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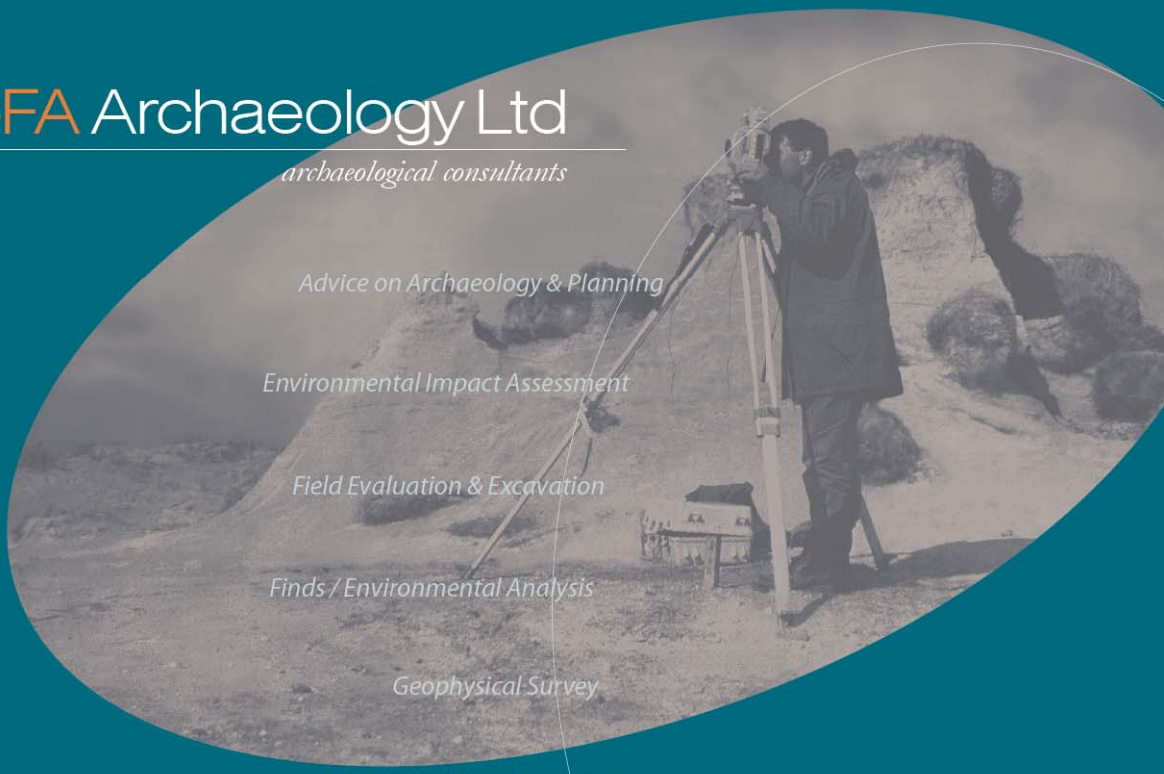

Advice on Archaeology & Planning

Environmental Impact Assessment

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Interpretation, Design & Display

Saint Ann's Mill Weir and Burley Mill Weir Kirkstall Leeds

Archaeological Watching Brief

Report No. Y157/14

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This document has been prepared in accordance with CFA Archaeology Ltd standard procedures.

Saint Ann's Mill Weir
and
Burley Mill Weir

Kirkstall
Leeds

Archaeological Watching Brief

Report No. Y157/14

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Summary

An archaeological watching brief was undertaken by CFA Archaeology during alterations to two weirs on the River Aire at Kirkstall, Leeds, West Yorkshire during April 2014. The two weirs, St. Ann's Mill Weir and Burley Mills Weir were altered to install fish passes. Removal of parts of the weirs and adjoining masonry exposed foundation deposits beneath the weirs. The 'steam pump platform' at St Ann's Mill Weir was not affected.

1. INTRODUCTION

1.1 General

This report presents the results of an archaeological watching brief undertaken by CFA Archaeology Ltd (CFA) on behalf of Bailey Construction North West Ltd between 8 and 30 April 2014 for the installation of two fish passes on the River Aire. The CFA code and number for the project is SAMW/2168.

Work was undertaken in accordance with a specification (Appendix 3) requested by Mr. David Roper of Bailey Construction (the client) and produced by David Hunter of West Yorkshire Archaeology Advisory Service (WYAAS 2013). The archaeological monitoring of alterations to the weirs was a condition of the planning consent (Ref: 13/03782/FU and 13/03783/LI).

1.2 Site Location and Description

The project required the alteration of two weirs on the River Aire to install fish passes. A fish pass or 'ladder' provides easier access for fish and eels to travel upstream. This is undertaken by reducing natural and manmade obstacles to install a platform that allows access between different levels of a waterway.

The fish passes were located on two weirs on a diverted stretch of the River Aire between Kirkstall Bridge and Redcote Lane Bridge (Fig. 1). This diverted portion of the River Aire stretches for 450m and flows to the south-east, parallel to the main river course. St Ann's Mill is 250m upstream from Burley Mills Weir. Both weirs can be accessed from the A65 Kirkstall Road/Commercial Road to the east. St Ann's Mill Weir is accessed from the site of the former St Ann's Mill, an area that is currently occupied by a number of small commercial units. Burley Mills Weir is accessed from a footpath that connects the eastern river bank with the main road.

The underlying solid geology is Pennine Lower Coal Measures consisting of mudstone, siltstone and sandstone. The superficial deposits are river terrace deposits that consist of sands and gravels (BGS 2014).

1.3 Historical Background

The historical background of both weirs is presented in the specification (Appendix 3), though a summary is given below.

St Ann's Mill Weir

St Ann's Mill is between the diverted arm of the River Aire and the Abbey Mills Goit. The weir at St Ann's Mill was installed to create a head that would increase the flow of water to a mill pond at the end of Abbey Mills Goit; a culverted body of water that powered a number of mills. A small island between the weir, goit and the diverted river is identified as the location of a water-return steam pump that drew water from the base of the weir and relocated it into the mill pond. St. Ann's Mill is first depicted in the 1770 Jeffrey's Map of Yorkshire. Abbey Mills Goit is believed to have originated in the 14th century.

Burley Mill Weir

Burley Mill Weir and its associated sluice gates are grade II listed (1375057). The weir supplied a head of water to Burley Mills 420m to the south-east via a long goit. The flow of water was controlled by a double sluice gate to the immediate north-east of the weir. The weir and sluice gates were built c. 1799 along with the contemporary Burley Mills for the woollen manufacturing firm Wormald, Gott and Wormald.

No alterations are known to have been made to either of the weirs prior to the installation of the fish passes.

1.4 Aims

In accordance with the specification (Appendix 3) the aim of the watching was:

> 'to identify and record the presence/absence, extent, condition, character and date (as far as circumstances permit) of any archaeological features and deposits which are disturbed or exposed as a result of groundworks in the area of interest.'

2. WORKING METHODS

All on-site recording was carried out according to standard CFA procedures, principally by drawing, photography and by completing standard CFA record forms.

Prior to any work on the weirs a safe working area had to be created. This was achieved by placing bags of hardcore to divert the flow of water and the installation of a number of pumps to extract water from the working area. CFA Archaeology followed the health and safety policy of the contractors to ensure safe working practices. This included wearing a life vest at all times.

