 2 m high and simply acting as retaining walls to the bankside behind. The eastern approach to the bridge appears to have had thin ashlar wing walls, splaying out at an oblique angle, but only the lowermost course of the northern survives, with the base of a slender supportive pilaster; any evidence of its southern counterpart is concealed beneath tarmac, and there is now no sign of any corresponding structure at the west end of the bridge.

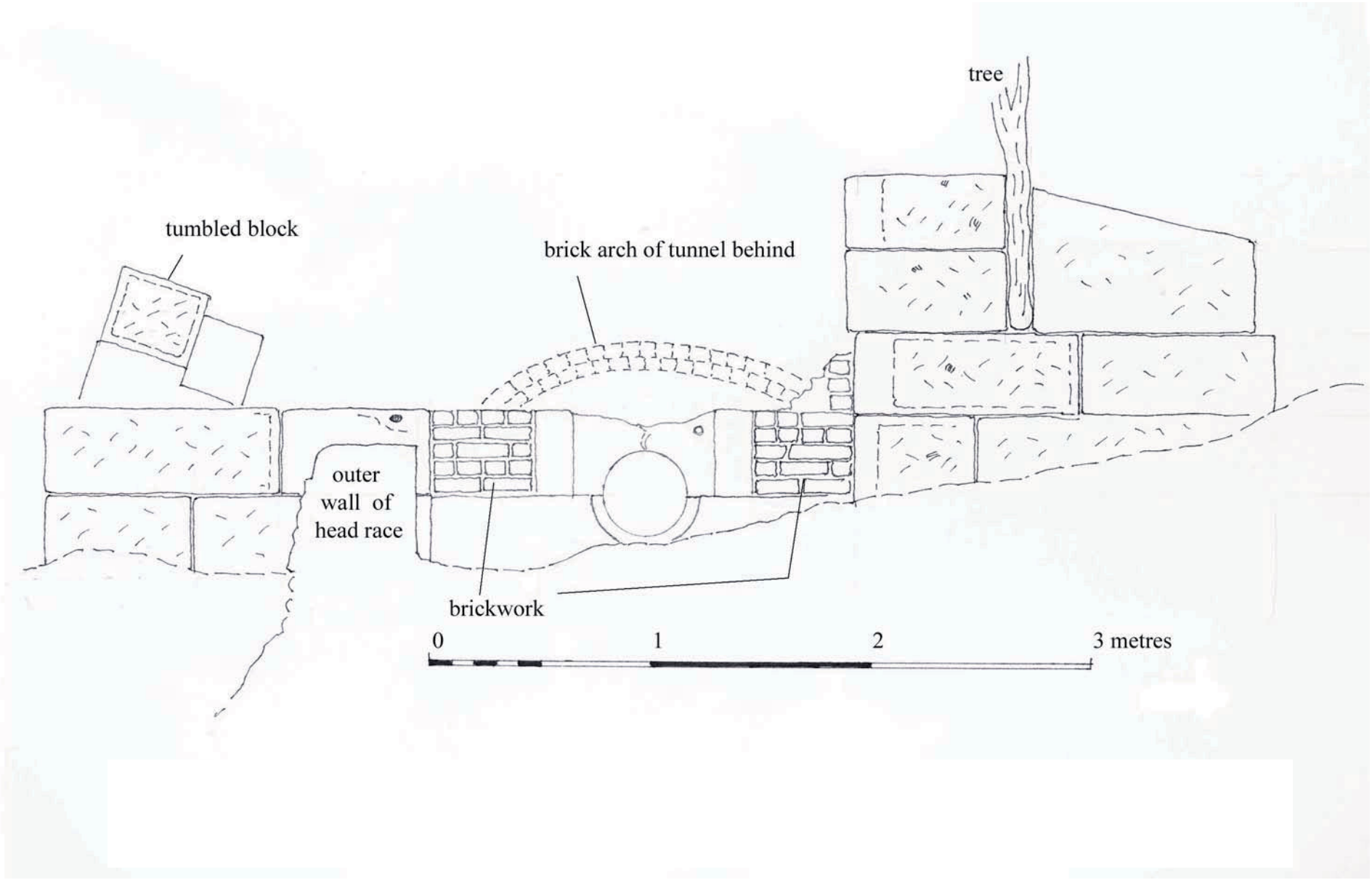
2.2 The Corporation Dam Intake

The remains of the Corporation Dam Intake are situated on the east bank of the Caldew c 30 m upstream (south) from the footbridge and c 12 m downstream of a modern footbridge at the foot of the tributary Wire Mire Beck. The construction of this footbridge and other associated recent works appear to have erased an upstream section of the former head race or head goit. The remaining 10 m or so of this are now infilled, and form a horizontal terrace on the river bank, with on its outer side a single course of large red sandstone blocks of trapezoidal section, their outer faces being rock-faced below a smooth upper section, with rounded upper angles. A typical block is 1.12 m long and 0.50 m high, being 0.57 m wide at the base and 0.50 m at the top; their ends are cut with grooves in the form of broad arrows, to facilitate the mortar bonding with adjacent blocks, and some blocks show infilled slots, probably lewis holes, in the centre of their upper surfaces.

The surviving length of the outer wall follows a slight but distinct curve, until the final section (where the outer wall has partly fallen away into the river) curves more sharply to the intake



Illus. 03: *A survey of the visible remains of the Corporation Dam Intake by Peter Ryder*



Illus. 04: *Elevation of the visible remains of the Corporation Dam Intake by Peter Ryder*

of the underground race. This takes the form of an opening 1.92 m wide in a wall of large ashlar blocks with a rock-faced-and-margined finish. The short length of wall north of the opening has partly collapsed; that to the south is in effect a retaining wall for the bank side and stands 1.50 m (four courses) high, extending for a further 1.75 m, the top course angling down to a height of 1.20 m at the end.

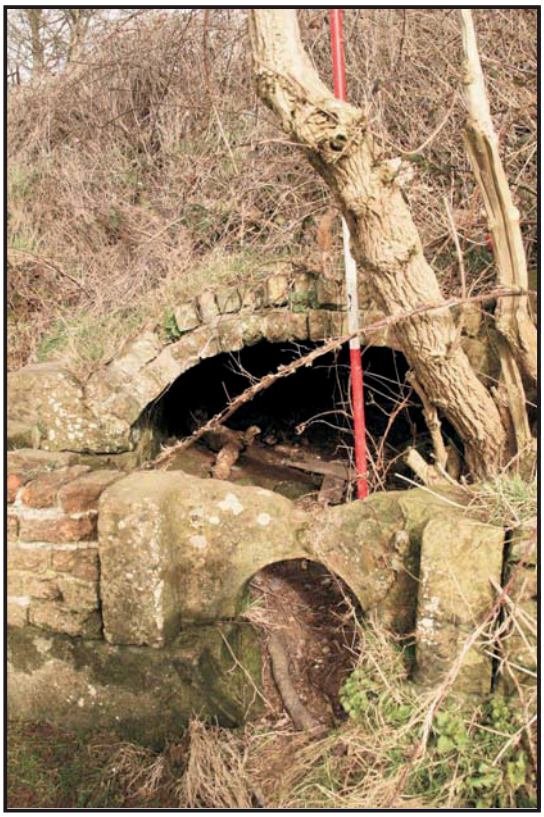
The opening in this ashlar wall, which has rounded angles to its jambs, is infilled by a recessed wall which has panels of old brick on either side of a central section with a rebated circular opening that appears to have been covered by some form of sluice to control inflow. Just behind this is the mouth of the intake tunnel, which is c 1.4 m wide and 0.8 m high at the entrance, with side walls of four courses of roughly-shaped stone and a double-skin segmental brick vault of around 20 voussoirs. The passage is floored by cobbles and river debris, as well as some odiferous organic material, and appears to continue in a straight line for at least 15 m, although the level of infill rises so that c 10 m in there is barely 0.3 m between it and the crown of the vault. A thin and determined speleo-archaeologist might make further progress.

Sandstone bedrock is exposed very close to the intake; it is not clear whether the subterranean passage is actually mined or, more likely given the relatively level ground directly above, constructed by a 'cut-and-cover' technique.

Illus. 05: *The SW pier of the Denton Street bridge, the only one of the four peirs to retain its capstone in place.*

Illus. 06: *The masonry of the larger, east abutment of the footbridge.*

Illus. 07: *The broken capstone belonging to the north-east pier, inscribed '1885/ [BENJAMI]N SCOTT ESQUIRE'*



Illus. 08: *Sluice intake for Corporation Dam from the west.*

Illus. 09: *View of the masonry associated with the Corporation Dam intake and headrace.*

3. DOCUMENTARY SURVEY

3.1 Sources

3.1.1Archives consulted

The following principal repositories of documentary, cartographic and photographic evidence were consulted:

- ***Cumbria County Record Office, Carlisle (CRO)***
- ***Carlisle City Library, Carlisle (CL)***
- ***Tullie House Museum, Carlisle (THM)***

Included amongst the various kinds of information used from each of the above sources are the following:

3.1.2 Primary documentary sources

The majority of primary documentary material consulted comprised maps and other illustrative material, as outlined more fully below.

3.1.3 Secondary and Published Information

Local and Regional Histories

Published works, which shed general contextual light upon the assessment area or upon particular aspects of its archaeology or history, are included in the bibliography (Section 9), and cited where relevant in the text. These include works by prominent local historians such as Dennis Perriam and Alan Harris (1967).

3.1.4 Map Evidence

The following maps contain useful information regarding the subjects of assessment:

1611 Carlisle and the Socage Manor (Durham U.L., Howard of Naworth, C49/1; printed by R.T. Spence, *Northern History* **20** (1984), 67
1684-5 James Richards' Plan of Carlisle
1746 George Smith, Plan of the City of Carlisle (CRO DX 334/1; reprinted 1995 by Cumbria County Council)
1781 Plan of Denton Holme (CRO DB/110/157)
c.1782 Plan of Denton Holme (from Holme Head to Castle Mill) (Carlisle Library 2A9)
June/August 1783 Plan of Denton Holme (CRO DB/110/156)
1821 John Wood, Plan of the City of Carlisle (CRO CaC17/3)
1842 Tithe plan for Caldewgate (redrawn to show Denton Holme land ownership in Harris 1967, 209)
1842 Plan of the City of Carlisle by G. Larnier. Published by Scott & Benson
1850/53 Plans of Carlisle by Richard Asquith (inclu. index plan) in Report to Board of Health (CRO)
1852 Denton Holme in 1852 (Jackson Collection, Cumbria County Library, Carlisle; printed in Harris 1967, 215)
1865 Plan of Holme Head by Richard Asquith, (CRO DB 110/225)
1865 Ordnance Survey, 1:2500, Sheet XXXIII.7
1901 Ordnance Survey, 1:2500, Sheet XXXIII.7
1925 Ordnance Survey, 1:2500, Sheet XXXIII.7

3.2 Historical synthesis

3.2.1 Corporation Dam

Historical background

Corporation Dam, or Corporation Millrace, was the name given to the millrace which flowed along the east side of the Caldew floodplain, between that river and the city of Carlisle itself. The channel powered a series of mills, as well as feeding water into the defensive ditches in front of the city walls, and, like its counterpart to the west of the Caldew, known as the Little Caldew, it appears to have been composed of a combination of natural streams and manmade channels.[1] The first references to Corporation Dam appear in medieval documentary sources, where it is described as a stream flowing from Blackwell (Perriam 1992, 34), and both the millrace itself and at least some of the mills it served were probably in existence as early as the 12th or 13th century. Typical is the evidence provided by royal commissions, which were established on 26 May 1382 and 15 February 1427 to enquire into the functioning of the millrace following illicit breaching of the channel (cf. Perriam 1992, 34):

> Commission . . . to enquire touching the breaking by certain evildoers of the banks of a stream running through the lands and waste of the lordship of Blakhall to the ditch (*fossata*) of the city of Carlisle and to a mill called 'le Castelmylne' by the city, held . . . by the citizens as parcel of the city, so that the course of the stream is impeded and the mill cannot be worked for want of water (*Cal Pat R* 1381-1385, 144)

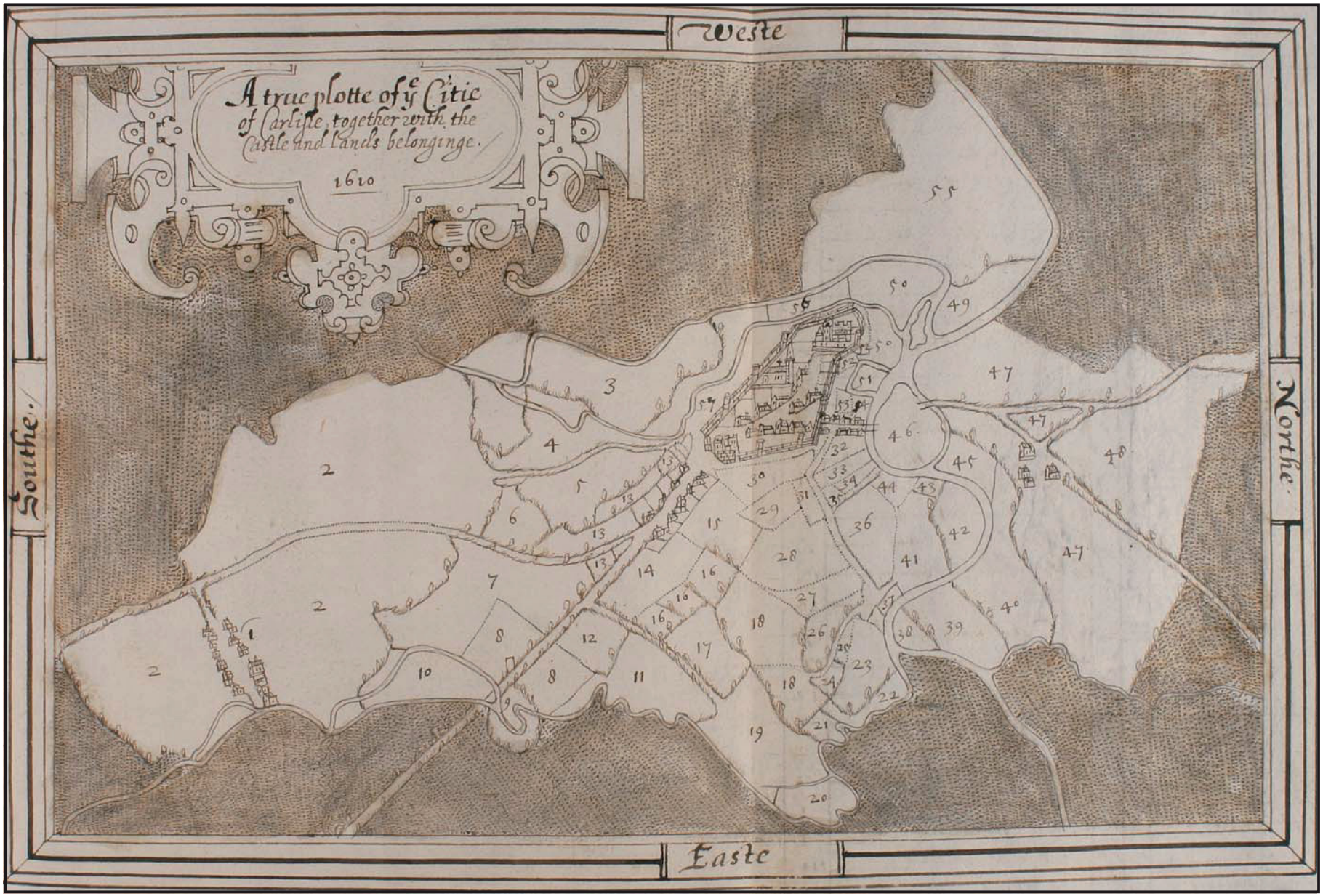
> … a certain water course … runs through the lands and wastes of the lordship of Blakhall to the ditches of the city of Carlisle and to the mill called 'le Castelmylne' which the citizens hold of the king in fee farm as parcel of the city. … certain malefactors have cut and broken the banks of the said water course so that the said ditches are dry, and the mill cannot grind for want of water, whereby the citizens have lost the profits of the mill, … (*Cal Pat R* 1422-1429, 402)

The impression given by these reports is that of a stream flowing directly towards the city mills from Blackwell, to the south, with no mention of the millrace drawing water from the Caldew, and it is therefore possible that no weir had yet been constructed on the river to channel water into the leet. The upper reaches of the stream described by the medieval sources may conceivably be represented by the present-day Wire Mire Beck, which flows northward from the direction of Blackwell and now joins the Caldew just below Holme Head Weir. The original course of this stream may have been captured by the Caldew – presumably at some stage after 1427 – when the river perhaps changed its course across the floodplain. This would in turn have necessitated the construction of a weir to direct water from the main river channel into the lower reaches of the stream, where the mills were located alongside the city walls. This would in any case have provided a more reliable and controllable water supply, particularly in summer. At any rate, the millrace is shown feeding off the Caldew on a map of the royal 'socage manor' of Carlisle dated to 1610 (Illus 10; DUL-SP HNP C49/1, associated with an Exchequer survey of the manor' undertaken in 1608; cf. Spence 1984, 67-8), implying there must have been a weir on the river by that date.

