Hurst Reservoir, Glossop, Derbyshire

Archaeological Investigation and Recording

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SUMMARY

Hurst Impounding Reservoir, which dates to the nineteenth century, is currently being decommissioned and Hurst Brook, which feeds it, is being restored. The site is situated approximately 2km to the east of the town of Glossop, Derbyshire (NGR centred SK 057 937), in the valley of Hurst Brook at the east side of Glossop and District Golf club, accessed via a track through the course. The reservoir is approximately 600m long by 200m wide and encompasses the reservoir and associated features. An Environmental Statement was prepared and submitted with the planning application (ref NP/HPK/1212/1230) for decommissioning and restoration, which included an assessment of the impact upon archaeology and cultural heritage. A consequence of the Environmental Statement was the proposal to mitigate the disturbance or complete removal of heritage assets relating to the nineteenth century, as well as any earlier, possibly prehistoric, below-ground remains through a programme of archaeological assessment and recording. United Utilities requested that Oxford Archaeology North (OA North) consult with the Peak District National Park Authority (PDNPA) Archaeologist in order to produce proposals outlining the mitigation recording of known standing heritage assets. Additional research, an Unmanned Aerial Vehicle (UAV) survey and building survey to English Heritage Level II standard was carried out in June 2013.

The contract for the work to construct Hurst Reservoir was advertised for tender in the Manchester Guardian at the end of May 1838 and the work was awarded to Samuel Taylor who later built other reservoirs in the wider area. The engineer was Thomas Ashworth and the surveyor was a man named JF Bateman.

The UAV survey results were combined with information gathered during the walkover survey carried out by OA North in June 2012, for the purposes of the Environmental Statement, as well as a further walkover survey carried out during the latest phase of work, following the draining of the reservoir basin that may have exposed any previously submerged remains. Other than the additional retaining walls on the north side of the reservoir, no further sites of archaeological significance were discovered. The building investigation and walkover survey have revealed that, for the most part, much of the visible structures of, and associated with, Hurst Reservoir appear not to date to the original construction of 1838. Indeed, none of the main structures associated with the original layout of Hurst Reservoir were visible. Instead, most of the structures recorded appear to date to the late 1950s or early 1960s when major modifications were undertaken by The Manchester Corporation Waterworks as a result of the Glossop Water Act.

Consequently, further investigation of the upstanding structures is deemed to be unnecessary due to the mid-twentieth century origins.
ACKNOWLEDGEMENTS

Oxford Archaeology North (OA North) would like to thank David Hopkin of United Utilities for commissioning the project, and to Sarah Whiteley the Peak District National Park Archaeologist, for her input on the specification.

The additional research was undertaken by Alastair Vannan, the UAV survey by Jamie Quartermaine and the building recording was undertaken by Karl Taylor. Karl Taylor and Alastair Vannan wrote the report and the drawings were produced by Karl Taylor and Mark Tidmarsh. The project was managed by Emily Mercer, who also edited the report.
1. INTRODUCTION

1.1 CIRCUMSTANCES OF THE PROJECT

1.1.1 An Environmental Statement (ES) was prepared and submitted with a planning application (ref NP/HPK/1212/1230) in 2012 for the decommissioning of Hurst Impounding Reservoir and the restoration of Hurst Brook. The ES included an assessment of the impact upon archaeology and cultural heritage, and proposals outlined to mitigate the disturbance or complete removal of heritage assets relating to the nineteenth century industrial heritage of Glossop, as well as any earlier, possibly prehistoric, below-ground remains through a programme of further archaeological assessment and recording.

1.1.2 United Utilities requested that Oxford Archaeology North (OA North) consult with the Peak District National Park Authority (PDNPA) Archaeologist in order to agree a programme of archaeological work in line with planning conditions to investigate the potential for below-ground remains, as well as mitigation recording of those known standing remains. Proposals included a further visual inspection consisting of a walkover and Unmanned Aerial Vehicle (UAV) survey of the drained reservoir basin to identify and record any exposed previously submerged remains. Additional research of the water company archives was also proposed to investigate the potential for any recorded remains. Furthermore, an English Heritage Level 2 building survey was undertaken of the standing remains to record them prior to their removal.