All alterations to the weirs and removal of masonry elements were monitored as part of the watching brief. A mechanical excavator equipped with a smooth-bladed bucket was used wherever possible to remove deposits. A hydraulic breaker was used to loosen larger masonry elements and structural deposits after they had been quantified. A crane and pulley were used to extract some of the larger masonry elements. Further exposing and cleaning of features was carried out by hand. Due to the proximity of

open water, the archaeological investigation was limited to the safe working area created by the contractor. Elements of the weirs' surfaces were never fully drained or exposed during the groundworks.

2.1 Standards and Guidance

CFA Archaeology is a registered organisation (RO) with the Institute for Archaeologists (IfA). All work was conducted in accordance with relevant IfA Standards and Guidance documents (IfA 1994 and 1996) and the specification (Appendix 3).

2.2 Archiving

The project archive, comprising all CFA records will be ordered according to nationally recognised standards (Brown 2011) and the Leeds Museum archiving requirements. The project will be deposited with Leeds Museum Discovery Centre. A summary of the results of the archaeological works will be submitted for inclusion in OASIS (ref: cfaarcha1-178989).

2.3 Monitoring

The watching brief was monitored by David Hunter, Senior Archaeological Officer for WYAAS, who was informed in advance of the works taking.

3. RESULTS

Numbers in parentheses refer to contexts, full descriptions of which form Appendix 1. St Ann's Mill Weir is shown on Figure 1 and plates 1-4. Burley Mill Weir is shown on Figure 2 and plates 5-8.

3.1 Saint Ann's Mill Weir

Saint Ann's Mill Weir is roughly 25m in length and concave in profile. The weir spans the River Aire on a north-to-south orientation. The open river is forced directly over the weir head and then down a sloping weir to create a staggered flow of water, which in turn forces a head of water towards the site of the former St. Ann's mill wheel.

The fish pass at St. Ann's Mill was at the northern edge of the weir abutting the steam-pump pad. The dimensions of the excavated area were 10.5m long, 4.2m wide and 0.5m in depth. The excavations required the removal of the upper course of the weir head (005) (0.5m depth) and 15 courses of the stone setts that formed the weir surface (001) .0.5m depth) (Plate 1). In all, seven blocks were removed from the upper course of the weir head (005). Removal of the stone-setts that formed the weir surface (001) exposed a foundation deposit of poorly sorted sub-angular sandstone blocks and smaller sandstone fragments (Plate 2). This hardcore deposit abutted the south-west facing wall associated with the steam-pump platform.

The stone structure to the north of the weir, identified as the steam pump area, was not affected by the groundworks. This pump platform overlooked the weir and survived to a height of 2-3m above the water level (Plate 3). The south-west face of the pump structure consisted of two distinct wall phases (002 & 003). Wall 002 was constructed of large rectangular-dressed gritstone blocks 0.35m deep that survived to a height of ten courses above the water level. The weir head (005) was keyed into this wall (002). Wall 003 was built on the top of Wall 002 and consisted of smaller sandstone blocks that survived to a height of 1.7m over nine courses (0.2m deep). The structure survived in poor condition and appears to have collapsed or to have been robbed out.

A large rectangular stone block 1.3m long, 1.2m wide and 0.5m high (006) was retrieved from the river at the base of the pump platform overlaying the weir surface (001). The stone had three notched indents on the corner of one face (Plate 4). The stone had presumably been displaced from the stone structure above.

3.2 Burley Mill Weir

Burley Mill Weir is 25m in length and concave in profile. The weir spans the River Aire on an east-to-west orientation (Plate 5). The weir creates a head of water that is lead via a flanking wall down the long goit towards the Burley Mill site via a double sluice gate. Unlike St. Ann's Mill, the river is sent above the weir head and over a sudden drop to create a waterfall between the two tiers of the river.

The fish pass was constructed on the eastern edge of the weir adjacent to the west-facing flanking wall built on the river bank (102). The wall turned to the north and east (101) to direct the head of water created by the weir towards the Burley Mill Goit and sluice gate. The excavation was 8m long by 4m wide. It required the removal of masonry deposits to a depth of 1.2m at the crest of the weir (103, 104) and 0.5m on the lower weir surface (105) (Plate 6). In total five blocks from the weir head (103) (c.0.25m deep) and 1m of block work from the weir wall (104) were removed. This included four full blocks from one course and part of the lower course (Plate 7). The stone setts at the base of the weir (105) were also removed. They were recorded at between 0.5 - 1m in length in 0.4m wide courses with an average depth of 0.45m. Spoil from excavations beneath this surface returned sandstone-cobbles and small sub-angular gritstone fragments within a gritty silty-sand. This deposit was never visible due to inundation across the working area.

Excavations at the north of the weir revealed a thin bluish-grey sandy-silt deposit (106) that overlay a deposit of sub-angular gritstone blocks 0.4m diameter (107) (Plate 8). This stone deposit contained a number of displaced dressed gritstone blocks with prominent tool marks.

The base of an upright timber post was identified 4m north of the weir upstream. The post was 0.2m in diameter and greater than 1m in length. It had a notched pointed end that had been driven into the river deposits. Only the base of the post was intact. It was extracted as part of the construction work.

5. DISCUSSION

5.1 St Ann's Mill

Reductions to the weir surface at St Ann's Mill Weir exposed a deposit of compact sub-angular gritstone fragments (004) that had been laid down for the foundation of the weir surface. The location of the fish pass at St. Ann's Mill Weir did not directly impact on the pump platform as the fish pass was offset from the flanking wall adjacent to the river. It is assumed that the large stone pad (006) identified at the base of the weir was displaced from the stone platform above and was therefore associated with the base for a pumping mechanism. The sockets that were cut from one face of the pad could have housed part of a machine or the platform for such a pump. Inferences on the original setting of the displaced stone pad are hard to draw due to the poor preservation of the remaining stone platform.

5.2 Burley Mill Weir

Removal of the lower weir surface at Burley Mills exposed a sub-angular gritstone hardcore deposit very similar to as St. Ann's Mill, although this deposit was never seen in-situ due to water ingress on the site.

The relict timber post identified upstream may be contemporary with the construction of the weir, although the purpose of this discrete timber and its relation to the weir structure is difficult to ascertain. The relict timber post could be from before or after the construction of the weir in c.1799.

6. CONCLUSION

The installation of the fish passes on the River Aire exposed the foundation deposits that underlay the weirs. The project identified the depths and extent of parts of the masonry elements of both weirs as well as the make-up of the river deposits adjacent to the weirs.

Work at St Ann's Mill Weir did not inform any further understanding of the steam-pump platform as the groundworks did not impact upon the upstanding remains of the pump structure.