The City Mills

Four mills were traditionally associated with Corporation Millrace. Three of these, Castle Mill, situated beside the castle, and Abbey Mill and the Borough Mill, located further upstream, probably originated in the 12th/13th century. However a building contract of 1434 (illustrated in Perriam 1992, 34) may imply that the fourth watermill, located at Caldew Bridge End, was established somewhat later than the others. All four mills are listed in the Exchequer survey

[1] The final, northernmost stretch of the millrace still flowed in a natural stream channel across the Eden floodplain as late as first decades of the 19th century, as shown by its meandering course across the Sauceries, recorded on Woods map of 1821. By 1842, however, this stretch too had been canalised (1842 Plan of the City of Carlisle; cf. Asquith's 1850 plan).



Illus. 10: *Carlisle and the Socrage Manor 1610, reproduced with permission of Durham University Library Special Collection, (D U.L.-SP, Howard of Naworth Papers, C49/1)*

of the royal 'socage manor' of Carlisle by Thomas Johnson in 1608 (cf. Spence 1984, 67-8) and Borough Mill appears – unnamed – along with Bridge End Mill on James Richards' 1684-5 plan of Carlisle. These were all controlled by the Corporation and were collectively known as the City Mills, Abbey Mill being held on a more or less permanent lease from the Dean and Chapter of Carlisle Cathedral, whilst the other three were owned by the Corporation (Jones 1985, 187). Smith's 1746 map of Carlisle shows a number of other watermills along the course of the 'Aquaduct for the City Mills' as it terms Corporation Dam.[2] The City Mills may originally have all been corn mills (Borough Mill is labelled 'Wheat Mill' on the 1746 map), but Abbey Mill was already serving as a fulling mill by the 18th century (Smith 1746; Cumbria County Library 2A9 – 1783; cf. Jones 1985). Furthermore the label 'Walk Mill Closes' given to the parcel of land (no. 57) below the west walls of the city on the map of the socage manor of Carlisle (DUL HNP C49/1) demonstrates there were one or more fulling mills on this stretch of the millrace by 1610 (Illus 10 & key; cf. Spence 1984, 67).

Changes to Corporation Dam in the late 18th century

The 1610 map aside, most of the 17th-, 18th- and early to mid-19th-century maps of the city did not extend sufficiently far upstream to show the weir and intake for Corporation Dam, whilst the various county maps were not detailed enough to be useful in this regard. Consequently, the earliest maps which shed light on arrangements for supplying water from the Caldew into Corporation Dam are a group of three late 18th-century maps (Cumbria Library 2A9 and CRO DB/110/156-157; see Illus 12-14) showing the area between Holme Head and Caldew Bridge. The three maps can be dated on the basis of internal evidence to August 1781 (CRO DB/110/157), 1782/3 (Cumbria Library 2A9) and June and August 1783[3] (CRO DB/110/156), and were specifically drawn up to record various changes to the management of the Caldew and the two millraces which fed off the river. Included in these measures was the replacement of the original Corporation Weir by one further upstream (north of the river's confluence with the Wire Mire Beck) after the original weir had been left high and dry when the channel of the Caldew shifted westward in 1771. Subsequently, in August 1781, a new bypass channel for Corporation Dam had to be cut by the city corporation after the river channel changed course again in the southern part of Denton Holme cutting through the earlier line of the mill race.

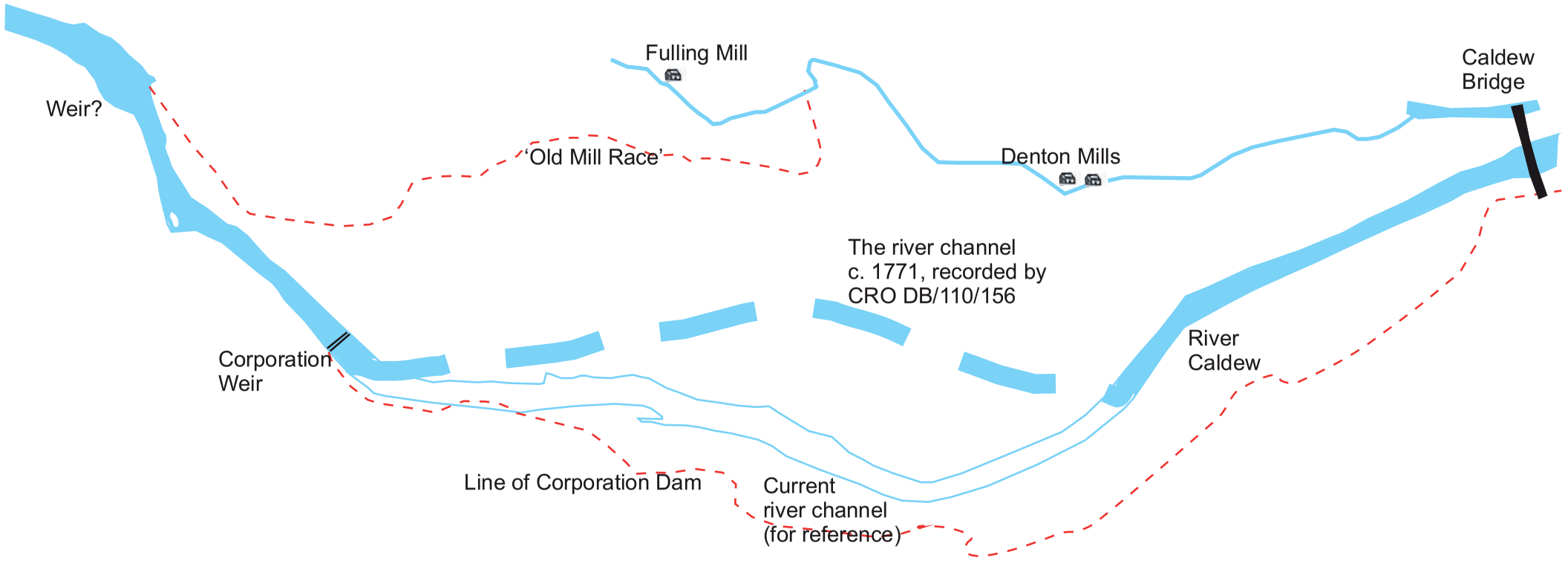
The site of the original, pre-1771, Corporation Dam weir, shown on the three maps, clearly lay further downstream than the site recorded in this report. On the other hand these cartographic depictions suggest that the replacement weir, constructed after 1771, could very well have occupied the same location as the extant millrace intake, although the 18th-century maps do not appear quite accurate enough to be absolutely confident of this.

The full sequence of events and construction works documented by the three maps, which also included the construction of Holme Head Weir and the confinement of the Caldew itself within a more direct channel (the 'new cut') to prevent it looping westward across the flood plain, is tabulated below. The driving force between the majority of these works seems to have been John Milbourne (who was certainly principally responsible for Holme Head Weir, the Little Caldew millrace and the 'new cut' for the Caldew).

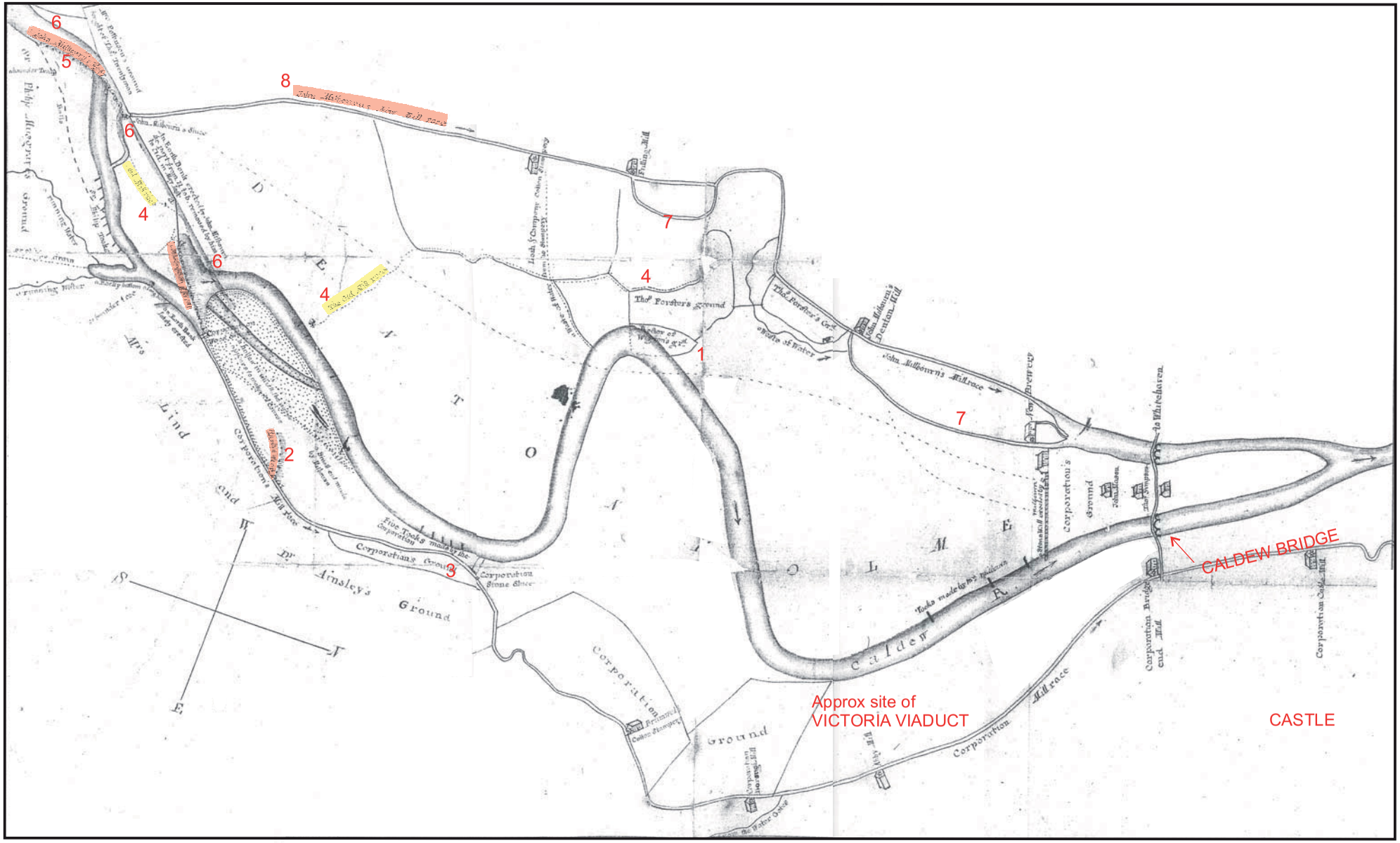
Date	Map Ref.	Map details
c. 1770	CRO DB/110/157	Holme Head: 'John Milbourn's wear' (sic) built. The weir fed 'John Milbourn's new millrace' (the Little Caldew) via a stone sluice. New banks to protect Holme Head along the Caldew.

[2] Three unnamed watermills are shown between the Caldew Bridge End Mill and the (Abbey) Fulling Mill. Castle Mills is depicted as a cluster of three watermills.

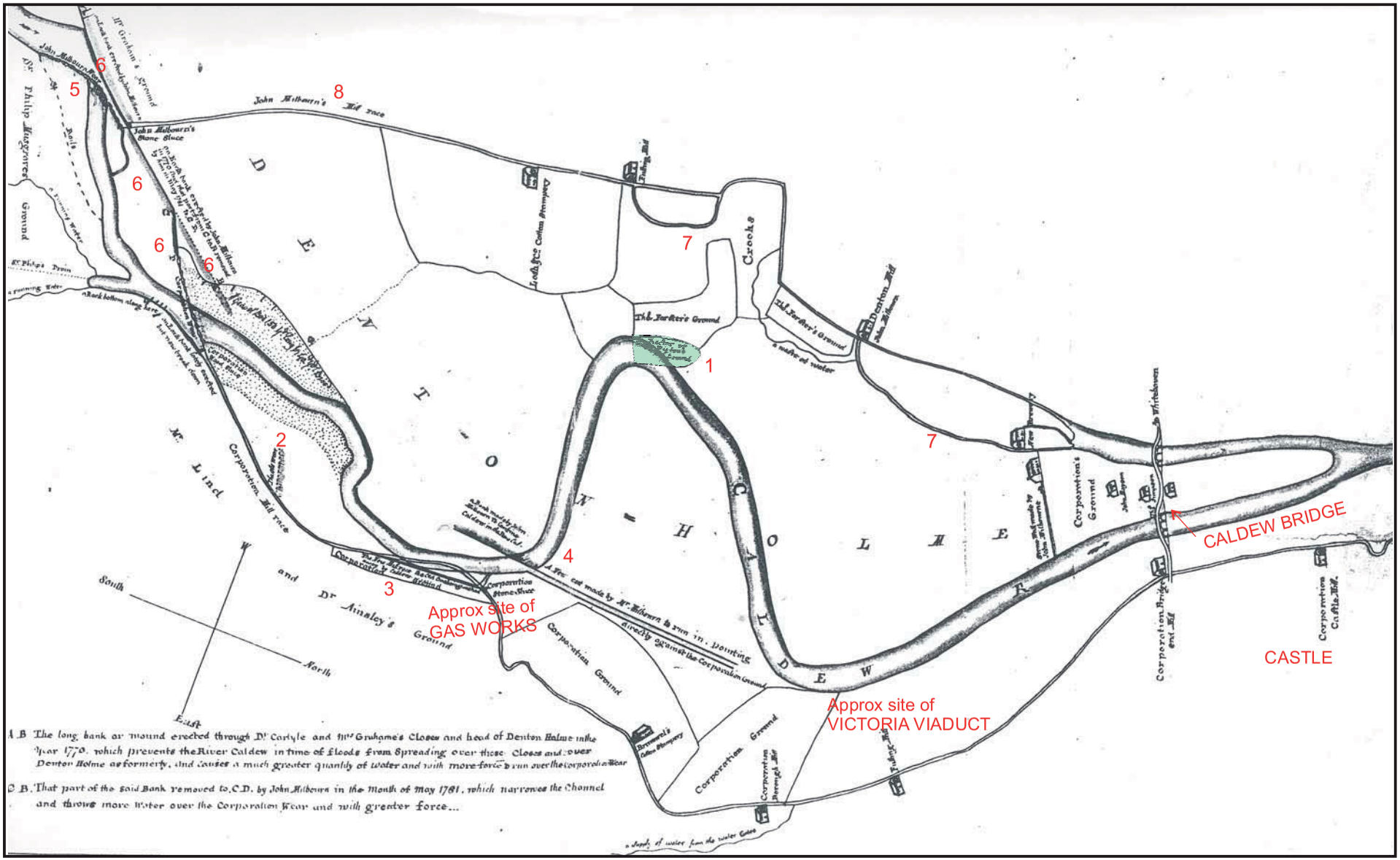
[3] CRO DB/110/156 was drawn up in June 1783, but part is covered by an attached flap recording further river movement in August 1783.