1.1.3 This report sets out the results of the investigation and recording, including detailed historical research, visual inspection of the reservoir basin and valley sides, as well as the building recording, in the form of a short document outlining the findings of the site work, which was carried in June 2013.

1.2 LOCATION AND GEOLOGY

1.2.1 The site is situated approximately 2km to the east of the town of Glossop, Derbyshire (NGR centred SK 057 937; Fig 1), in the valley of the Hurst Brook. It is located at the east side of Glossop and District Golf club, accessed via a track through the course. The reservoir is approximately 600m long by 200m wide, and encompasses the reservoir and associated features.

1.2.2 The underlying geology consists primarily of shale grit which is Carboniferous sandstone. There are also areas of the Millstone Grit group which comprise mudstone, siltstone and sandstone. The are no extensive recorded superficial deposits, although there are areas of alluvium in the valley bottom (bgs.ac.uk). The soils on the western part of the site are classified as freely-draining, slightly acid soils, whilst those on the eastern part are very acid loamy upland soils with a very wet surface (landis.org.uk).
2. METHODOLOGY

2.1 PROJECT DESIGN

2.1.1 A project design was produced by OA North and approved by PDNPA, outlining the methodology for the proposed programme of archaeological work, which was adhered to in full (Appendix 1). The programme was designed to identify any archaeological deposits or features that may be present within the reservoir basin and areas of the valley sides to be impacted by the proposed decommissioning and reconstruction works. The work was also undertaken in order to mitigate the impact by means of preservation by record of any known heritage assets. The methodology for the work was carried out in accordance with best practice guidelines, including the National Planning Policy Framework (NPPF; DCLG 2012), English Heritage 1991 and Institute for Archaeologists (IfA) (2012).

2.2 HISTORICAL RESEARCH

2.2.1 The proposed development site, and an encompassing zone of 1km radius from the proposed development boundary, comprised the study area used to gather data for the previously submitted ES (OA North 2012). The aim of additional historical research concentrated specifically on the application area, focusing on the reservoir structures and their context within their immediate environs, was to examine documents and plans available within the water companies’ archives or those held within local archive repositories. Specific archives deposited by the successive administrative bodies responsible for Hurst Reservoir were not forthcoming in detailed searches of archive catalogues, although further primary documents, including plans of the reservoir, were accessed.

2.2.2 The principal sources of information consulted were historical and modern maps of the study area and information held by the Derbyshire Historic Environment Records (DHER), as well as published and unpublished secondary sources. Sources consulted include:

- **Derbyshire Historic Environment Record (DHER):** the DHER was consulted to establish the sites of archaeological interest already known within the study area. The DHER is a database of all known sites of archaeological interest in Derbyshire, and is maintained by Derbyshire County Council;

- **Glossop Local Studies Library:** the local studies section is housed within Glossop Library and holds published maps, as well as unpublished primary sources and secondary published sources;

- **Derbyshire County Record Office (DRO):** the record office holds both published and manuscript maps, as well as unpublished primary sources
and secondary published sources, relating to the areas that lie within the historic boundaries of Derbyshire;

2.2.3 **Oxford Archaeology North:** OA North has an extensive archive of secondary sources, as well as numerous unpublished client reports on work carried out both as OA North and under its former guise of Lancaster University Archaeological Unit (LUAU). These were consulted where relevant.

2.3 **Visual Inspection**

2.3.1 A visual inspection of the drained reservoir basin and valley side was carried out using a detailed photogrammetric survey undertaken by an unmanned aerial vehicle (UAV) in June 2013 by OA North from which a 3D model and 2D plans were generated (Fig 2). The model was inspected with the aim of identifying previously unknown heritage assets. A detailed walkover survey was also carried out using a *Leica 1200* series RTK GPS system to record any identified sites. Any sites discovered were to be added to the photogrammetric survey and the final drawing were produced using an industry standard CAD package.

2.4 **Building Investigation**

2.4.1 **Introduction:** a measured survey of the sites outlined in the ES associated with the reservoir (Sites 01-13, 17-18, 21-22, and 27-29 (Fig 3)) was carried to an English Heritage Level 2 standard (English Heritage 2006) as well as adhering to standard and guidance published by the IfA (2008).

2.4.2 **Descriptive Record:** written descriptive records of all the upstanding elements of the sites listed in *Section 2.4.1* above were produced. These provide a summary account of the structure’s type, form, function, date and sequence of development.