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APPENDICES

Appendix 1: Context Register

Saint Ann's Mill Weir

Context no.	Type	Description
001	Masonry	Weir surface. Constructed of pitched gritstone blocks, laid out in courses to create the gradient of the weir. Blocks are typically 0.6m Width 0.6-1.5m Length. Surface extends beyond the limit of excavation. All blocks have exposed depth of 0.45-0.5m. A pale whitish-grey mortar is evident as a bonding between the blocks. Overlies Foundation 004.
002	Masonry	South-facing wall. Constructed of dressed gritstone blocks 0.6-1.5m Length x 0.35m Depth. Survives to a height of ten courses 13m Length 2-3m Height. Foundation for south-facing wall 003. Keyed into St. Ann's Mill Weir to the west (001, 004 and 005).
003	Masonry	Upper portion of south-facing weir wall. Constructed of dressed gritstone blocks 0.16-0.35m Length x 0.2m Depth. Survives to a height of nine courses c.3m Width 1.2-1.7m Height. Overlies Wall 002.
004	Deposit	Gritstone foundation for Weir Surface 001. Indurated deposit of sub-angular brownish-grey poorly sorted gritstone blocks 0.1-0.6m Diameter. Hardcore fill overlain by Weir Surface 001.
005	Masonry	Weir head. West-facing gritstone wall meeting the flow of the diverted River Aire. Seven blocks at east end of one course were removed. Blocks c.0.5m Height 0.6m Length 1.5m Width. Chisel marks evident on the block faces. Prominent rust scarring suggests former iron braces between the blocks. Evidence of a pale whitish-grey lime rich mortar between some of the blocks. Abuts Weir Surface 001. Overlies Foundation Deposit 004.
006	Masonry	Displaced stone pad. 1.3m Length 1.2m Width 0.5m Height. Large rectangular gritstone slab. Three notched indents on one lengthways side face 0.06m Depth. Distinct tool marks create an undulating grooved facing.

Burley Mill Weir

Context	Type	Description
101	Masonry	Curved flanking weir wall. Constructed of dressed gritstone blocks 0.6-0.9 Length 0.25-0.3m Depth. Exposed to a height of 1.7m. Keyed into Wall 102 to the south. Overlies Weir Head 103.
102	Masonry	West-facing flanking wall. Constructed of dressed gritstone blocks 0.7-0.9m Length 0.4m Depth. Exposed to a height of six courses (2.2m). Keyed into Curved Wall 101 to North. Overlies Weir Head 103.
103	Masonry	Weir Head. Constructed of rectangular gritstone blocks 1.7m Length 0.5-1.1 Width 0.25m Height. Blocks are tapered to create the concave design of the weir. Jointed by a thin iron panel on upper face that runs length of the weir 0.17m Width and smaller iron rivets between each individual block. Keyed into Wall 102 to east. Overlies Weir Wall 104
104	Masonry	South-facing weir wall. Second course of Burley Mills Weir that creates the south-facing weir wall. Constructed of gritstone blocks 1.2m Length 1.5m Width 0.7m Depth. Offset 0.2m to south of Weir Head 103 to create a narrow ledge. Underlies Weir Head 103. Keyed into Wall 102 to east. Abuts Stone Surface 105 to south
105	Masonry	Lower stone tier of weir. Constructed of gritstone blocks (0.4m Width 0.5 - 1m Length 0.45m Depth) to create a stone set surface 5m Wide at the base of the weir.
106	Deposit	Fluvial sandy-silt deposit. Loose mid bluish-grey sandy-silt containing frequent pebble and rounded stones. 0.05 - 0.2m Thick. Deposited against Weir Head 103. Overlies Stone Deposit 107.
107	Deposit	Stone deposit upstream of Weir Head. Consists of large sub-angular gritstone fragments roughly 0.4m diameter. At least two identifiable dressed gritstone blocks were identified within this deposit. Overlain by Fluvial Deposit 106. Abuts Weir Head 103 and 104

Appendix 2: Photographic Register

Saint Ann's Mill Weir

No	Contexts/description	Facing	Conditions
1	South-facing profile of Weir Wall 002	North	Overcast
2	Oblique shot of Weir Wall 002 following damming of the river	North-east	Overcast
3	Working shot of the removal of Weir Head 005	North-east	Overcast
4	West-facing profile of Weir Head 005	East	Overcast
5	Close up shot of Weir Head 005	East	Overcast
6	General shot of the north bank from site	East	Bright
7	Working shot of the removal of stone from Weir Head 005	North	Bright
8	West-facing profile of Weir Head 005	East	Bright
9	Working shot of dismantlement of Weir Head 005	North-east	Bright
10	Shot of gritstone blocks removed from Weir Surface 001	North-west	Bright
11	Shot of gritstone blocks removed from Weir Surface 001	North	Bright
12	North-east-facing shot of the weir following removal of Weir Surface 001	North-east	Bright
13	South-facing profile of Weir Wall 002 following removal of Weir Surface 001	North	Bright
14	North-facing profile of Weir Surface 001 following dismantlement	South	Bright
15	Foundation Deposit 004 abutting Weir Wall 002	North	Bright
16	Close-up shot of the makeup of Deposit 004	North-west	Bright
17	North-facing profile of Weir Head 005, with visible mortar bonding	South	Bright
18	General shot of the fish pass excavation	North-west	Bright
19	Carved face of Stone Pad 006	North-west	Bright
20	Detailed shot of grooves on Stone Pad 006	North-west	Bright

Burley Mills Weir

No	Contexts/description	Facing	Conditions
21	General shot of Burley Mill Weir prior to groundworks	North-west	Bright
22	General shot of Burley Mill Weir from bank to east	South	Bright
23	Flanking Weir Walls 101, 102 and Weir Walls 103,104 and 105	East	Overcast
24	Southern-face of the Weir looking at Wall 102 and Stone Surface 105	South-east	Overcast
25	Southern-face of the Weir following damming	North-west	Overcast
26	General shot of Burley Mill Weir	West	Overcast
27	Shot of Weir Head 103 showing the demarcated working area	South-east	Overcast
28	Stone Surface 105 prior to removal	South-east	Overcast
29	Close-up shot of relict iron fastening on Weir Head 103	North-east	Overcast
30	Working shot of breaking up of Weir Head 103	North-west	Overcast
31	Working shot of breaking up of Weir Head 103	North-west	Overcast
32	Partly exposed Weir Wall 104 beneath Weir Head 103	East	Overcast
33	Wooden post dislodged from upstream of weir	East	Overcast
34	Close-up shot of dislodged wooden post	East	Overcast
35	General shot of exposed Deposit 108	North-east	Overcast
36	East-facing section of Weir Head 103 and Weir Face 104	North-west	Overcast
37	West-facing section of Weir Head 103 and Weir Face 104	East	Overcast
38	General shot of groundworks and river facing downstream	South-east	Overcast
39	General shot of the weir prior to removal of Weir Head 103	North-west	Overcast
40	Working shot of removal of Lower Weir Head 105	East	Overcast
41	South-facing profile of Weir Wall 104 during removal of Lower Weir Wall 105	North-east	Overcast
42	North-facing profile of Weir Wall 101	South-east	Overcast
43	North-facing profile of Flanking Wall 101, facing towards the Burley Mills Goit Sluice	East	Overcast
44	East-facing profile of Weir Head 103 following excavation of the fish pass area	West	Overcast
45	Oblique shot of West-facing profile of Weir Head 103 following excavation	South-east	Overcast
46	West-facing-profile of Weir Wall 103	East	Overcast
47	General shot of the fish pass area following excavation	South-west	Overcast
48	Working shot of removal of Weir Surface 105	North-west	Overcast
49	East-facing shot of the long goit sluice at east of Burley Mill Weir	South-east	Overcast
50	Partially exposed wooden post cutting into Deposit 107	South-west	Overcast

Appendix 3: The Specification

WEST YORKSHIRE ARCHAEOLOGY ADVISORY SERVICE:
SPECIFICATION FOR ARCHAEOLOGICAL WATCHING BRIEFS AT BURLEY MILL WEIR AND SAINT ANN'S MILL WEIR, KIRKSTALL, LEEDS

(SE 26570 34950 & SE 26420 35170)

Specification prepared on behalf of Leeds City Council, at the request of Mr David Roper of Bailey Constuction North West Ltd. (Planning Permission references 13/03782/FU and 13/03783/LI).