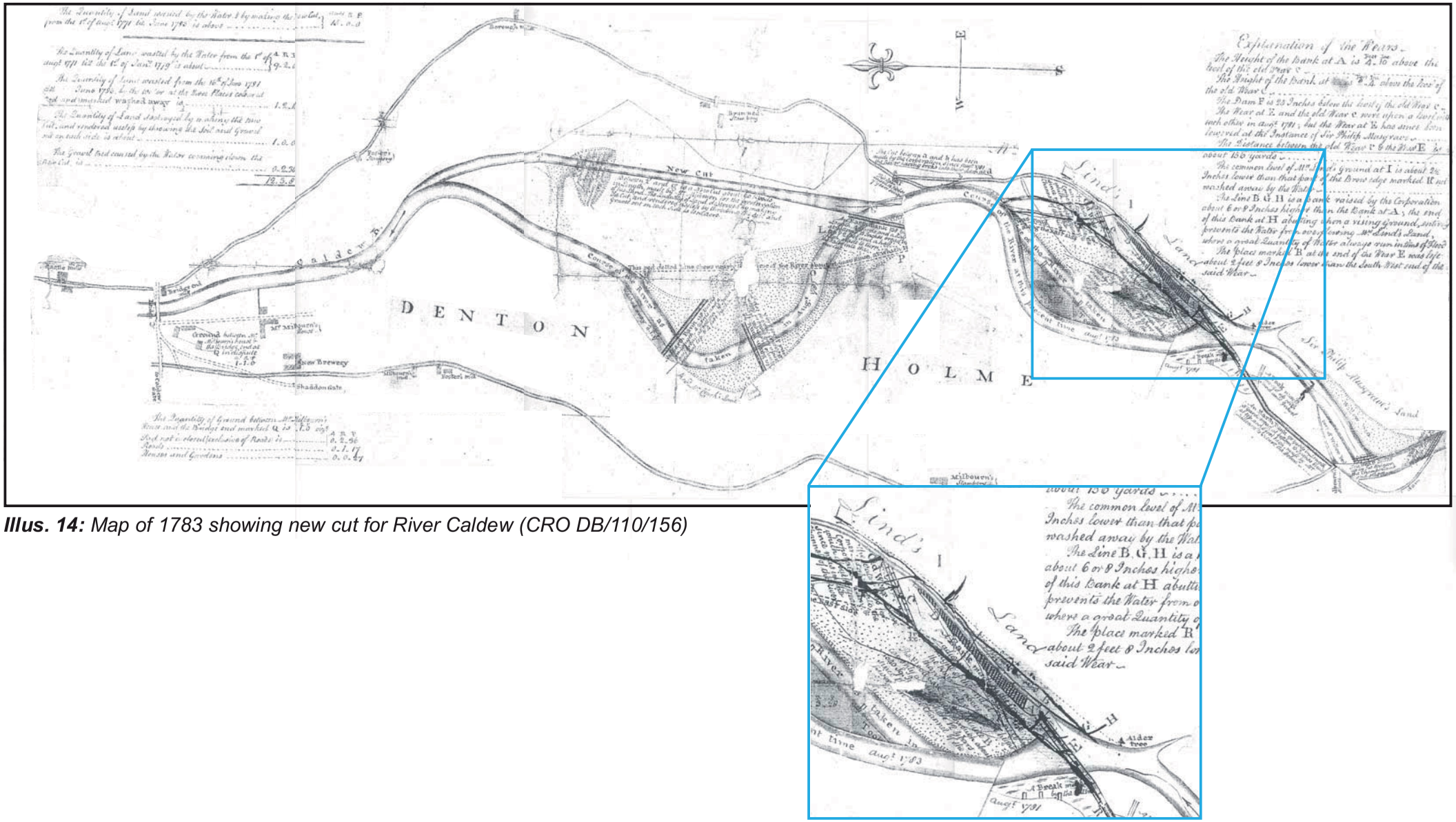
Illus. 11: *The earliest developments in Denton Holme (pre. C.1770), based on information from CRO DB/110/156-7 and Cumbria Library 2A9*



Illus. 12: *A late 18th century map (May/August 1781) of the Caldew and associated mill races (*
1. The Rector of Wigton's ground (correspondence with Vicar of Wigton's field on figure 50) 2. 'The Old Weir' (in former bed of the river)
3. The original course of Corporation Mill race before being washed away by the Caldew, 4. 'The Old Mill Race, i.e. Original course of Little Caldew,
5. 'John Milbourn Wear' (Holme Head weir) 6. Flood defence embankments of 1770 and 1781 which prevent 'the River Caldew in time of floods from spreading over...Denton Holme as formerly' 7. Original, natural stretches of the Little Caldew watercourses, 8. Upper course of the Little Caldew described as 'John Milbourn's New Mill Race' i.e. Late 18C man made channel



Illus. 13: *A late 18th century map of the Caldew and associated mill races (Cumbria Library 2A9). Points of interest include:*
1. The Rector of Wigton's ground (correspondence with Vicar of Wigton's field on figure 50) 2.' The Old Weir' (in a former bed of the river)
3. 'The New Millrace, the old one being washed away by the Caldew', 4. 'The New Cut', 5. ' John Milbourn Wear' (Holme Head weir)
6. Flood defence embankments of 1770 and 1781 which prevent 'the River Caldew in time of floods from spreading over...Denton Holme as formerly'
7. Original, natural stretches of the Little Caldew watercourses', 8. Upper course of the Little Caldew described as 'John Milbourn's Mil race'



Illus. 14: *Map of 1783 showing new cut for River Caldew (CRO DB/110/156)*

1771	CRO DB/110/156 CRO DB/110/157	Old Corporation Weir left dry as the Caldew channel shifts westward.[4] Necessitates construction of new Corporation Weir further upstream and the extension of Corporation Dam (millrace).
May 1781	CRO DB/110/156 CRO DB/110/157 Cumbria Library 2A9	East end of John Milbourne's earth bank at Holme Head realigned to join up with new Corporation Weir (= new weir in existence by then).
Aug 1781	CRO DB/110/156 Cumbria Library 2A9	River channel changes position again in S part of Denton Holme – cuts through Corporation mill race to the E and then loops westward through the central part of Denton Holme (cutting across the Rector of Wigton's field). New bypass channel for Corporation millrace cut by the Corporation Work begun on the 'new cut' for the Caldew by John Milbourne - completed by June 1783.
Aug 1783	CRO DB/110/156	Further westward loop by Caldew in the S part of Denton Holme.
Post 1783, pre-1852	Milbourne-Dixon estate map (1852)	Subsequently the river channel in the S part of Denton Holme seems to have been confined on a line closer to its original course.

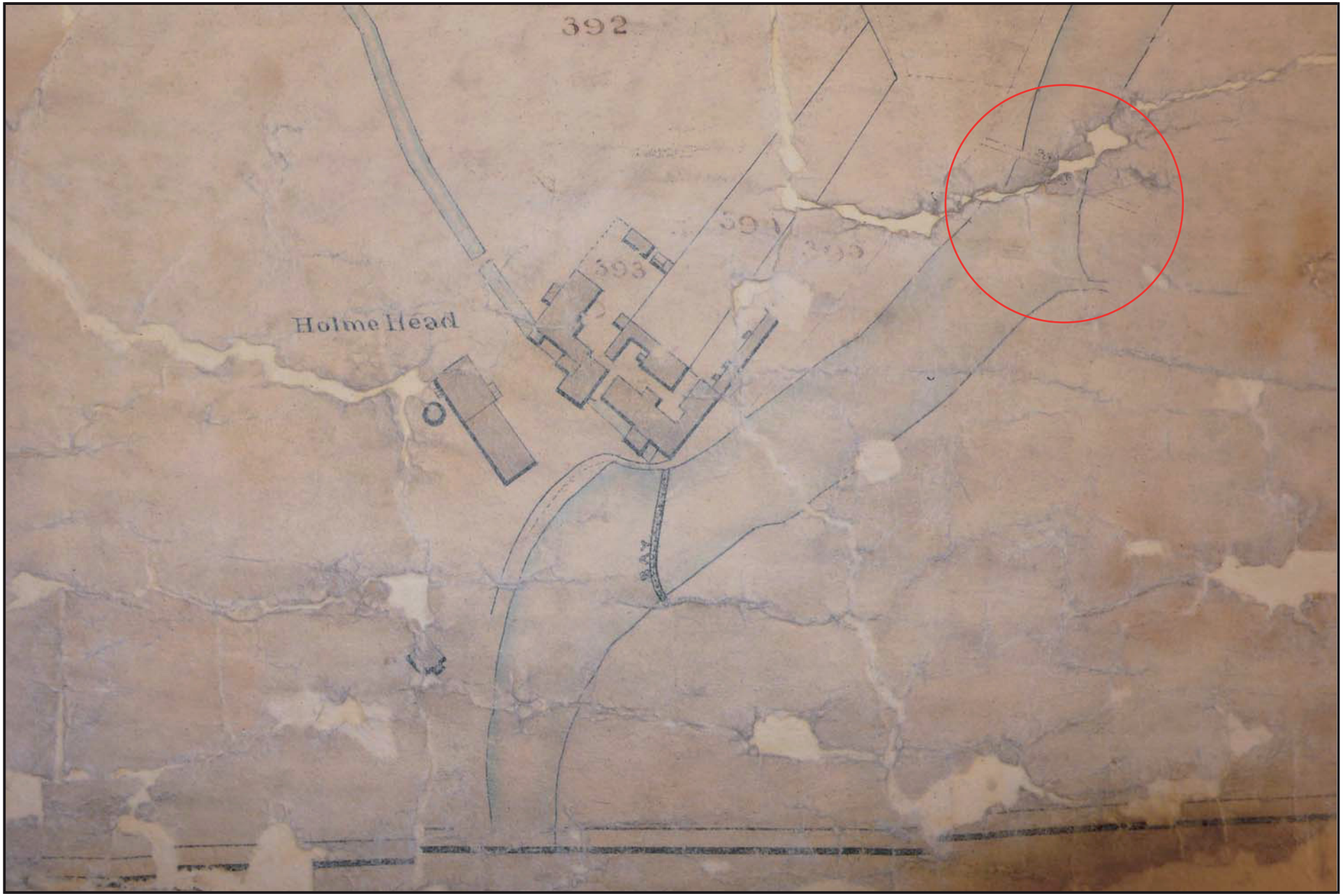
Abandonment in the mid-19th century

There is no further detailed map evidence covering the area of the millrace intake until a series of mid-19th-century examples, beginning with the Caldewgate tithe map in 1842, continuing with the Milbourne Dixon estate map of 1852[5], Richard Asquith's plan of Holme Head (1865) and the first edition Ordnance Survey published in the same year. None of these show a weir at the site of the surviving intake for Corporation Dam, although Asquith's 1865 map does mark the intake itself, labelling it 'sluice' and it may be this intake rather than the mouth of the Wire Mire Beck which is also evident on the tithe map. A 'weir' is also labelled on the second edition Ordnance Survey (1901) at the mouth of the Wire Mire Beck, though the associated structures are unclear and it is not clear whether this actually represents the millrace intake or some other feature associated with the beck itself. As was suggested above, the weir built between 1771 and 1781 near the Caldew/Wire Mire Beck confluence was probably associated with the extant intake sluice which is one of the subjects of this report. Its apparent absence from the mid-19th century map evidence suggests that the weir had been removed by c. 1840, perhaps as a result of Corporation Dam going out of use as a functioning millrace.

On the other hand, the 1852 map does mark a weir, or 'bay' as it is labelled, further down the Caldew, at what appears to be the same location as the original Corporation Weir. This does not figure on the 1:2500 OS first edition, which instead shows a breakwater or cutwater feature, resembling a large bridge abutment, at this point. The breakwater can still be seen today. The presence of the weir in the river channel, at the apparent site of the pre 1771 Corporation weir, implies that, by this stage, the Caldew had been confined back into its original course, which ran to the east of that shown in the maps of the 1780s. Thus the 1852 map shows the river channel flowing significantly closer to the line of Corporation Millrace

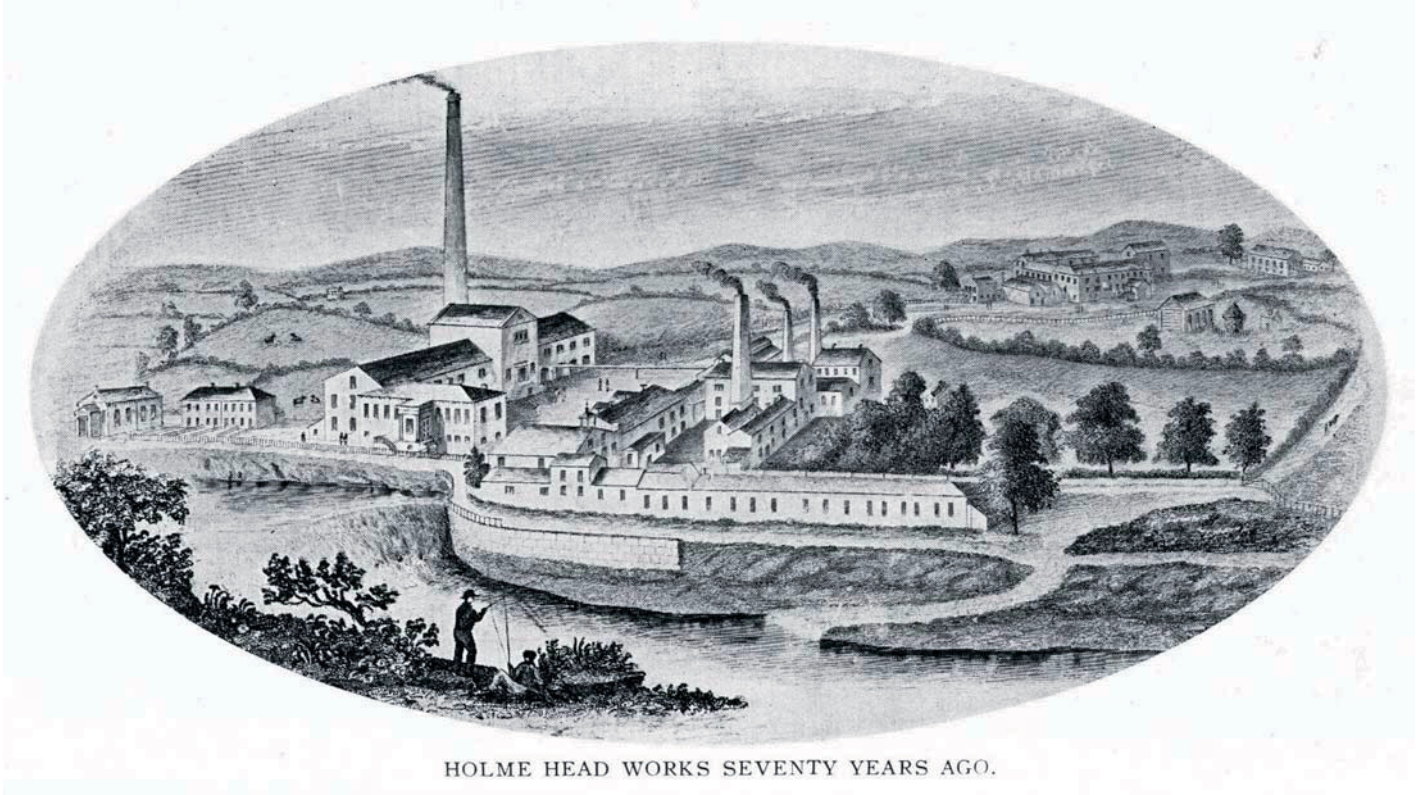
[4] 'The old wear where the water was formerly taken into the Corporation Dam & which about [12?] years since was in the channel of the river' (CRO DB/110/156 dated August 1783).

[5] The 1852 map, which was included within an indenture relating to the Milbourne-Dixon estate, is particularly useful in facilitating the interpretation of the 18th-century maps for it contains a number of features which figure on those maps but not on the later Ordnance Survey, yet is sufficiently accurate and close in time to the latter to enable the 18th-century features to be plotted with reference to the Ordnance Survey. Accordingly, the estimated location of the various weirs, the river channels and other watercourses shown on the 18th-century maps have been plotted on the 1852 map in Illus 19 in order to make correlation with the modern street plan and current Ordnance Survey easier.

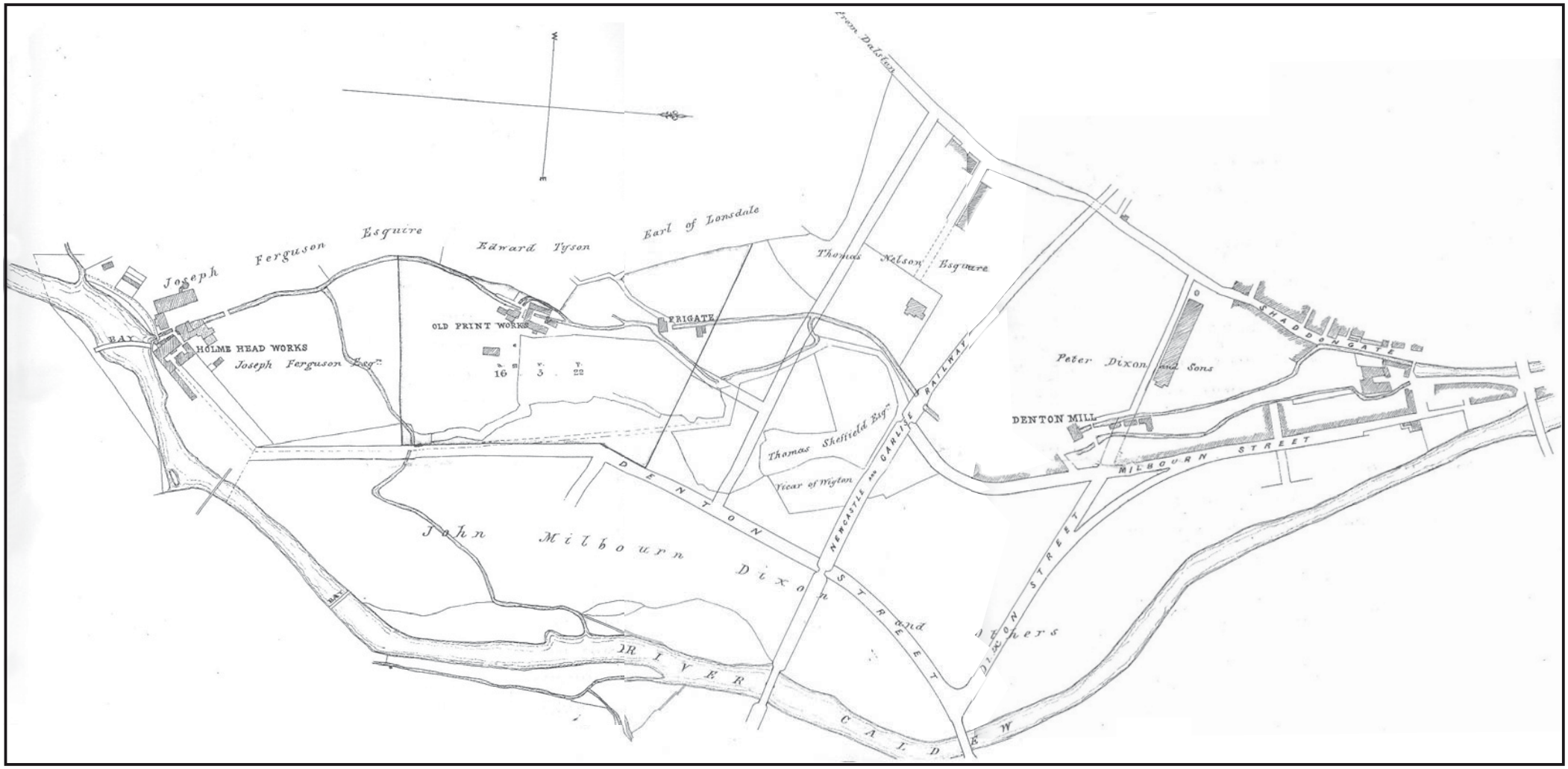


Illus. 15: *Extract from the Caldewgate Tithe Plan (1842) showing the footbridge and possible Corporation Dam intake beside Holme Head (circled in red).*