2.4.3 **Site drawings:** the photogrammetric survey (Fig 2), together with Ordnance Survey base plans supplied by the client were annotated with relevant detail for a Level 2 record using both a *Leica TCR805ultra* reflectorless total station and a highly accurate hand-held Leica Disto distance measurer, accurate to +/- 1mm. The total station was attached to a tablet computer running *TheoLT* survey software produced by *Kubit-UK*, which is a plug in for *Autodesk AutoCAD*. The final drawings were produced using *AutoCAD 2004*. The survey plans that were produced are as follows:

- ground level plans of those sites listed in *Section 2.3.1* were produced where access allowed;
- cross-sections through Site 03 (the by-wash channel) Site 04 (the Overflow Weir), and Site 18 (the dam), were produced;
• elevations of the main walls were produced including the wave wall (Site 10), the wing walls (Site 21) and two other retaining walls. These were produced using rectified photography (see Section 2.4.4);

• **Photographs:** photographs were taken with a Canon EOS 5D ‘full-frame’ digital SLR camera using a variety of lenses. Images were saved in both jpg and Canon raw format (CR2). The unprocessed raw images were then converted to 8bit exif-tif files using Canon Digital Photo Professional (DPP) software. The photographic archive consists of general images together with scaled coverage of constructional, operational and functional detail. Elevation drawings of the main walls were produced using photographs rectified through the use of Kubit PhoToPlan. Survey targets were affixed to the walls and the images were rectified using control points. Plans showing the photographic locations and directions have been generated.

2.5 **ARCHIVE**

2.5.1 A full professional archive has been compiled in accordance with current IfA (IfA 2006) and English Heritage guidelines (English Heritage 1991). The paper and digital archive will be deposited with the Preston Record Office on completion of the project, and a paper copy will be sent to the Lancashire Historic Environment Record, Preston.
3. HISTORICAL AND ARCHAEOLOGICAL BACKGROUND

3.1 BACKGROUND

3.1.1 The establishment of Hurst Reservoir: the early nineteenth century saw the expansion and improvement of communication routes that reflected the requirements of Glossop as a town that was increasing in terms of industrial development. The Sheffield to Glossop turnpike road was opened in 1821 through the Snake Pass (White 1857, 7), whilst the Sheffield to Manchester railway was built during the early nineteenth century and was open by 1842 (Pigot 1842). However, the line did not pass through Glossop and a branch line from Dinting to Howardtown was built by the Duke of Norfolk, with a station being built in 1847.

3.1.2 In 1820, eighteen textile mills were present around Glossop, all of which spun cotton and some of which were engaged in weaving (Stroud 2001, 11). By 1831, however, there were 112 cotton mills throughout Derbyshire, most of which were situated in the Longdendale and Glossop area (Quayle 2006, 60), and by 1842 Glossop was described as being of ‘great manufacturing consequence’ with the immediate vicinity of Glossop supporting spinning mills, the manufacture of textiles for calico printing, the manufacture of woollen goods, two paper mills, and coal mining within three miles of the town (Pigot 1842).

3.1.3 Consequently, the presence of industry instigated the construction of reservoirs to provide power for the mills. In 1837, fifty mill owners and gentlemen, known as the Glossop Commissioners, formed the Reservoir Company and secured an act of parliament to construct two reservoirs at Hurst Brook, Chunal Brook, and the Shelf Brook (Quayle 2006, 64; DHER 3689). Unfortunately, insufficient funding meant that only the Hurst Reservoir was constructed and the other two proposed reservoirs were abandoned (Quayle 2006, 60). It has been suggested (Sharpe 2005, 71) that the growth of steam power, and the consequent decline of water power, was also a factor in the decision not to construct all of the reservoirs, although the Mossy Lea Reservoir on the Shelf Brook was financed privately by the Duke of Norfolk (op cit, 64). The engineer for the Hurst Reservoir was Thomas Ashworth and the surveyor was a man named JF Bateman (op cit, 60) and the reservoir was built in 1838 (op cit, 71). The contract for the work to construct Hurst Reservoir was advertised for tender in the Manchester Guardian at the end of May 1838 and the work was awarded to Samuel Taylor who later built other reservoirs in the wider area (op cit, 73).