1. Summary

1.1 A limited amount of archaeological work consisting of a watching brief is proposed to identify and record any archaeological remains which are revealed and/or disturbed during construction of two fish passes at these two historic weirs on the River Aire. This specification has been written by the West Yorkshire Archaeology Advisory Service (WYAAS), the holders of the West Yorkshire Historic Environment Record.

NOTE: The requirements detailed in paragraphs 6.2, 6.3, 6.4 and 11.1 are to be carried out by the archaeological contractor **prior** to the commencement of fieldwork.

2. Site Location & Description

Grid Reference: SE 26570 34950 & SE 26420 35170

2.1 The development sites are both located on weirs on the River Aire 840m and 620m to the south east of Kirkstall Bridge. Both sites can be accessed from the eastern bank of the river off the A65, Commercial Road.

2.2 The sites lie in Leeds District and in the historic township of Headingley cum Burley.

2.3 The watching brief will be maintained during all groundworks that are undertaken during the development.

3. Background

3.1 Planning permission for a pair of fish passes has been granted by Leeds City Council's Planning Authority. The Planning Authority was advised by WYAAS that there is reason to believe that important archaeological remains may be affected by the proposed development and that archaeological investigations are required. This work is a condition to the planning consent.

3.3 This specification has been prepared by WYAAS, at the request of Mr David Roper (of Bailey Construction North West Ltd., Bellman Farm Buildings, Chatburn Road, Clitheore BB7 4JX Tel.: 01200 422999) to detail what archaeological work is required during the watching brief and to enable an archaeological contractor to provide a quotation.

4. Archaeological Interest

Burley Mill Weir is grade II listed (National Heritage List for England Number 1375057) and a registered heritage asset. The curving masonry weir supplied a head of water for the contemporary Burley Mills which was built for the woollen manufacturing firm of Wormald, Gott and Wormald in c. 1799. The water raised by the weir was lead to Burley Mill by a long goit or mill race via a double sluice gate adjacent to the weir.

St Ann's Mill's is a non-designated heritage asset (West Yorkshire Historic Environment Record PRN 9092 & 3829). The site of the original St Ann's Mill has a unusual water management system which is currently understood to function as follows.

The mill was driven by a water wheel in the ground floor of the original mill building (which is now a ruin). The water was taken from the Aire c. 850m to the north-west and directed along the Abbey Mills Goit (PRN 3829). To the immediate north of Saint Ann's Mill the width of the goit channel increases to form a mill pond. This goit may have originated in the 14th century. Saint Ann's Mill is not shown on a 1711 map of the Earl of Cardigan's Estate, however, by the 1770s Jeffreys' Map of Yorkshire shows the goit was supplying three mills. These can be identified as Abbey Mills, Savins' Mill and St. Ann's Mill.

By the early 19th century this supply was augmented by additional water drawn from a diversion of the River Aire; the subject weir being employed to raise the river's level and fill the mill pond described above. Note the original course of the Aire is fossilised by the Bramley and Headingley cum Burley township boundary. It is believed that a *water-return* steam pump was also constructed to further augment the water supply drawn from the new channel and it is the stone bed of the engine constructed for this purpose that survives on a small island between the goit/mill pond and the diverted branch of the Aire. It is assumed that this pump drew water from a pound or pond at the foot of the weir. However, the details of this engine's installation have not been full investigated or explained.

Water-return engines were an application of contemporary steam powered pumping technology to early factory production and were often, but not exclusively, of the Newcomen type. They were employed during the later 18th and early 19th century to assist water powered prime movers before reliable and adequately powered rotary acting steam engines were available. The *water-return* engine was also applied in situations where there was insufficient water to power machinery. Although up to 35 such steam pumping engines are known in the county during the 18th and early 19th centuies detailed evidence of their form is lacking (Giles and Goodall 1992 Yorkshire Textile Mills: 1770 – 1930, HMSO p. 133). It would be normal practice in an 18th century installation for the pump to be located directly below the "outdoor" arm of the beam engine, downstream of a water wheel and deliver the returned water to a reservoir at a higher level (e.g. Low Mills Keighley of 1780 or Marshall's Water Lane Mill, Holbeck, of 1791) although a more direct supply to the water wheel, via a launder, was employed in other installations (e.g. Boulton and Watt's "Old Bess" engine at the Soho Foundry, Birmingham).There is currently insufficient information to identify with certainty the type of engine at St. Ann's mill and fully understand how the pumping system functioned.

Burley Mill Weir is of regional significance. The weir at St Ann's Mills is of local significance although proof of its association with a steam pumping engine would greatly enhance this.

For these reasons an archaeological record of both weirs' construction is necessary if they are to be impacted by development.

5. Aim of the Watching Brief

5.1 The aim of the watching brief is to identify and record the presence/absence, extent, condition, character and date (as far as circumstances permit) of any archaeological features and deposits which are disturbed or exposed as a result of groundworks in the area of interest. The archaeological contractor should record and compare the methods of construction employed in the two weirs and record any evidence of the construction and operation of the Saint Ann's Mill pumping engine observed during the works.

5.3 This work will mitigate the destruction of buried archaeological remains through 'preservation by record'.

6. General Instructions

6.1 Health and Safety

6.1.1 The archaeologist on site will naturally operate with due regard for Health and Safety regulations. In this case, where archaeological work is carried out at the same time as the work of other contractors in the river bed, regard should also be taken of any reasonable additional constraints that these contractors may impose. This work may require the preparation of a Risk Assessment of the site, in accordance with the Health and Safety at Work Regulations. The West Yorkshire Archaeology Advisory Service and its officers cannot be held responsible for any accidents or injuries that may occur to outside contractors engaged to undertake this watching brief while attempting to conform to this specification. Any Health and Safety issues which may hinder compliance with this specification should be discussed with WYAAS at the earliest possible opportunity (see section 12.2).

6.2 Confirmation of Adherence to Specification

6.2.1 Prior to the commencement of *any work,* the archaeological contractor must confirm adherence to this specification in writing to WYAAS, or state (with reasons) any proposals to vary the specification. Unauthorised variations are made at the sole risk of the contractor (see para. 12.2 below). Modifications presented in the form of a re-written specification/project design **will not** be considered by WYAAS.

6.3 Confirmation of Timetable and Contractors' Qualifications

6.3.1 Prior to the commencement of *any work*, the archaeological contractor **must** provide WYAAS **in writing** with:

- a projected timetable for the site work
- details of the staff structure and numbers

- names and *CVs* of key project members (the project manager, site supervisor, any proposed specialists, sub-contractors *etc.*)

6.3.2 All project staff provided by the archaeological contractor must be suitably qualified and experienced for their roles and have experience of recording industrial structures. The timetable should be adequate to allow the work to be undertaken to the appropriate professional standard, subject to the ultimate judgement of WYAAS.

6.4 Notification and Monitoring

6.4.1 The watching brief will be monitored as necessary and practicable by WYAAS in its role as curator of the county's archaeology. WYAAS should be provided with **as much notice as possible in writing** (and certainly not less than one week) of the intention to start the watching brief. A copy of the archaeological contractor's risk assessment of the site should accompany the notification.

6.4.2 The Leeds City museums officer named in paragraph 11.1 should be notified in writing of the commencement of fieldwork at the same time as WYAAS.