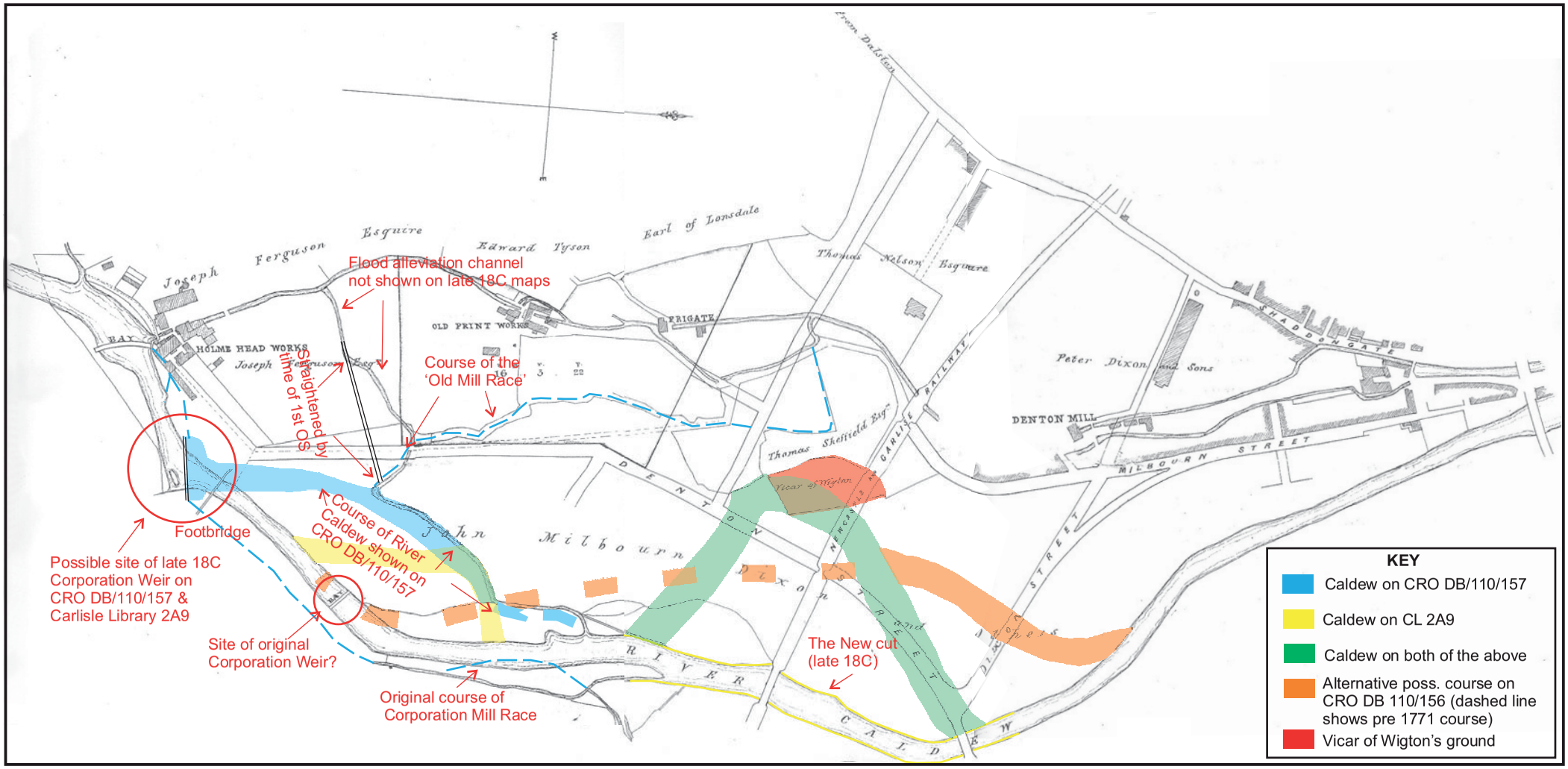
Illus. 16: *Index plan of Holme Head area by Asquith in Report to Board of Health, 1850 (CRO)*



Illus. 17: *Lithograph showing Holme Head 1854. It was included in the Ferguson Brothers centenary volume published in 1924, to which the caption relates*



Illus. 18: *The Milbourne-Dixon 1852 estate map of Denton Holme*



Illus. 19: *Features extracted from the late 18th century maps shown in relation to mid 19th century developments using the Milbourne-Dixon estate map of 1852 as a base*

than is evident in the 1780s maps, although some allowance for distortion must be made when using the latter.

The late 18th-century maps show that the millrace was initially open along its entire length but it is clear that the much of the Corporation Dam channel had already been covered over by 1865, when the first edition Ordnance Survey appeared, which provides a terminus antequem for the brick tunnel vault evident over the intake today (see Section 2). An open stretch of the channel did still remain alongside Boustead's Grassing on the first edition Ordnance Survey, but even this had disappeared by the time of the OS second edition, having presumably been culverted in the intervening years. The switchover to steam power in the mills and the provision of piped water supply in Carlisle had already rendered Corporation Millrace redundant by the mid-19th century. The channel was covered over or drained and infilled during the 1860s to release land for railway installations following the construction of Citadel station and the West Coast Main Line by the Caledonian Railway and the London and North Western Railway (LNWR) in the 1840s.

3.2.2 Denton Street footbridge

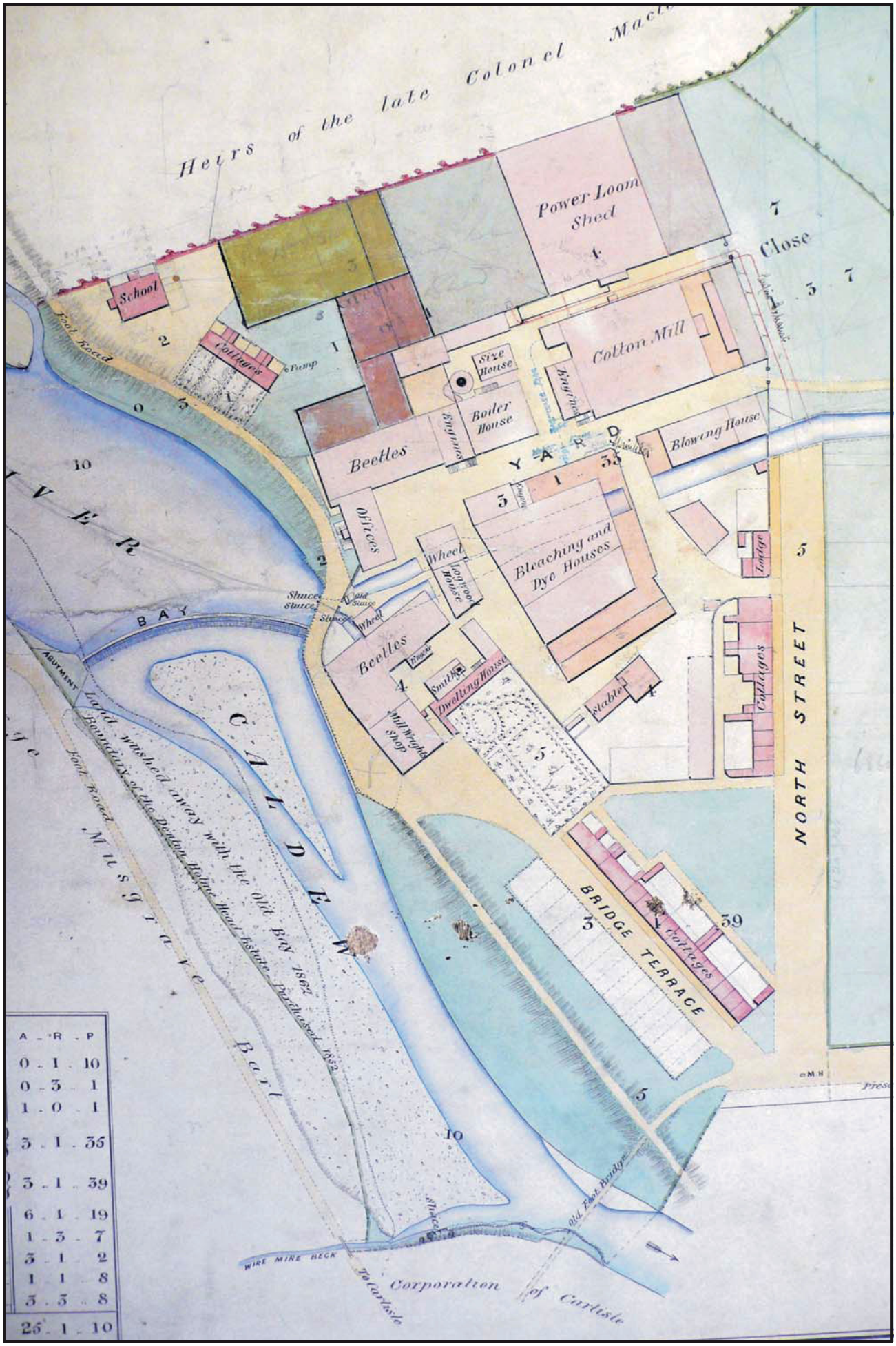
A footbridge is first shown on the site of the present Denton Street bridge on the Caldewgate tithe map of 1842 (Illus 15) and appears to have been erected in about 1839-40 (Harris 1967, 213, n 21, citing CRO Minute Book No 1, *Various Committees*, 24 January 1840). It is not shown on the index map associated with Richard Asquith's detailed survey of the city centre produced for the Board of Health, though it must have been in existence then. It does, however, figure on the Milbourne Dixon estate map prepared in the preceding year (Illus 18) and on Asquith's plan of the Holme Head works in 1865 (CRO DB 110/225; see Illus 20-21), where it is labelled 'old foot bridge', as well as on the first Ordnance Survey edition of the same year (Illus 22).

This structure was the earliest bridge across the Caldew in Carlisle, upstream of the historic Caldew Bridge, with the exception of the 1837 railway bridge, which carried a branch of the Newcastle and Carlisle line across the river to the canal basin. The footbridge provided access from the city to the rapidly expanding mills of Denton Holme, and in particular to the adjacent complex of Holme Head Mill, on the west bank of the Caldew, which had been established by Ferguson Brothers in 1828 (Anon 1924, 43).

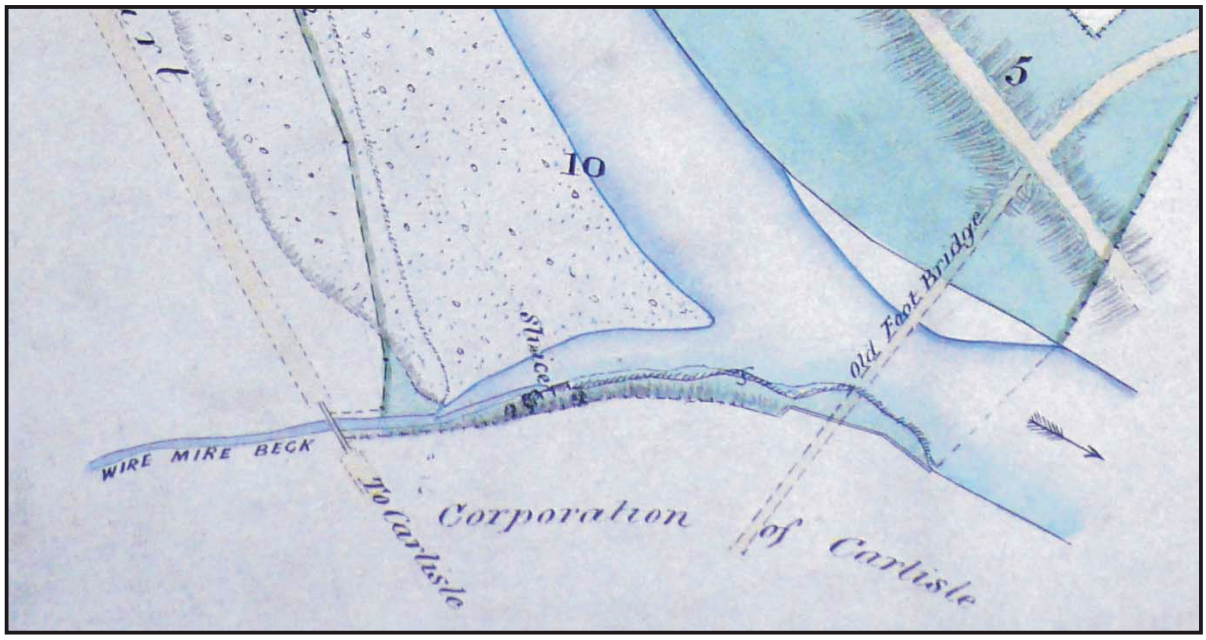
No views of this initial footbridge could be located. It is not shown on the lithograph of Holme Head c. 1850 (published in the Ferguson Centenary Volume of 1924 with the caption 'Holme Head 70 years ago'; see Illus 17), although it is not clear whether this is because the scope of the view did not quite extend far enough downstream to include the bridge or whether the artist deliberately excluded it.

The present footbridge was built in 1885, replacing the earlier structure. The date is marked on one of the capstones, which also bears the name of the mayor in that year, Benjamin Scott. Scott was a member of the family of industrialists who owned the Hudson Scott & Sons. The company's factory on James Street, opened in 1869 (Rafferty 1998, 25), specialised in the manufacture of tin boxes with lithographic printed designs and was to form the core of the Metal Box Company, following amalgamation in 1921 (Rafferty 1998, 69).

The rebuilding of footbridge should be seen in the context of the wider programme of works undertaken in the mid- to late 19th century to improve communications between the city centre and the mills and newly developing working class suburb of Denton Holme. Thus the Nelson Bridge, midway between the Caldew Bridge and the Denton Street footbridge, was completed in 1853 (Harris 1967, 213-14) and rebuilt as part of the higher level Victoria Viaduct twenty years later, in 1876-7, when Citadel Station was remodelled to accompany the construction of the Settle and Carlisle Railway and the goods avoiding line (Perriam 1992, 77). Such works were sponsored by the City Corporation and received financial

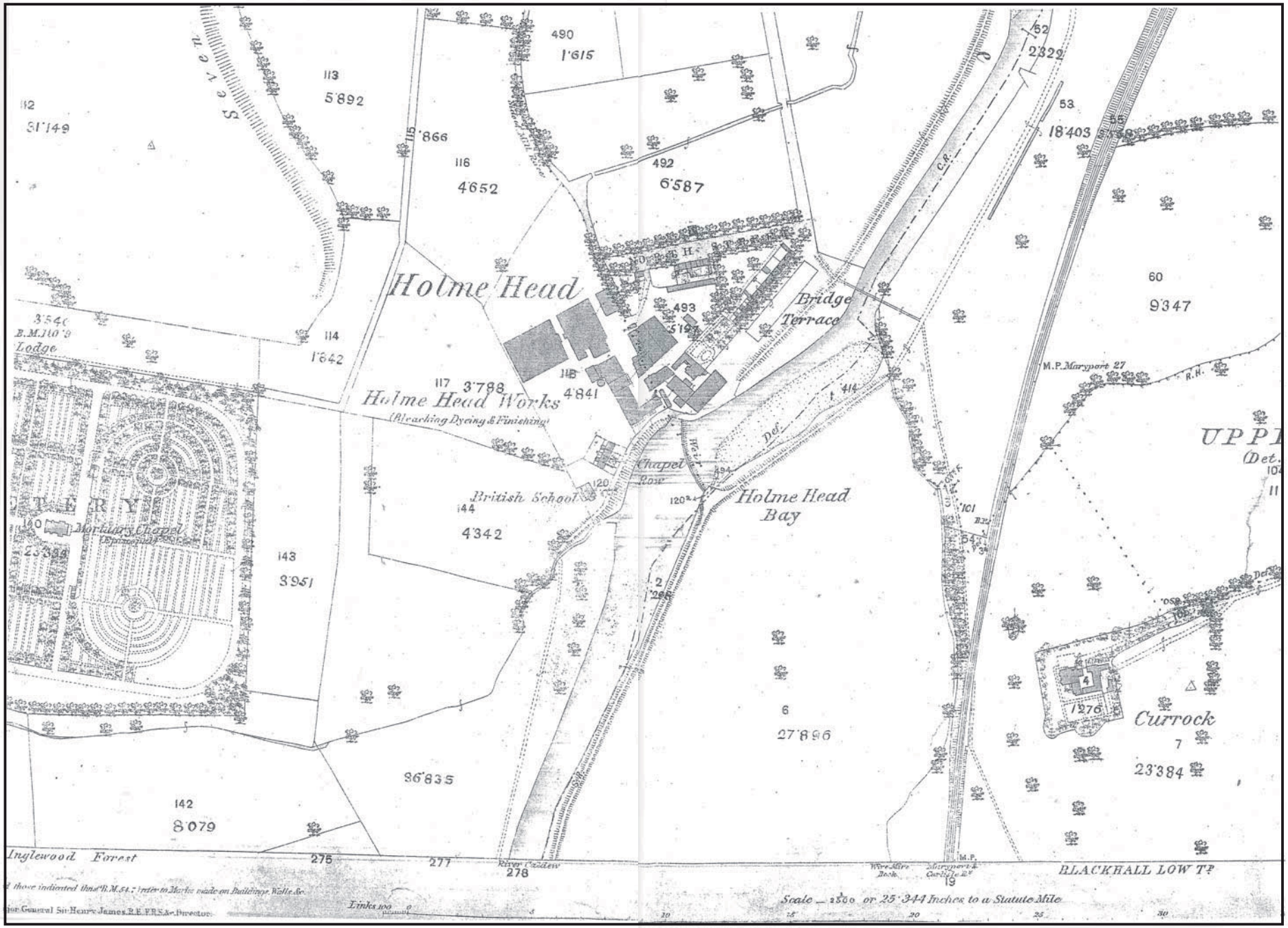


Illus. 20: *Plan of Holme Head by Richard Asquith, 1865 (CRO)*



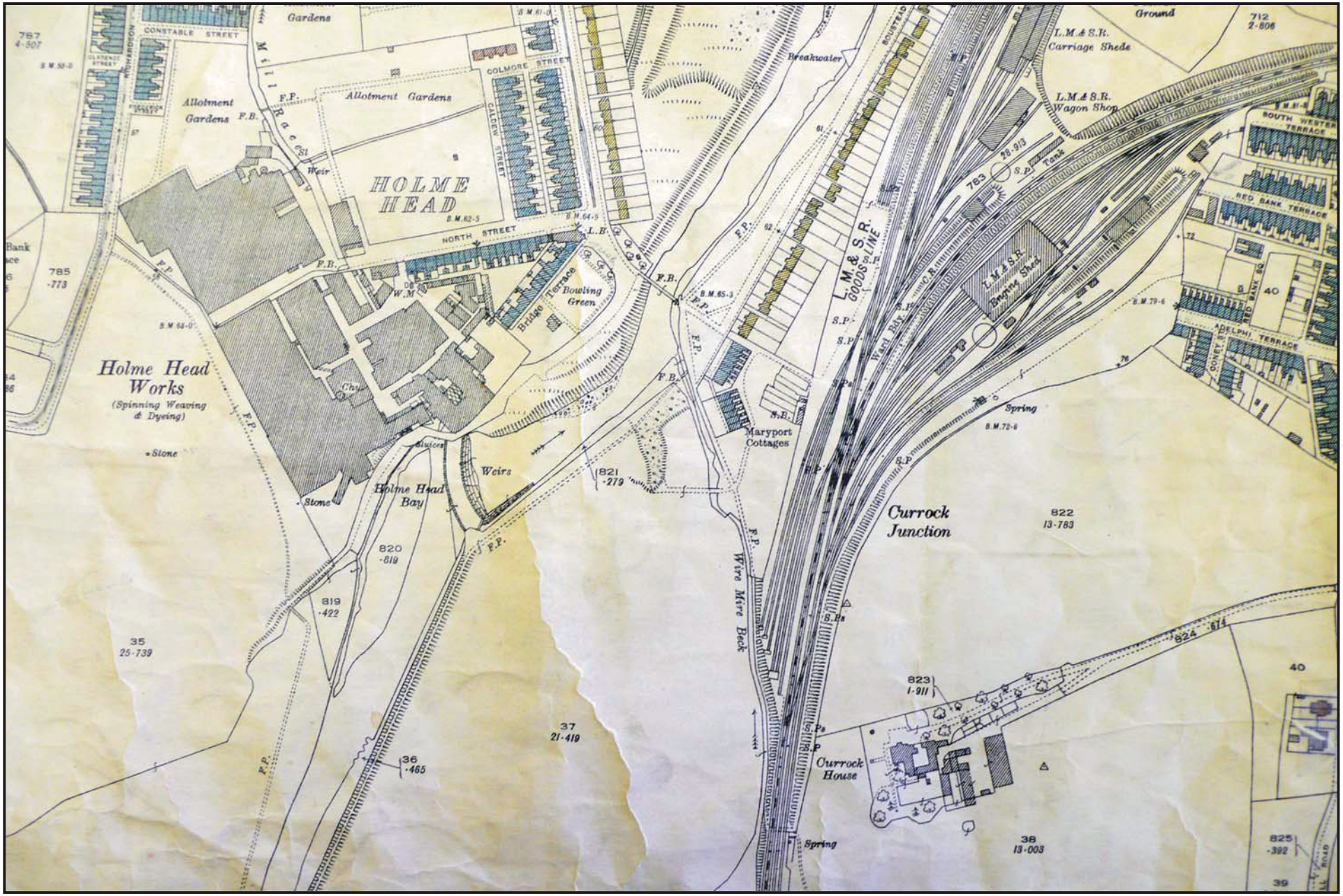
Illus. 21: *Enlarged extract from Asquith's 1865 plan showing the footbridge and Corporation Dam intake sluice in more detail*

assistance from that body, but the principal cost was met by the proprietors of land and industrial concerns in Denton Holme who stood to benefit the most (Harris 1967, 213).



Illus. 22: *Extract from First Edition Ordnance Survey 1865 , Holme Head,1:2500, sheet xxiii.7*

Illus. 23: *Extract from the second edition 1:2500 Ordnance Survey sheet XXIII.7 (1901)*



Illus. 24: *Extract from the third edition 1:2500 Ordnance Survey sheet XXIII.7 (1925)*

4. CONCLUSIONS

4.1 Denton Street footbridge

The Denton Street footbridge, which spans the River Caldew a short distance downstream from Holme Head Weir, is a late Victorian building of cast iron construction, carried by abutments of red sandstone ashlar. The date of construction, 1885, is provided by an inscription on the fallen capstone from the north-east pier. The structure replaced an earlier footbridge, built c. 1839-40.

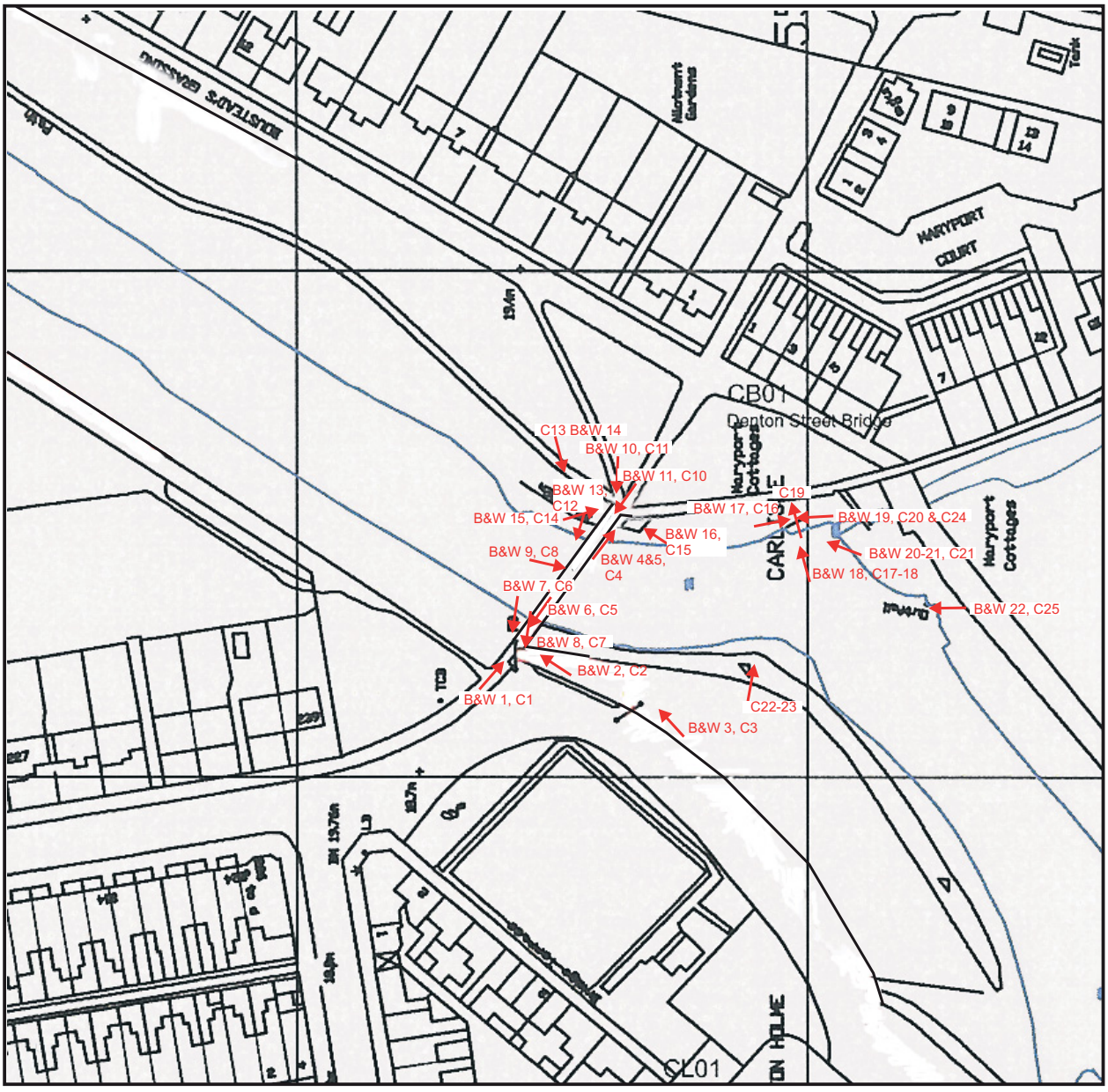
It is intended to re-use some of the masonry from the existing bridge in the replacement structure, including the capstones of the piers, only one of which (on the south-west pier) is currently in place, the others having tumbled to the ground. Particular effort should be made to include the inscribed datestone.

4.2 Corporation Dam intake

The intake for Corporation Dam is located immediately downstream of the confluence of the Wire Mire Beck with the River Caldew. As part of the Caldew and Carlisle City works the channel, which is now culverted, being covered by a brick vault, is to be blocked.

The millrace channel known as Corporation Dam dates back to the Middle Ages, and originally may not even have been connected to the Caldew. However the surviving intake structure is much later in date probably having been built no earlier than the last decades of the 18th century. An earlier weir serving Corporation Dam was rendered redundant when the river channel changed course in 1771 and was replaced by a new weir between 1771 and 1781, located further upstream nearer Holme Head. Contemporary historic maps suggest that the replacement weir and intake lay in the same general area as the surviving structures recorded here. The two may therefore be cautiously identified with one another, although the cartographic evidence is not conclusive, in large part because of the difficulty of correlating the positioning of the features shown on the late 18th-century maps with the Ordnance Survey.

No trace of a weir is shown at this point on mid-19th century maps and any weir here was presumably removed as Corporation Dam went out of use. The channel of Corporation Dam was probably culverted and covered by the segmental brick vault at this stage.



Illus. 25: *Photographic reference plan*

5. PHOTOGRAPHIC CATALOGUE

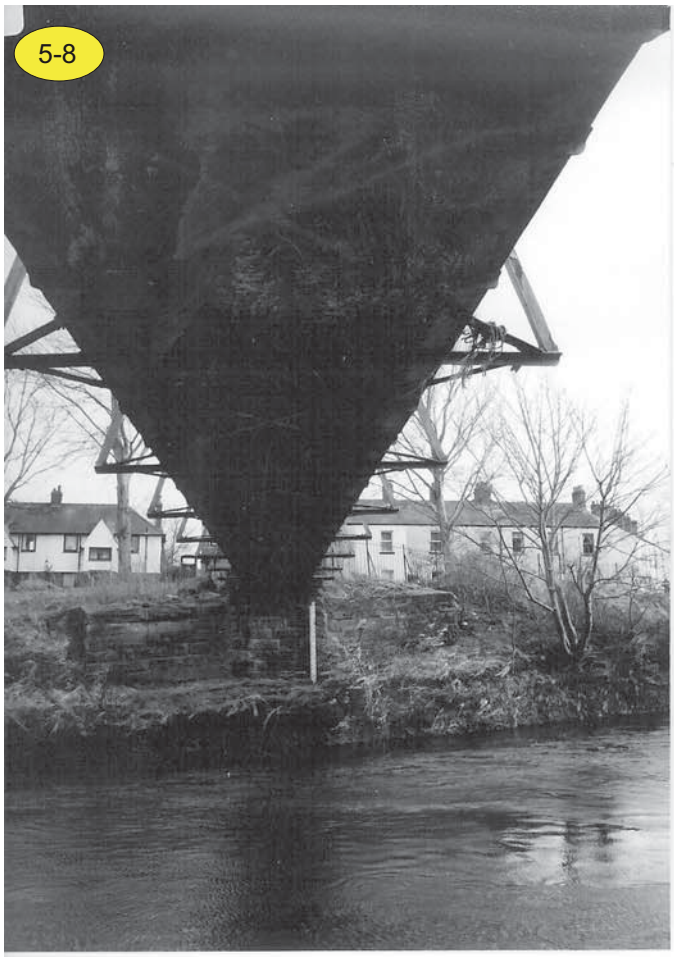
N.B. The descriptive captions are written as if the bridge is set east-west, when the true orientation is nearer to south-west to north-east.

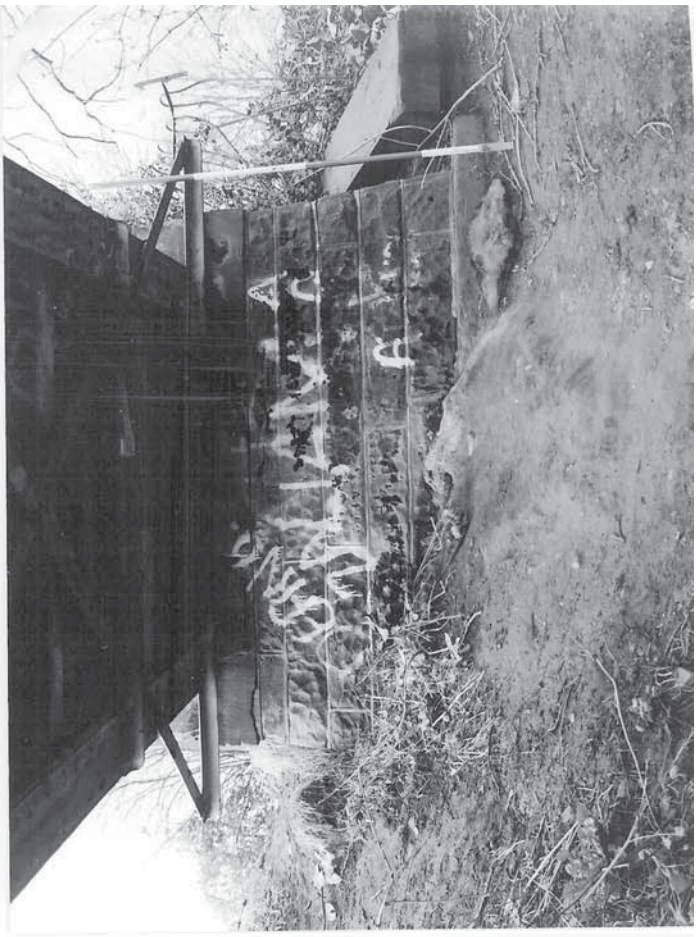
5.1 Monochrome prints

Photo/ Neg. no.	Description
1/1A	View of Denton Street Bridge from the west
2/2A	View of the west end of the bridge looking north
3/3A	Southern side of the Denton Street bridge
4/4A	The eastern abutment viewed from underneath the bridge
5/5A	The eastern abutment viewed from underneath the bridge
6/6A	The western abutment viewed from underneath the bridge
7/7A	The western abutment viewed from the north east
8/8A	The inner face of the south-west pier
9/9A	A detailed view of the bridge construction
10/10A	Broken NE pier capstone inscribed '1885 / [BENJAMI]N SCOTT ESQUIRE'
11/11A	View of Denton Street Bridge from the east
12/12A	View of the east end of the bridge taken from the north
13/13A	Northern face of Denton Street bridge
14/14A	Northern view of the Denton Street bridge
15/15A	The eastern abutment viewed from the north-west
16/16A	The eastern abutment viewed from the south
17/17A	View of the intake from the north with head race channel evident in the background
18/18A	View of the mouth of the intake showing the circular opening probably associated with some form of sluice to control inflow
19/19A	View of the mouth of the intake from the south
20/20A	View of the intake from the south with the stone blocks of the head race outer wall visible in the foreground
21/21A	View of the Denton Street bridge, the intake and revetment from the south
22/22A	Distant south view of Denton Street Footbridge