7. Fieldwork Methodology

7.1 An archaeologist should be present on site **during any excavation**. The archaeologist should view the area as it is being dug and any trench sections after excavation has been completed. Where archaeology is judged to be present, the excavated area should be rapidly cleaned and the need for further work assessed. Where appropriate, any features and finds should then be quickly hand excavated, sampled if appropriate, and recorded.

7.1.2 Any features/deposits of archaeological interest should be accurately located on a site plan and recorded by photographs, scale drawings and written descriptions sufficient to permit the preparation of a report. Section drawings (at a minimum scale of 1:20) **must** include heights O.D. Plans (at a minimum scale of 1:50) **must** include O.D. spot heights for all principal strata and any features.

7.1.3 The actual areas of disturbance (even if no archaeological remains are present) should be recorded on a suitable base map/development plan and the stratigraphic sequence and the depth of the excavations will be briefly recorded. If archaeological remains are identified, their location is to be accurately tied into the National Grid and located on an up-to-date 1:1250 O.S. map base.

7.1.4 Excavated soil should be searched as practicable for finds. All finds, except unstratified 20th century material, should be collected and retained for processing.

7.1.5 All securely stratified contexts should be sampled for environmental analysis and scientific dating. Additional 'spot' samples should be taken if suitable material is encountered during the watching brief.

7.1.6 The intention of the archaeological watching brief is not to unduly delay the work of other contractors on site, however, a degree of flexibility is also expected of the developer in order that the archaeologist can fulfil the terms of this specification (see

8.1 below). The archaeologist shall not excavate any area beyond those scheduled for destruction by the development.

7.1.7 If, in the professional judgement of the archaeologist on site, the watching brief reveals below-ground conditions which indicate that potentially archaeological levels are absent, the archaeologist should contact WYAAS to discuss reducing or curtailing the requirements. The work may only be curtailed with the prior agreement of WYAAS and written confirmation will be provided by WYAAS.

7.1.8 In the case of Saint Ann's Mills the archaeologist should take a number of photographs recording the water side elevation of the possible *water-return* pumping engine.

7.1.9 Except where otherwise requested, black and white photography using orthodox monochrome chemical development should be used. Film should be no faster than ISO400. Slower films should be used where possible as their smaller grain size yields higher definition images. Technical Pan (ISO 25), Pan-F (ISO50), FP4 (ISO125) and HP5 (ISO400) are recommended. The use of dye-based films such as Ilford XP2 and Kodak T40CN is unacceptable due to poor archiving qualities. Black and white photography should be supplemented by colour photography; this should be in transparency format (i.e. slides or digital photography as an acceptable alternative, see paragraph 7.1.9 below).

7.1.10 Digital photography: as an alternative for colour slide photography, good quality digital photography may be supplied, using cameras with a minimum resolution of 8 megapixels. Note that conventional black and white print photography is still required and constitutes the permanent record. Digital images will only be acceptable as an alternative to colour slide photography if each image is supplied in three file formats (as a RAW data file, a DNG file and as a JPEG file). The contractor must include metadata embedded in the DNG file. The metadata must include the following: the commonly used name for the site being photographed, the relevant centred OS grid coordinates for the site to at least six figures, the relevant township name, the date of photograph, the subject of the photograph, the direction of shot and the name of the organisation taking the photograph. **Any digital images are to be supplied to WYAAS on gold CDs by the archaeological contractor accompanying the hard copy of the report.**

7.2 Use of Metal Detectors on Site

7.2.1 Spoil heaps are to be scanned for both ferrous and non-ferrous metal artefacts using a metal detector capable of making this discrimination, operated by an experienced metal detector user (if necessary, operating under the supervision of the contracting archaeologist). Modern artefacts are to be noted but not retained (19th-century material and earlier should be retained.)

7.2.2 If a non-professional archaeologist is to be used to carry out the metal-detecting, a formal agreement of their position as a sub-contractor working under direction must be agreed in advance of their use on site. This formal agreement will apply whether they are paid or not. To avoid financial claims under the Treasure Act a suggested wording for this formal agreement with the metal detectorist is: "In the process of working on the archaeological investigation at [*location of site*] between the dates of

[*insert dates*], [*name of person contributing to project*] is working under direction or permission of [*name of archaeological organisation*] and hereby waives all rights to rewards for objects discovered that could otherwise be payable under the Treasure Act 1996."

8. Unexpectedly Significant or Complex Discoveries

8.1 Should there be, in the professional judgement of the archaeologist on site, unexpectedly significant or complex discoveries made that warrant more detailed recording than possible within the terms of this specification, then the archaeological contractor is to urgently contact WYAAS with the relevant information to enable the matter to be resolved with the developer.

8.2 The terms of the Treasure Act, 1996, as amended, must be followed with regard to any finds, which might fall within its purview. Any such finds must be removed to a safe place and reported to the local coroner as required by the procedures laid down in the 'Code of Practice'. Where removal cannot be effected on the same working day as the discovery, suitable security measures must be taken to protect the finds from theft.

9. Post-excavation Analysis and Reporting

9.1 On completion of the fieldwork, any samples shall be processed and all finds shall be cleaned, identified, analysed, dated (if possible), marked (if appropriate) and properly packed and stored in accordance with the requirements of national guidelines. Finds of 20th century date should be quantified and summarily described, but can then be discarded if appropriate. All finds of 19th century or earlier date should be retained and archived.

9.2 A fully indexed field archive shall be compiled consisting of all primary written documents, plans, sections, and fully labelled photographs/slides. Standards for archive compilation and transfer should conform to those outlined in *Archaeological Archives – a guide to best practice in creation, compilation, transfer and curation* (Archaeological Archives Forum, 2007). Photographic prints should be mounted in appropriate archivally-stable sleeves. Labelling should be on the *back* of the print in pencil giving film and frame number only and on applied printed labels on the front of the appropriate photographic sleeve which should include:

- film and frame number
- date recorded and photographer's name
- name and address of site
- national grid reference
- specific subject of photograph.

A quantified index to the field archive should form an appendix to the report. The original archive is to accompany the deposition of any finds, providing the landowner agrees to the deposition of finds in a publicly accessible archive (see Section 10 below). In the absence of this agreement the field archive (less finds) is to be deposited in the West Yorkshire Historic Environment Record.

9.3 A fully illustrated report should be produced, which should include background information on the need for the project, a description of the methodology employed,

and a full description and interpretation of the results, placing them in a local and regional, and if appropriate, national context. It is not envisaged that the report is likely to be published, but it should be produced with sufficient care and attention to detail to be of academic use to future researchers.

9.4 Any digital prints in the report must be made on paper and with inks which are certified against fading or other deterioration for a period of 75 years or more when used in combination. If digital printing is employed, **the contractor must** supply details of the paper/inks used in writing to the WYAAS, with supporting documentation indicating their archival stability/durability.

9.5 Location plans should be produced at a scale which enables easy site identification and which depicts the full extent of the areas covered by the watching brief (a scale of 1:50,000 is not regarded as appropriate unless accompanied by a more detailed plan or plans). Plans should be at an appropriate scale showing: areas excavated and the identified (and, where possible, predicted) archaeological features/deposits. Trench and feature plans **must** include O.D. spot heights for all principal strata and any features. Section drawings **must** include O.D heights and be cross-referenced to an appropriate plan.

9.6 All artefacts and environmental material will be analysed by a qualified and experienced specialist. Artefact analysis is to include the production of a descriptive catalogue. Finds critical for dating and interpretation should be illustrated.