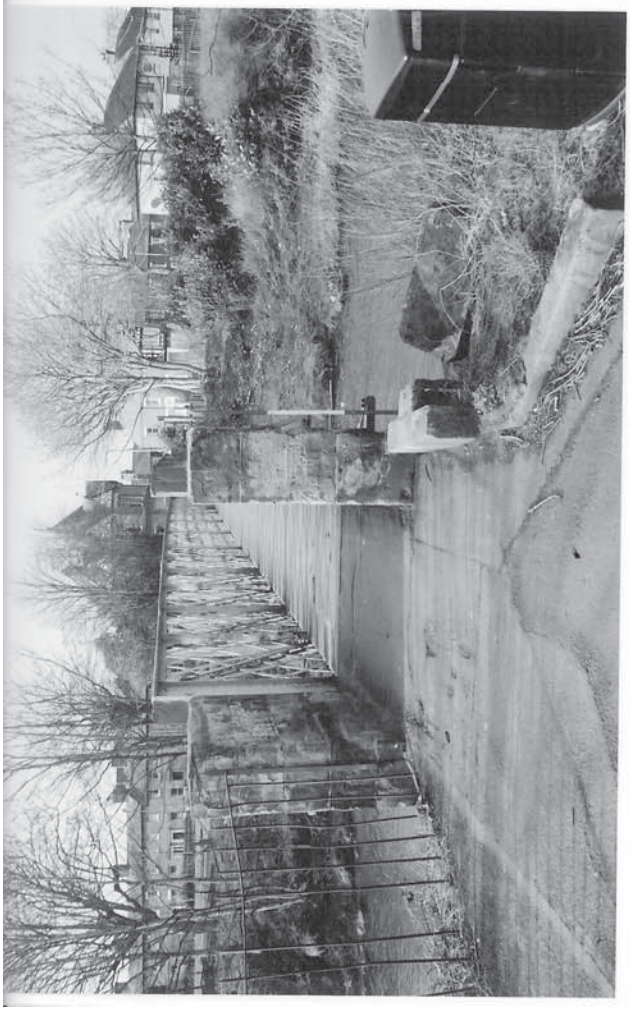
1-4

5-8





9-12



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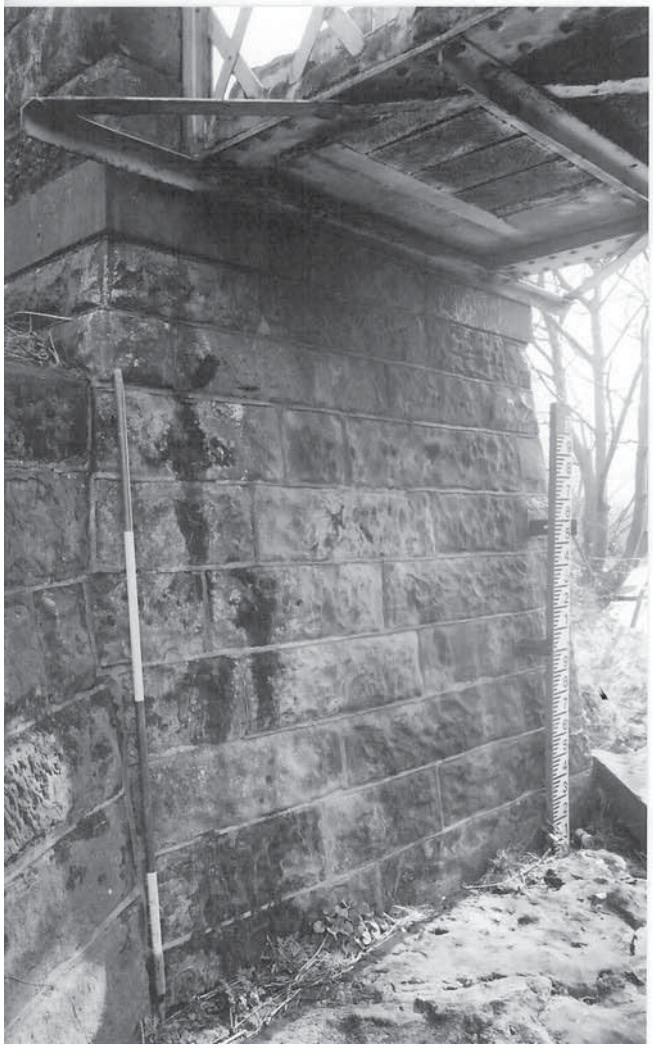
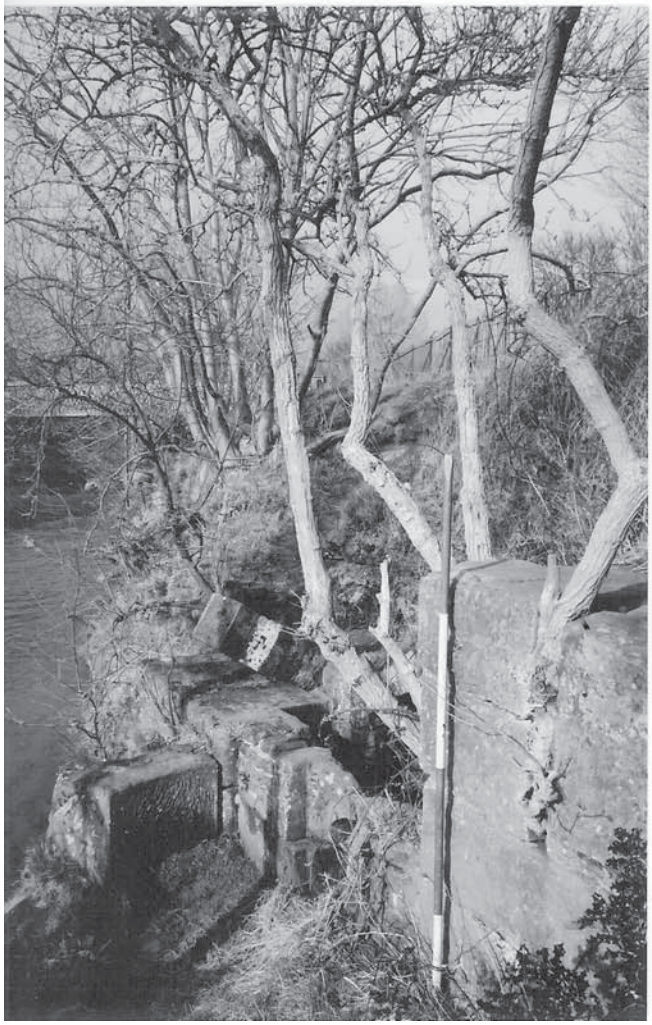


17-20

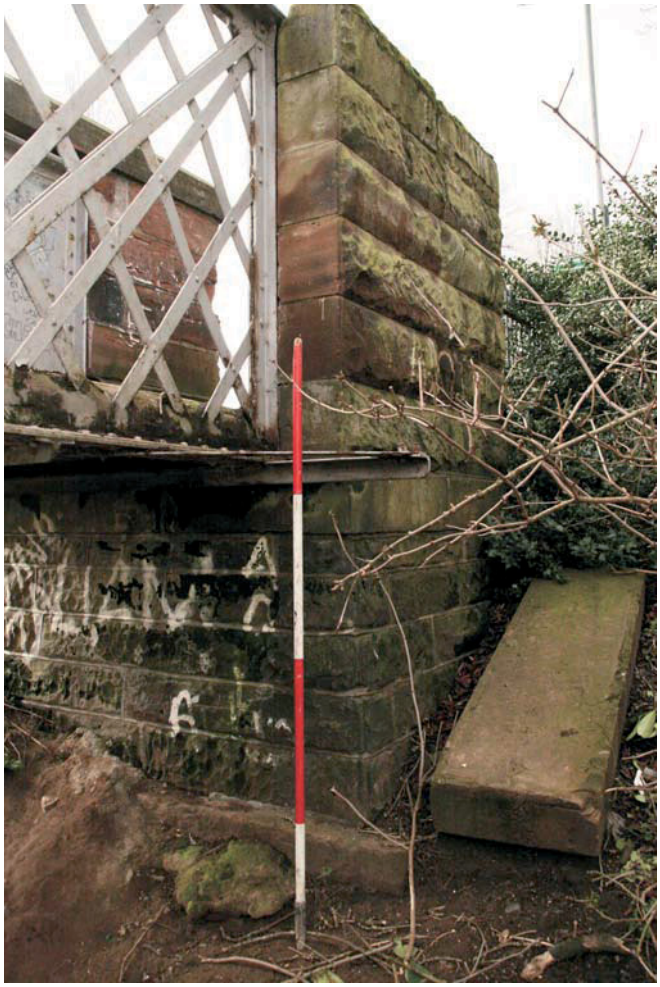


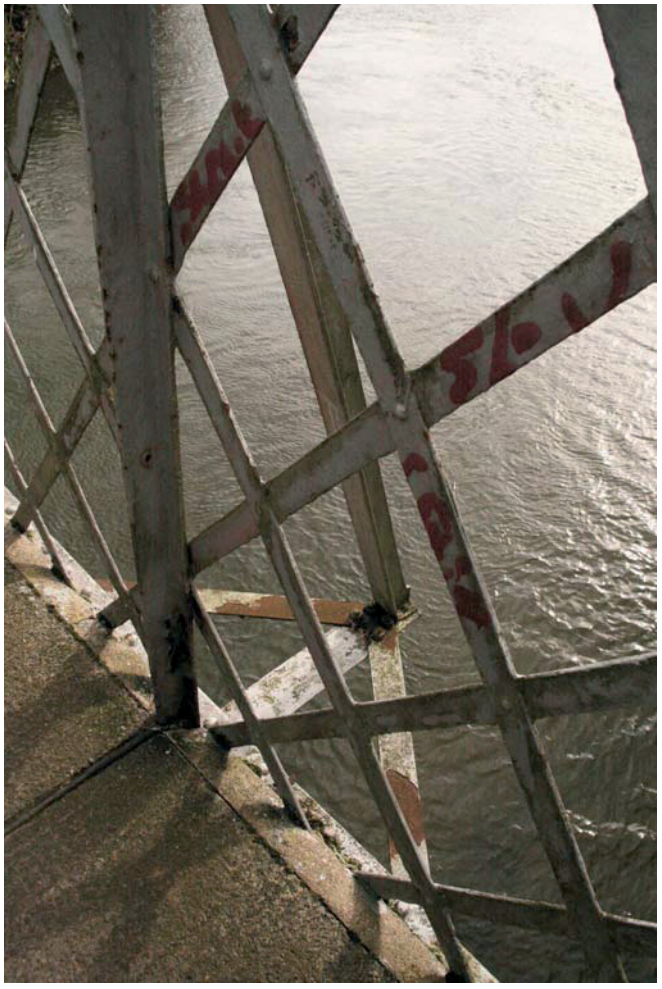
5.2 Colour Prints

Photo no.	Description
1	View of Denton Street Bridge from the west
2	View of the west end of the bridge looking north
3	Southern side of the Denton Street bridge
4	The eastern abutment viewed from underneath the bridge
5	The western abutment viewed from underneath the bridge
6	The western abutment of the bridge viewed from the north-east
7	The inner face of the south-west pier
8	A detailed view of the bridge construction
9	Broken NE pier capstone inscribed '1885 / [BENJAMI]N SCOTT ESQUIRE'
10	View of Denton Street Bridge from the east
11	View of the east end of the bridge taken from the north
12	North face of Denton Street bridge from the north-east
13	North side of the Denton Street bridge
14	The eastern abutment viewed from the north-west
15	The eastern abutment viewed from the south
16	View of the intake from the north with head race channel evident in the background
17	View of the mouth of the intake
18	View of the mouth of the intake showing the circular opening probably associated with some form of sluice to control inflow
19	View inside the intake tunnel
20	View of the mouth of the intake from the south
21	View of the intake from the south with the stone blocks of the head race outer wall visible in the foreground
22	View of the intake from the west
23	View of the intake and the mouth of the Wire Mire Beck from the west bank
24	View of the Denton Street bridge, the intake and revetment from the south
25	Distant view of south side of Denton Street Footbridge and intake

1-4

5-8



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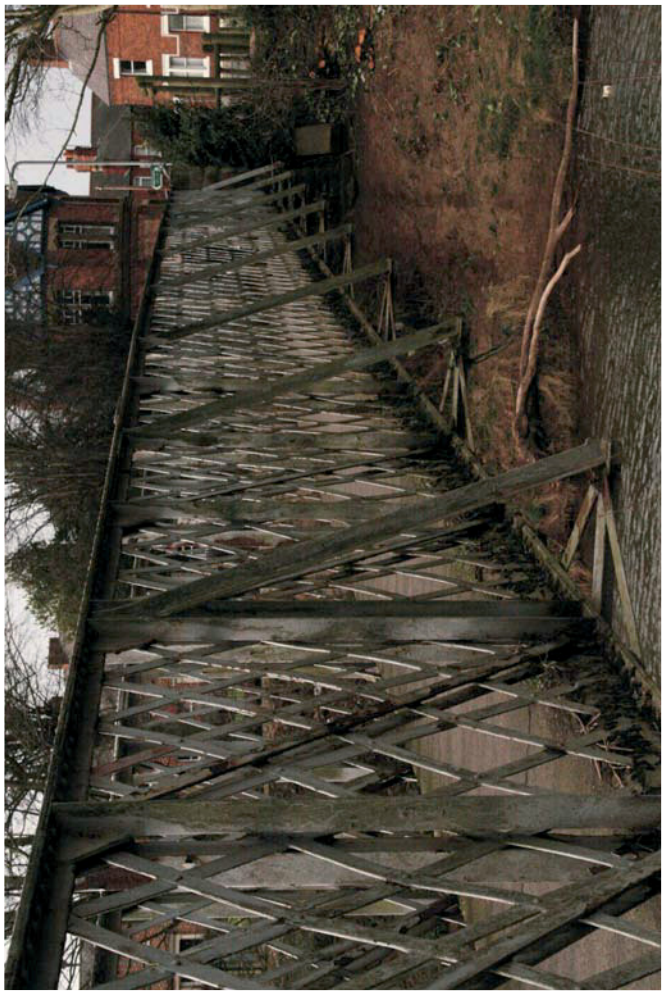


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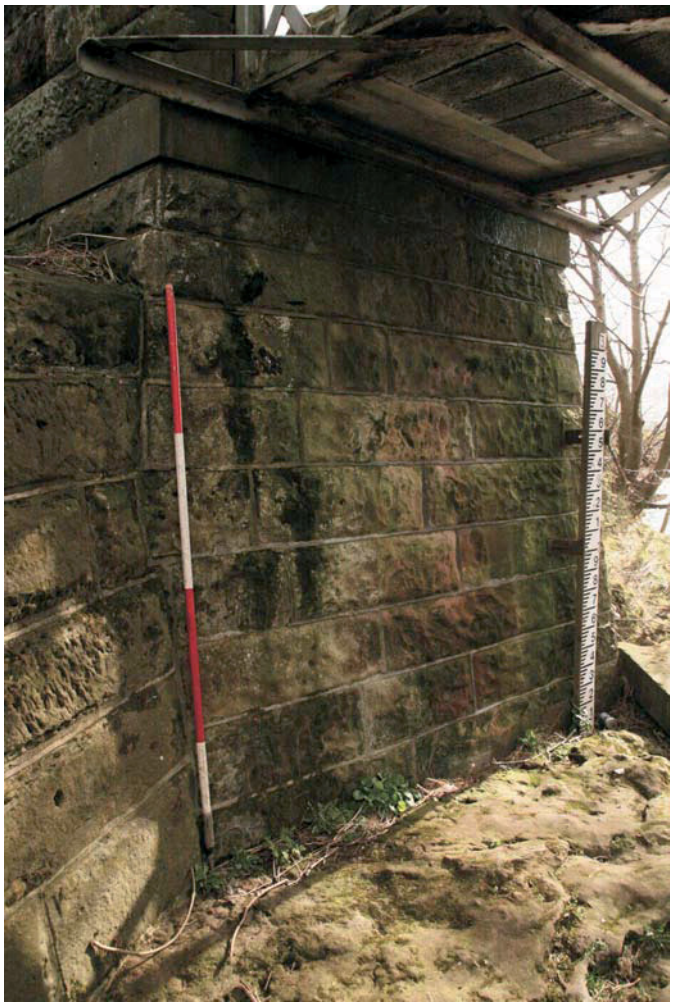

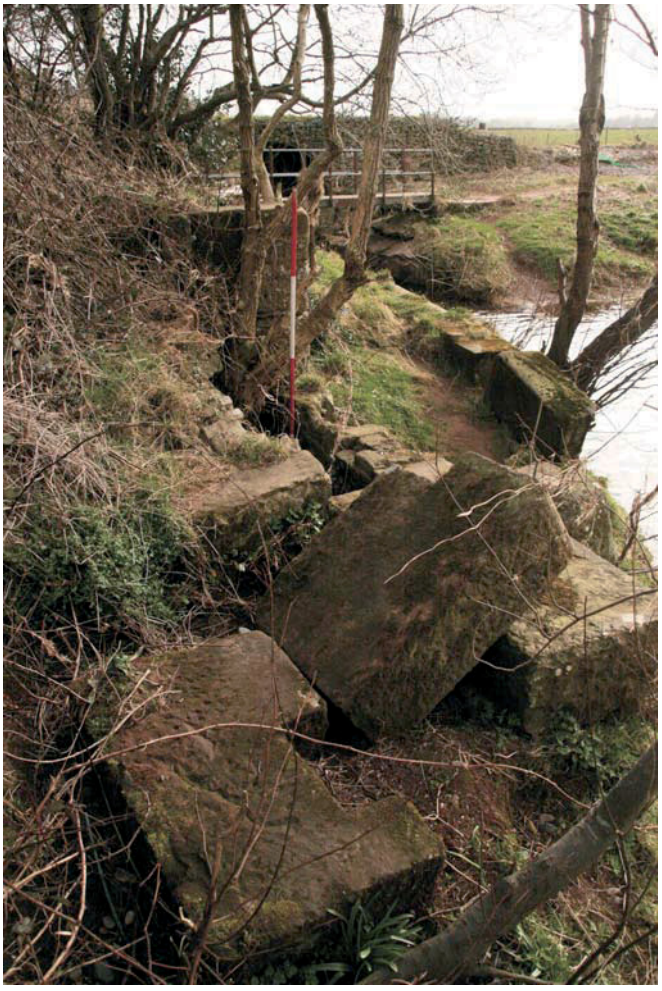


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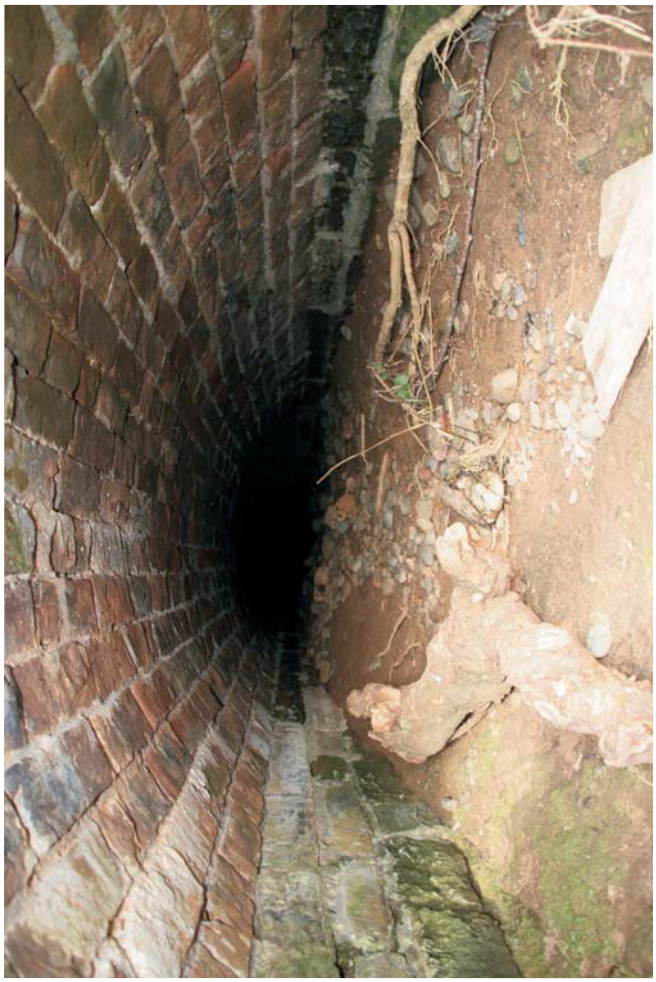


21-24


25

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APPENDIX 1:
TECHNICAL DRAWINGS OF DENTON STREET FOOTBRIDGE

Caldew & Carlisle City FAS drawings B0664400/CB1/1000-1002 supplied by *Jacobs,* for *Environment Agency*.

IMNW525/CB01/1100: Denton Street Footbridge – Plan and section

IMNW525/CB01/1101: Denton Street Footbridge – Structural details

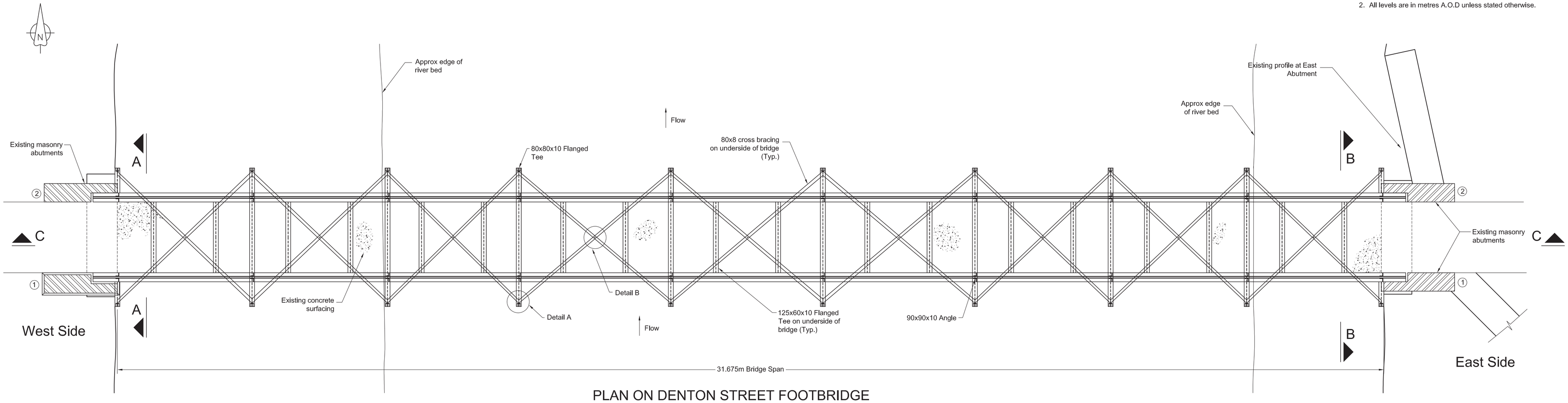
IMNW525/CB01/1102: Denton Street Footbridge – Abutment details

Drawing number / Rev

IMNW525/CB01/1100-P1

Notes

1. All dimensions are in millimetres (mm) unless stated otherwise.
2. All levels are in metres A.O.D unless stated otherwise.

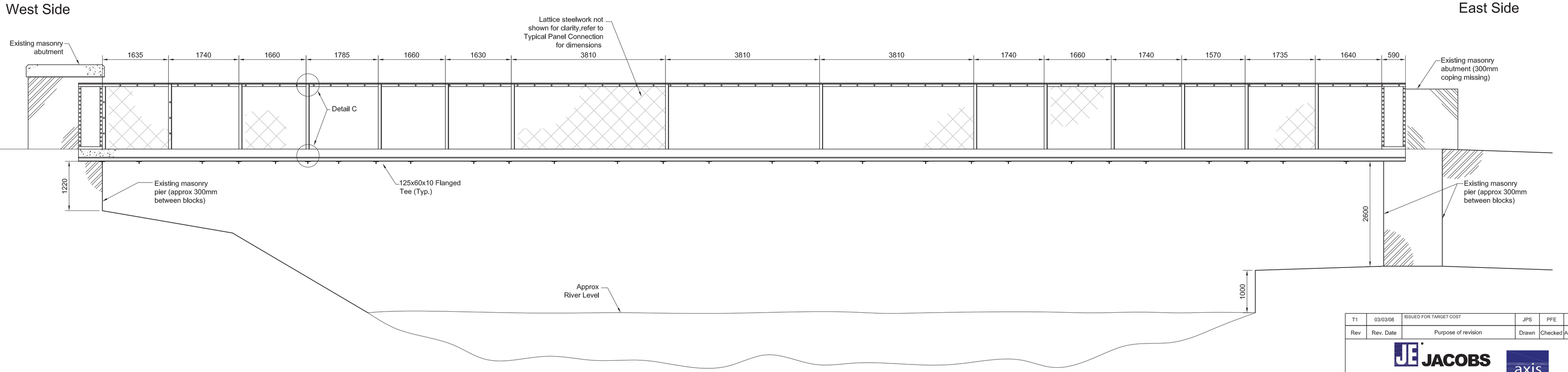


PLAN ON DENTON STREET FOOTBRIDGE

(Concrete Deck Omitted For Clarity)
Scale (A1) 1:50
Scale (A3) 1:100

West Side

East Side



SECTION C-C

Scale (A1) 1:50
Scale (A3) 1:100

0 1000 2000 3000 4000 5000 mm
SCALE 1 : 50

Rev	Rev. Date	Purpose of revision	Drawn	Checked	Approved
T1	03/03/08	ISSUED FOR TARGET COST	JPS	PFE	MAS

JACOBS Halcrow axis

Client: Environment Agency

Project: Caldew and Carlisle City City Flood Allviaion Scheme

Drawing title: Dention Street Footbridge Plan and Section

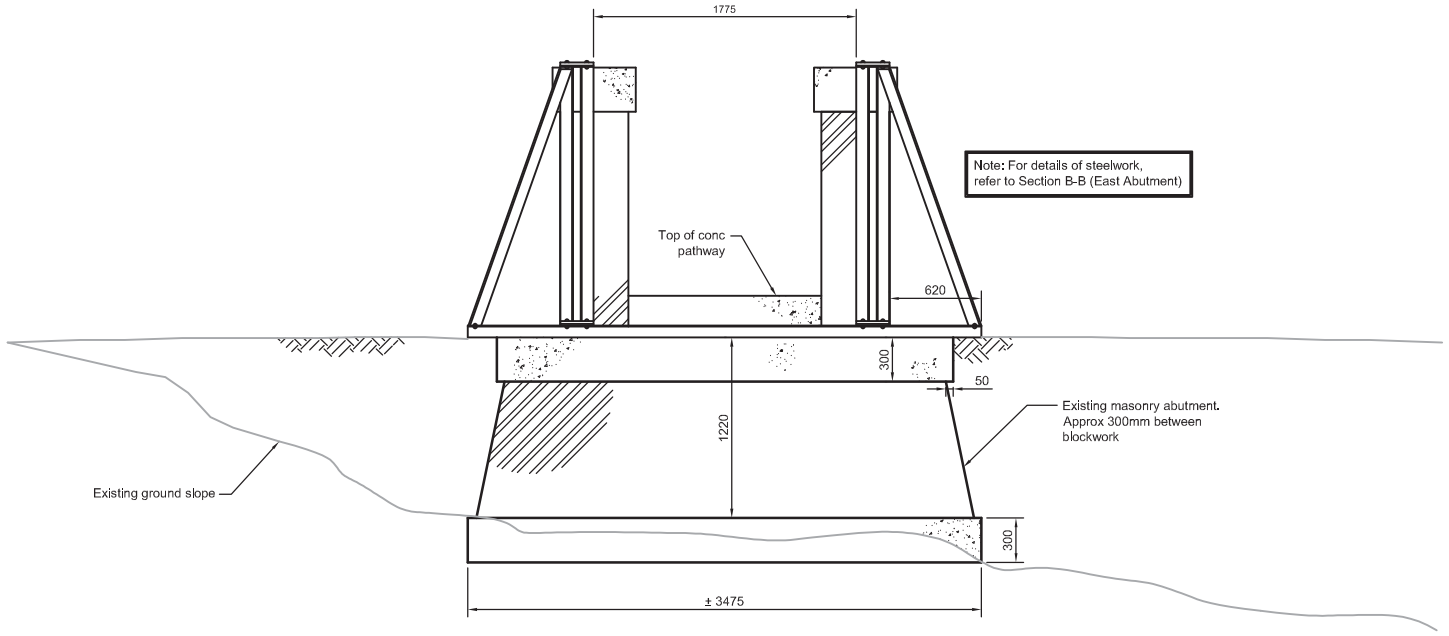
Drawing status: FOR TARGET COST

Produced by	Jacobs ✓	Halcrow ✗	Axis ✗		
Job No.	B0664400	WNCCDD	574		
Scale	@ A1	DO NOT SCALE			

Drawing number: IMNW525/CB01/1100 Rev: T1

Drawing number / Rev

IMNW525/CB01/1101-T1



SECTION A-A (WEST SIDE)

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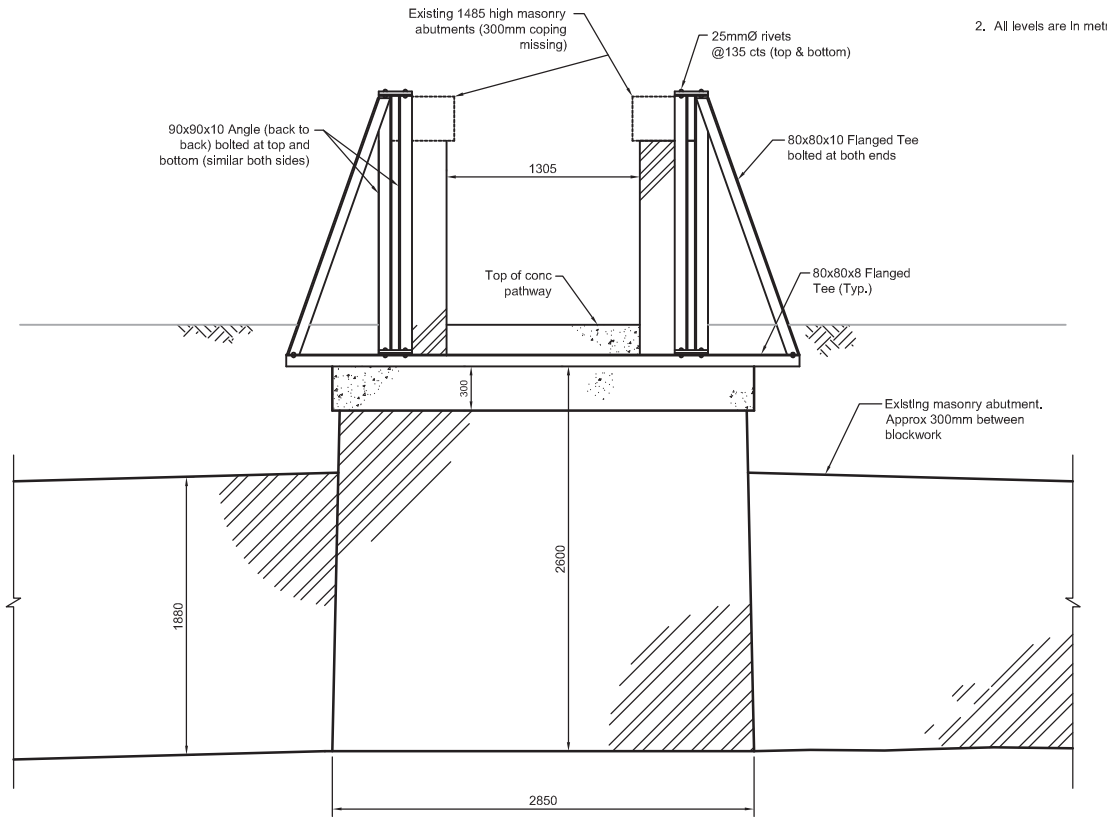
Scale (A3) 1:50



SECTION B-B (EAST SIDE)

Scale (A1) 1:25
Scale (A3) 1:50

Notes

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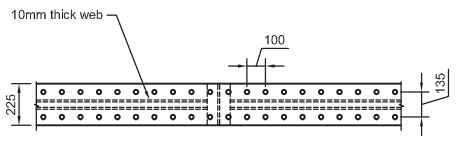
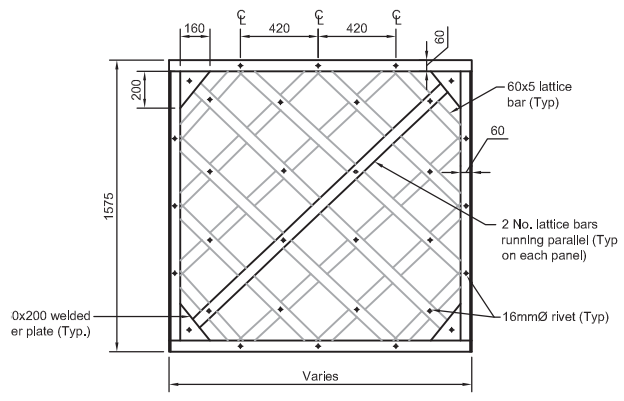
2. All levels are in metres A.O.D unless stated otherwise.