9.7 Details of the style and format of the report are to be determined by the archaeological contractor, but should include a full bibliography, a quantified index to the site archive, details of the current and intended location of the archive and, as an appendix, a copy of this specification.

10. Report Submission and Deposition with the HER

10.1 **The archaeological contractor will supply a hard copy of the report to the client and another hard copy (plus a digital copy on a gold disk) directly to the WYAAS within a period of one month following completion of fieldwork**, unless a revised date has been agreed in writing with WYAAS. A copy of the final report (in .pdf format) shall also be supplied to English Heritage's Science Advisor (Andy Hammon, English Heritage, 37 Tanner Row, York Y01 6WP). Completion of this project and a recommendation from WYAAS to discharge the planning condition are dependant on receipt by WYAAS of a satisfactory report which has been prepared in accordance with this specification. Any comments made by WYAAS in response to the submission of an unsatisfactory report will be taken into account and will result in the reissue of a suitably edited report to all parties, within a timescale which has been agreed with WYAAS.

10.2 The report will be supplied on the understanding that it will be added to the West Yorkshire Historic Environment Record and will become publicly accessible once deposited with the WYAAS.

10.3 Copyright - Please note that by depositing this report, the contractor gives permission for the material presented within the document to be used by the WYAAS, in perpetuity, although The Contractor retains the right to be identified as

the author of all project documentation and reports as specified in the *Copyright, Designs and Patents Act* 1988 (chapter IV, section 79). The permission will allow the WYAAS to reproduce material, including for non-commercial use by third parties, with the copyright owner suitably acknowledged.

10.4 The West Yorkshire HER supports the Online Access to Index of Archaeological Investigations (OASIS) project. The overall aim of the OASIS project is to provide an online index to the mass of archaeological grey literature that has been produced as a result of the advent of large-scale developer funded fieldwork. The archaeological contractor must therefore complete the online OASIS form at http://ads.ahds.ac.uk/project/oasis/. Contractors are advised to contact the West Yorkshire HER officer prior to completing the form. Once a report has become a public document by submission to or incorporation into the HER, the West Yorkshire HER may place the information on a web-site. Please ensure that you and your client agree to this procedure in writing as part of the process of submitting the report to the case officer at the West Yorkshire HER.

10.5 The attached summary sheet should be completed and submitted to the WYAAS for inclusion in the summary of archaeological work in West Yorkshire published on WYAAS' website.

10.6 A brief entry for "Post-medieval Fieldwork in England and Northern Ireland" should be submitted to the Journal of the Society for Post – Medieval Archaeology.

11. Archive Deposition

11.1 Before commencing any fieldwork, the archaeological contractor must contact the relevant District museum archaeological curator in writing (copied to WYAAS) to determine the museum's requirements for the deposition of an excavation archive. In this case Katherine Baxter Leeds Museum Discovery Centre, Carlisle Road, Hunslet, Leeds, LS10 1LB Tel.: 0113 2141558 Email: katherine.baxter@leeds.gov.uk.

11.2 It is the policy of the Leeds Museum's to accept complete excavation archives, including primary site records and research archives and finds, from all excavations carried out in the District, which it serves and specific guidance for the contractor are provided (see Leeds Museum Archiving Requirements below).

11.3 It is the responsibility of the archaeological contractor to endeavour to obtain consent of the landowner, in writing, to the deposition of finds with the Leeds Museum.

11.4 It is the responsibility of the archaeological contractor to meet the Leeds Museum's requirements with regard to the preparation of fieldwork archives for deposition.

12. General Considerations

12.1 Authorised Alterations to Specification by Contractor

12.1.1 If, on first visiting the site or at any time during the course of the recording exercise, it appears in the archaeologist's professional judgement that:

i) a part or the whole of the site is not amenable to recording as detailed above, and/or
ii) an alternative approach may be more appropriate or likely to produce more informative results,

then it is expected that the archaeologist will contact WYAAS as a matter of urgency in order that the matter can be resolved in liaison with the developer and the Local Planning Authority.

12.2 Unauthorised Alterations to Specification by Contractor

12.2.1 It is the archaeological contractor's responsibility to ensure that they have obtained WYAAS's consent in writing to any variation of the specification prior to the commencement of on-site work or (where applicable) prior to the finalisation of the tender. Unauthorised variations may result in WYAAS being unable to recommend determination of the planning application to the Local Planning Authority based on the archaeological information available and are therefore made solely at the risk of the contractor.

12.3 Technical Queries

12.3.1 Similarly, any technical queries arising from the specification detailed above, should be addressed to WYAAS without delay.

12.4 Valid Period of Specification

12.4.1 This specification is valid for a period of one year from date of issue. After that time it may need to be revised to take into account new discoveries, changes in policy or the introduction of new working practices or techniques.

Name of Officer
David Hunter **December 2013**

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West Yorkshire Historic Environment Record
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WF1 2DE

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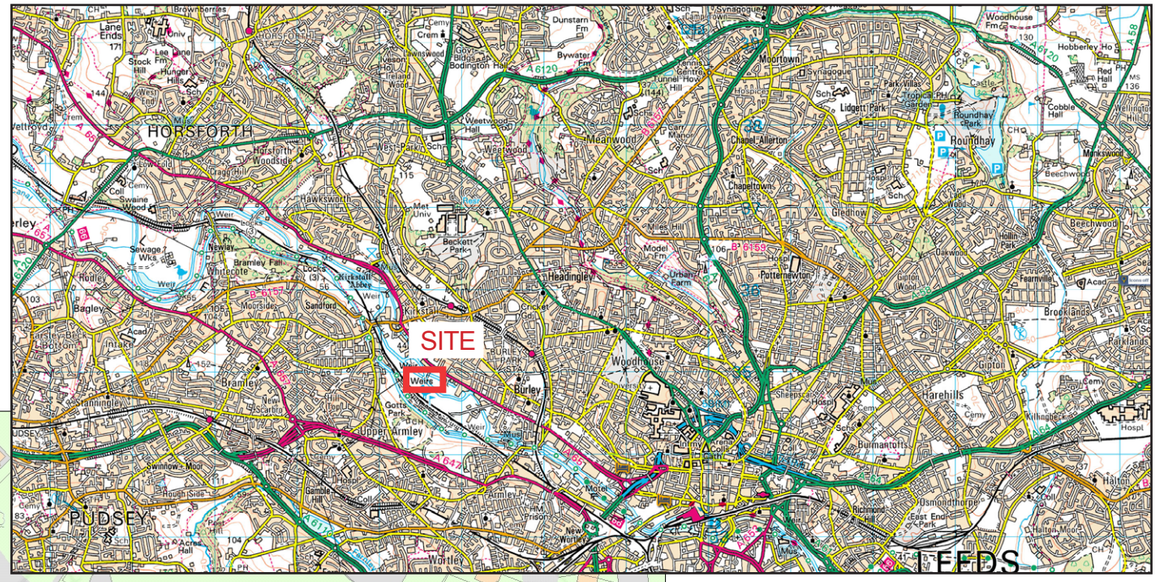
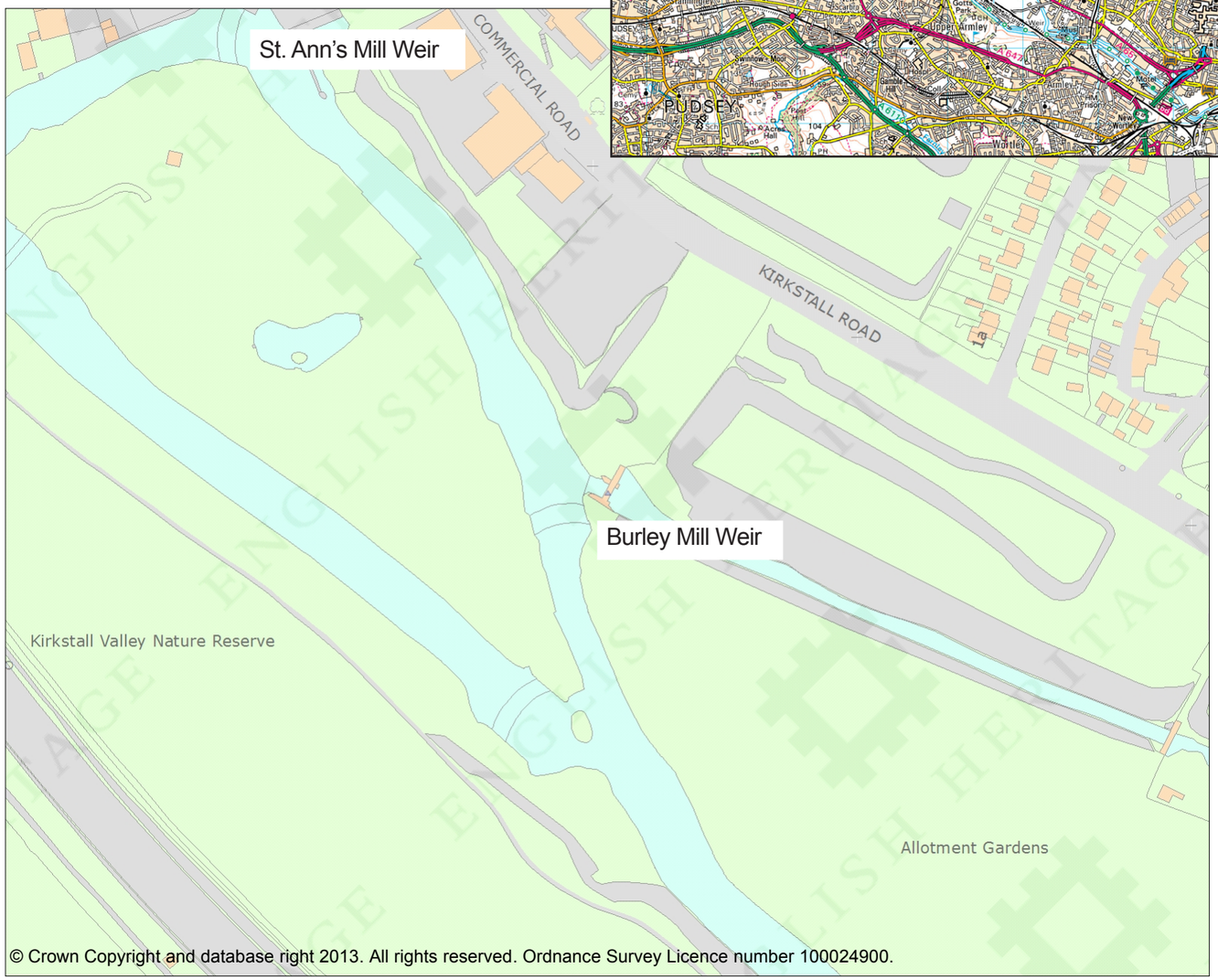
Figures 1-2





Name: WEIR AND SLUICE GATES AT NGR 2658 3497 APPROXIMATELY 450 METRES NORTH WEST OF BURLEY MILLS

Key

ENGLISH HERITAGE
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Fig. No:	Revision
1	A