PLAN ON PANEL CONNECTION

Scale (A1) 1:20
Scale (A3) 1:40



TYPICAL PANEL CONNECTION

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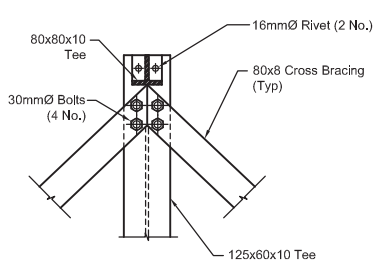
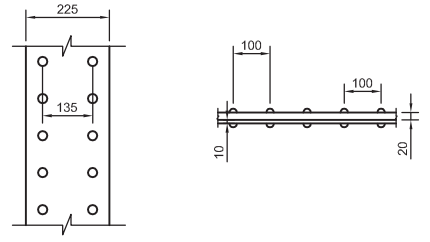
Scale (A3) 1:40



DETAIL A

Scale (A1) 1:10
Scale (A3) 1:20



TYPICAL CONNECTION ALONG BRIDGE PANELS

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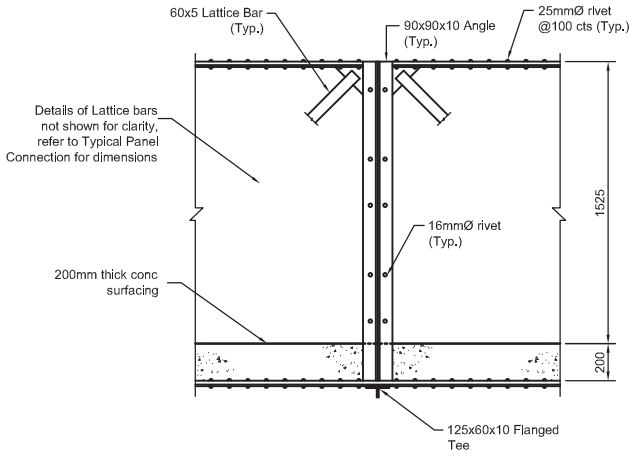
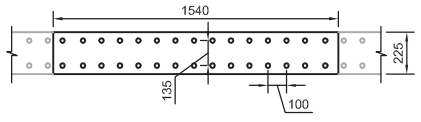
Scale (A3) 1:20



TYPICAL SECTION ON PANEL CONNECTION (DETAIL C)

Scale (A1) 1:20
Scale (A3) 1:40



PLAN

Scale (A1) 1:20
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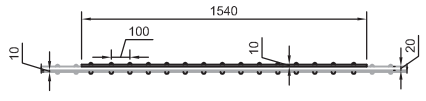

ELEVATION ON WELD PLATE @ MID SECTION ON BRIDGE (DETAIL E)

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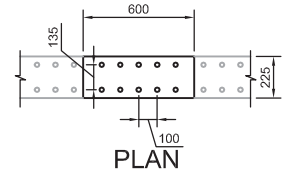

PLAN

Scale (A1) 1:20
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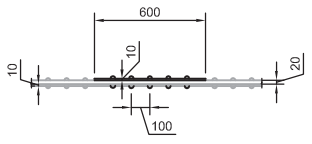

ELEVATION ON WELD PLATE @ QUAD SECTIONS ON BRIDGE (DETAIL F)

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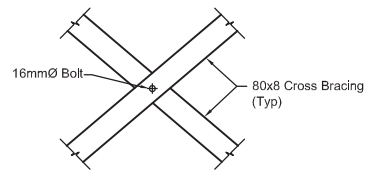
Scale (A3) 1:40



DETAIL B

Scale (A1) 1:10
Scale (A3) 1:20

Rev	Rev. Date	Purpose of revision	Drawn	Checked	Approved
T1	03/03/08	Issued for Target Cost	ALM	PFE	MAS
P1	29/02/08	PRELIMINARY ISSUE	ALM	PFE	MAS

JE JACOBS Halcrow axis

Client: Environment Agency

Project: Caldew and Carlisle City City Flood Allviaion Scheme

Drawing title: Dention Street Footbridge Structural Details

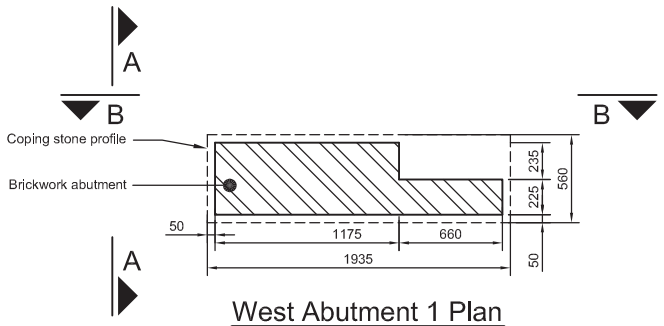
Drawing status: FOR TARGET COST

Produced by	Jacobs ✓	Halcrow ✗	Axis ✗
Job No.	B0664400	WNCCDD	574
Scale	@ A1	DO NOT SCALE	

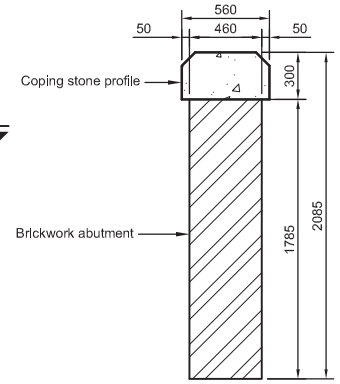
Drawing number: IMNW525/CB01/1101 Rev: T1

Drawing number / Rev

IMNW525/CB01/1102-T1



West Abutment 1 Plan
Scale 1:25 (A1)
Scale 1:50 (A3)



Section A-A
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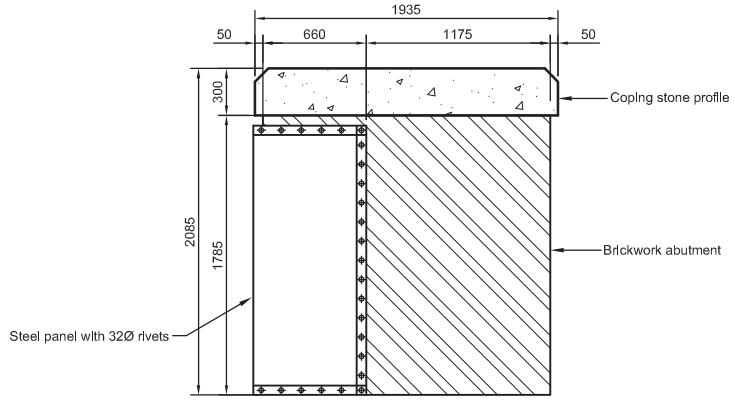

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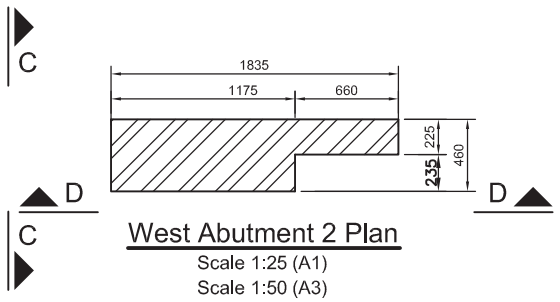
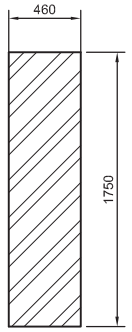


West Abutment 2 Plan
Scale 1:25 (A1)
Scale 1:50 (A3)



Section C-C
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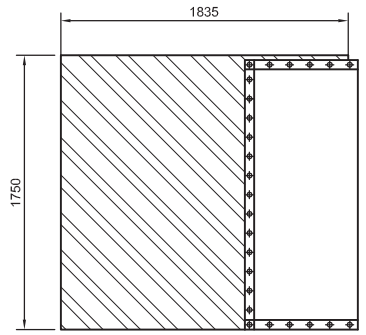

Section D-D
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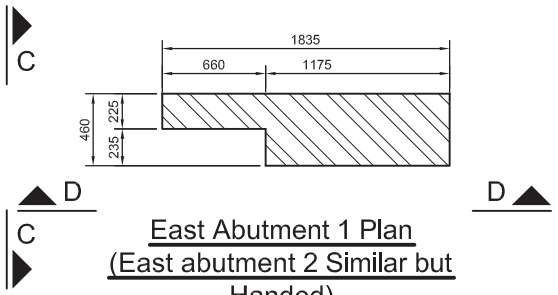

East Abutment 1 Plan
(East abutment 2 Similar but Handed)
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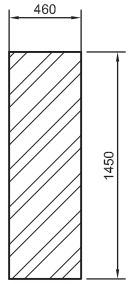
Scale 1:50 (A3)



Section E-E
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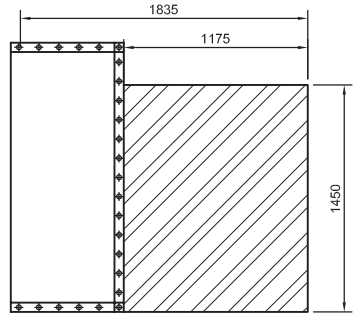

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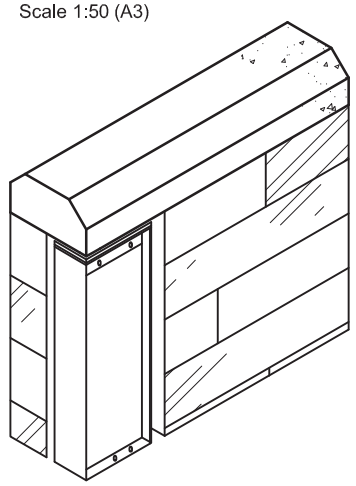
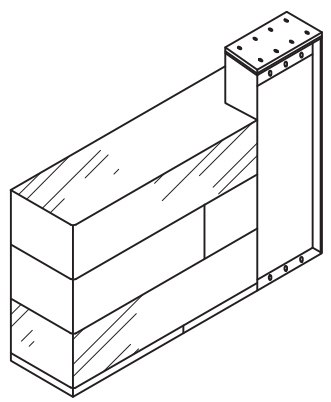


ISOMETRIC VIEW ON WEST ABUTMENT (SIDE 1 ONLY)
Scale 1:25 (A1)
Scale 1:50 (A3)



ISOMETRIC VIEW ON EAST ABUTMENT (BOTH SIDES)
Scale 1:25 (A1)
Scale 1:50 (A3)

Notes

1. All dimensions are in millimetres (mm) unless stated otherwise.
2. All levels are in metres A.O.D unless stated otherwise.

0 500 1000 1500 2000 2500 mm
SCALE 1 : 25

FOR TENDER

Rev	Rev. Date	Purpose of revision	Drawn	Checked	Approved
T1	03/03/08	Issued for Target Cost	ALM	PFE	MAS
P1	29/02/08	PRELIMINARY ISSUE	ALM	PFE	MAS

JACOBS Halcrow axis

Client: Environment Agency

Project: Caldew and Carlisle City City Flood Allviaion Scheme

Drawing title: Dention Street Footbridge Abutment Details

Drawing status: FOR TARGET COST

Produced by	Jacobs ✓	Halcrow ✗	Axis ✗
Job No.	B0664400	WNCCDD	574
Scale	@ A1	DO NOT SCALE	

Drawing number: IMNW525/CB01/1102 Rev: T1

CUMBRIA COUNTY HISTORIC ENVIRONMENT SERVICE

APPENDIX 2:

BRIEF FOR AN ARCHAEOLOGICAL BUILDING RECORDING PROJECT OF DENTON STREET FOOTBRIDGE, CARLISLE, CUMBRIA

BRIEF FOR AN ARCHAEOLOGICAL BUILDING RECORDING PROJECT

OF DENTON STREET FOOTBRIDGE, CARLISLE, CUMBRIA

Issued by the

County Historic Environment Service

Environment Unit, Economy, Culture and Environment

Date of Brief: 30 November 2007

This Design Brief is only valid for 1 year after the above date. After this period the County Historic Environment Service should be contacted. Any specification resulting from this Brief will only be considered for the same period.

SITE DESCRIPTION AND SUMMARY

Site Name: Denton Street Footbridge, Carlisle

Grid Reference: NY 39835 54550

Planning Application Reference No.: 1/07/1473

Detailed specifications are invited from appropriately resourced, qualified and experienced archaeological or architectural contractors to undertake the archaeological project outlined by this Brief and to produce a report on that work. The project team must be led by a member of the Institute of Field Archaeologists or the Institute of Historic Building Conservation or equivalent. No fieldwork may commence until approval of a specification has been issued by the County Historic Environment Service.

PLANNING BACKGROUND

1.1 Cumbria County Council's Historic Environment Service (CCCHES) has been consulted by Carlisle City Council regarding a planning application for the implementation of a flood alleviation scheme around Carlisle.

1.2 The scheme has been the subject of an Environmental Impact Assessment which has identified that the footbridge at Denton Street is of some historic interest and will be demolished as part of the development. Consequently, a condition has been placed on planning consent requiring a programme of archaeological building recording prior to the proposed works taking place.

1.3 This advice is in accordance with guidance given in Planning Policy Guidance note 15 (Planning and the Historic Environment), Planning Policy Guidance note 16 (Archaeology and Planning) as well as with sub-regional and regional policy.

ARCHAEOLOGICAL BACKGROUND

2.1 The footbridge at Denton Street crosses the River Caldew and is first shown on documents dating to 1852.

SCOPE OF THE PROJECT

3.1 Objectives

3.1.1 To make a record of the historic structure prior to demolition.

3.2 *Work Required*

3.2.1 Before any on site work commences *a desk-based survey* of the existing resource should be undertaken to set the footbridge in its historic context. This should include an assessment of those primary and secondary sources referenced in the County Records Office.

3.2.2 To carry out a *photographic record* of the footbridge. This should comprise the requirements of a 'Photographic Survey' as described by English Heritage *Understanding Historic Buildings A Guide to Good Recording Practice, 2006*.

PROJECT DESIGN

4.1 Before the project commences a project proposal must be submitted to and approved by the County Historic Environment Service.

4.2 Proposals to meet this Brief should take the form of a detailed project design prepared in accordance with the recommendations of The Management of Archaeological Projects, 2nd ed. 1991, and must include:

- A description of the building recording system to be used
- Details of key project staff, including the names of the project manager any other specialist sub-contractors to be employed
- Details of on site staffing, e.g. the number of people to be employed on site per day
- A projected timetable for all site work through to the publication of results

4.3 Any significant variations to the proposal must be agreed by the County Historic Environment Service in advance.

REPORTING AND PUBLICATION

5.1 The archaeological work should result in a report, this should include as a minimum:

- A site location plan, related to the national grid, produced at an appropriate scale to show the relationship of the footbridge to nearby buildings or significant landscape features
- A front cover/frontispiece which includes the planning application number and the national grid reference of the site
- A concise, non-technical summary of the results
- A description of the footbridge's form, function, age, development sequence and construction materials. Where known, the footbridge's architects, builders, patrons and owners should be provided
- A description of the historic context of the footbridge
- A scaled plan showing the location of each photographed feature of architectural or archaeological interest
- Photographs of the footbridge should be accompanied by an appropriate description
- A description of the methodology employed, work undertaken and the results obtained
- Plans, sections drawings and photographs at an appropriate scale
- The dates on which the project was undertaken

5.2 Three copies of the report should be deposited with the County Historic Environment Record within two months of completion of fieldwork. This will be on the understanding that the report will be made available as a public document through the County Historic Environment Record.

5.3 Cumbria HER is taking part in the Online Access to Index of Archaeological Investigations *(OASIS) project. The online OASIS form at http://ads.ahds.ac.uk/project/oasis must therefore also be completed as part of the project. Information on projects undertaken in Cumbria will be made available through the above website, unless otherwise agreed.*

THE ARCHIVE

6.1 An archive must be prepared in accordance with the recommendations in Brown, DH, 2007, *Archaeological Archives A Guide To Best Practice In Creation, Compilation, Transfer and Curation*, Archaeological Archives Forum. Arrangements must be made for its long term storage and deposition with an appropriate repository. A copy shall also be offered to the National Monuments Record.

6.2 The County Historic Environment Service must be notified of the arrangements made.

PROJECT MONITORING

7.1 One weeks notice must be given to the County Historic Environment Service prior to the commencement of fieldwork.

FURTHER REQUIREMENTS

8.1 It is the archaeological contractor's responsibility to establish safe working practices in terms of current health and safety legislation, to ensure site access and to obtain notification of hazards (eg. services, contaminated ground, etc.). **The County Historic Environment Service bears no responsibility for the inclusion or exclusion of such information within this Brief or subsequent specification**.

8.2 All rooms should be clear of obstructions as far as practically possible in order to provide an adequate photographic record to be made.

8.3 The involvement of the County Historic Environment Service should be acknowledged in any report or publication generated by this project.

FURTHER INFORMATION

For further information regarding this brief, contact

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Email: jo.mackintosh@cumbriacc.gov.uk

As part of our desire to provide a quality service to all our clients we would welcome any comments you may have on the content or presentation of this design brief. Please address them to the Assistant Archaeologist at the above address.