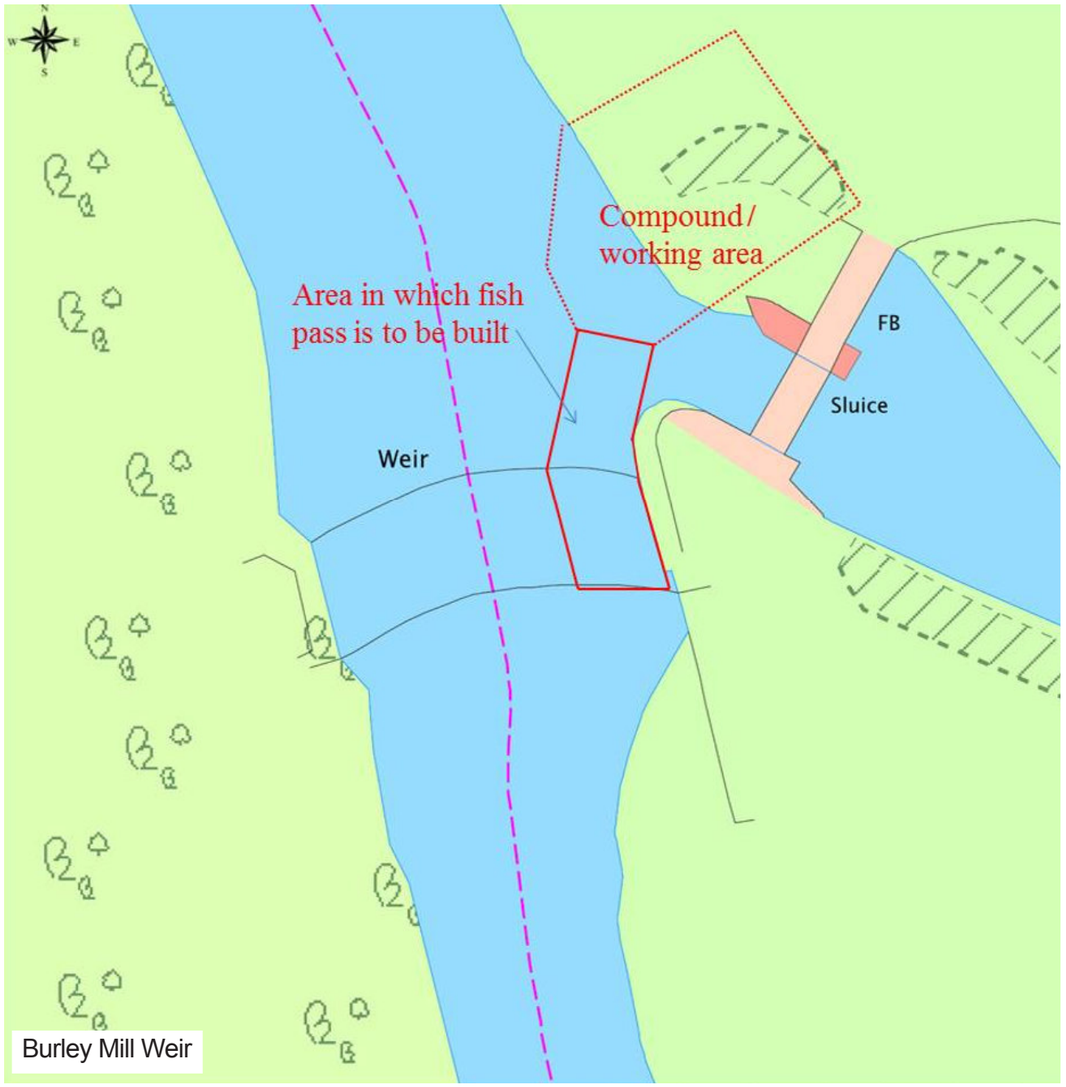
Title
Site Location

Project
St. Ann's Mill Weir and Burley Mill Weir, Kirkstall, Leeds

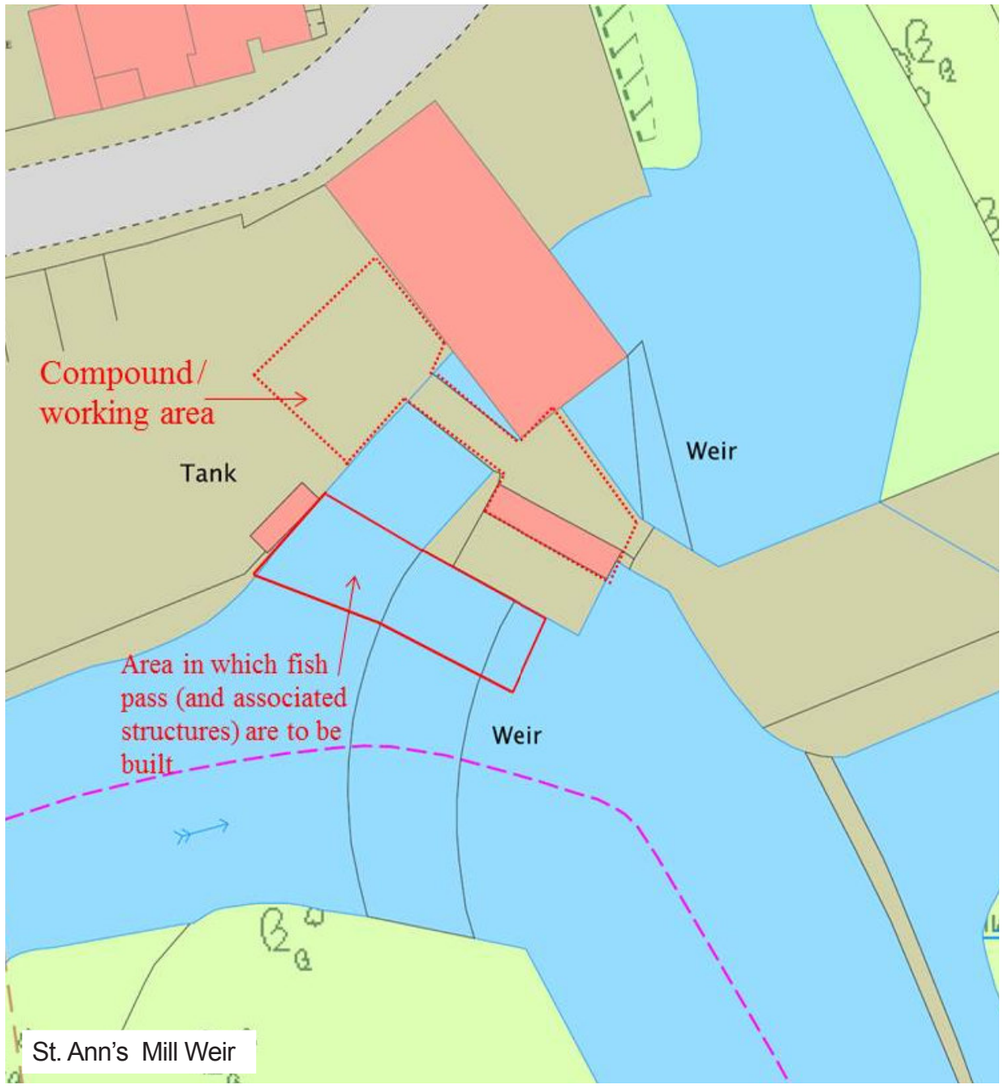
Client
Bailey Construction North West Ltd

Scale at A3
1:2500

Drawn by:	Checked by:	Report No:
TB	MB	Y157-14



Burley Mill Weir



St. Ann's Mill Weir

5m 10m 15m 20m 25m 30m 35m

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plans ahead by ema
Prepared by: Toby Coe.

Key

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Fig. No:	Revision
2	A

Title
Detailed Locations of Burley Mill Weir and St. Ann's Mill Weir

Project
St. Ann's Mill Weir and Burley Mill Weir, Kirkstall, Leeds

Client
Bailey Construction North West Ltd

Scale at A3
1:2500

Drawn by:	Checked by:	Report No:
TB	MB	Y157-14

Plates 1-8

Plate. 1 - North-west-facing shot of the fish pass excavation at St. Ann's Mill Weir

Plate. 2 - North-facing profile of St. Ann's Mill Weir Surface 001 following dismantlement

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Title: Plates 1 and 2	Fig. No:	Report: Y157-14	Drawn: TB	CKD: MB	Date: 22/05/14
	Client: Bailey Construction North West Ltd				
Project: St. Ann's Mill Weir and Burley Mill Weir, Kirkstall, Leeds	Scale:				

Plate. 3 - North-east-facing shot of St. Ann's Mill Weir following removal of Weir Surface 001

Plate. 4 - Carved face of Stone Pad 006 retrieved from the foot of St. Ann's Mill Weir

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Title: Plates 3 and 4	Fig. No:	Report: Y157-14	Drawn: TB	CKD: MB	Date: 22/05/14
	Client: Bailey Construction North West Ltd				
Project: St. Ann's Mill Weir and Burley Mill Weir, Kirkstall, Leeds	Scale:				

Plate. 5 - North-west-facing shot of Burley Mill Weir following damming of the river

Plate. 6 - Working shot of breaking up of the Weir Head (103) at Burley Mill Weir

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Title: Plates 5 and 6	Fig. No:	Report: Y157-14	Drawn: TB	CKD: MB	Date: 22/05/14
	Client: Bailey Construction North West Ltd				
Project: St. Ann's Mill Weir and Burley Mill Weir, Kirkstall, Leeds	Scale:				

Plate. 7 - West-facing profile of Weir Head 103 following excavation

Plate. 8 - East-facing profile of Weir Head 103 and Weir Wall 104 following excavation of the fish pass area

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Title: Plate 7 and 8	Fig. No:	Report: Y157-14	Drawn: TB	CKD: MB	Date: 22/05/14
	Client: Bailey Construction North West Ltd				
Project: St. Ann's Mill Weir and Burley Mill Weir, Kirkstall, Leeds	Scale:				

WEST YORKSHIRE ARCHAEOLOGY ADVISORY SERVICE SUMMARY SHEET
ARCHAEOLOGICAL FIELDWORK IN WEST YORKSHIRE

Site name/ Address; Saint Ann's Mill Weir and Burley Mill Weir	
Township: Kirkstall	**District:** Leeds
National Grid Reference: SE 26420 35170 & SE 26570 34950	
Contractor: CFA Archaeology Ltd	
Date of Work: 8 and 30 April 2014	
Title of Report: Saint Ann's Mill Weir and Burley Mill Weir, Kirkstall, Leeds Archaeological Watching Brief	
Date of Report: June 2014	

SUMMARY OF FIELDWORK RESULTS (100 WORDS OR LESS)

An archaeological watching brief was undertaken by CFA Archaeology during alterations to two weirs on the River Aire at Kirkstall, Leeds, West Yorkshire during April 2014. The two weirs, St. Ann's Mill Weir and Burley Mills Weir were altered to install fish passes. Removal of parts of the weirs and adjoining masonry exposed foundations beneath the weirs. The 'steam pump platform' at St Ann's Mill Weir was not affected.

Author of summary: Mark Bell	**Date of summary:** 18 June 2014