3.1.4 The increase in the economic fortunes of the town was concurrent with improvements to local amenities, and markets were established in the town in 1845, with the Glossop Gas Company being established during the same year (Stroud 2001, 9). Glossop became a post town in 1848, and in 1852 the town was provided with piped drinking water from Swineshaw (ibid). The mill owners invested in public buildings, chapels and workers’ housing, and a model of paternalistic industrialism may have sheltered the area to some
degree from the effects of the cotton famine of the early 1860s, as road and waterworks projects provided employment for cotton workers, although thousands of people left the area at this time (ibid).

3.1.5 The private individuals of the Glossop Commissioners had control of the organisation of issues relating to the reservoirs for which they were responsible, including the setting of water rates for Hurst Reservoir, as suggested in a notice of an extraordinary general meeting of the Commissioners published in the Manchester Times on Saturday 7th March, 1857 (Plate 1). In 1859, it was suggested that Glossop required a form of local government, in contrast to the organisation of amenities and works by the local gentry of the Howard family, and mill owners (Quayle 2006, 63). A Royal Charter to form the Borough of Glossop was granted in 1866 and eleven of those initially elected into this local government of aldermen led by a mayor were mill owners or cotton manufacturers (op cit, 64). The Glossop Corporation purchased local waterworks from Lord Howard in 1879, although this did not include all of the local reservoirs, and did not include Hurst Reservoir.

Plate 1: A notice placed in the Manchester Times on Saturday 7th March, 1857 relating to Hurst Reservoir by members of the Glossop Commissioners

3.1.6 On Friday August 14th 1885, the body of a man was found in Hurst Reservoir and was reported upon in the Sheffield and Rotherham Independent. On the 18th August the Sheffield and Rotherham Independent published a further report that provided fuller details of this somewhat macabre incident (Plate 2). This suggested that the location of the reservoir beyond the administrative boundaries of the Borough of Glossop had led the borough police to decline to respond to the presence of the body, and that a county policeman had also ignored the case, as he was going on holiday, resulting in the body lying in the open overnight.

3.1.7 The economic status of Glossop changed during the early twentieth century, with the closure of some of the local mills (Stroud 2001, 12). A brief period of
growth in the 1920s was followed by a slump that affected Glossop extremely badly, with 80% of the population being involved in the cotton industry (ibid). By 1931, 55.6% of the workforce was unemployed and between 1929 and 1939 16% of the population left the area. This economic decline appears to have been reflected in the viability of the local reservoirs, with numerous sites, which had been established to power mills, being taken over by the Glossop Corporation Waterworks in 1929 (Quayle 2006, 65). In 1938, it was proposed that the Glossop Corporation should consider a Water Commission to borrow £20,700 for a water reserve at Hurst Reservoir to be used for the domestic supply (Sharpe 2005, 81). Debates at council meetings included the suggestion that the expense would be too great and that it would be more expedient to repair leaks in the existing supply and the proposal did not proceed (ibid).

In 1952 the royal assent was received for the Glossop Water Act, which transferred the responsibility for Hurst Reservoir to the mayor, aldermen, and burgesses of the Borough of Glossop (Glossop Corporation) from the Glossop Commissioners (DRO Q/RP/1/401/2). In addition to this exchange of responsibility, the act also included the expansion of the reservoir holdings to include land fringing the reservoir and the construction of an additional channel along the northern edge of the reservoir, which was referred to as an ‘intended stream diversion’ and is currently known as the by-wash channel (ibid; DRO Q/RP/1/401/1). The documents also provided details of the owners of the land in the immediate vicinity of the reservoir (DRO Q/RP/1/401/1). The reservoir was held by the Commissioners of the Glossop Reservoirs, with
John Gordon Worrall named as Clerk; the Glossop Golf Club was named, with Joseph William Hall as secretary. The land to the north and east was described as rough pasture, moorland, streams, river banks, and footpath, and was owned by Alfred and Thomas Glaister, Peter Jackson, and Harry Watson. The land to the south of the reservoir was described as rough pasture, moorland, streams, river banks, and accommodation road, and was owned and occupied by Thomas Hawksworth Thornhill. The intended scheme also included the building of a filter house and pumping station at Hurst Reservoir, and the construction of an additional concrete reservoir at Brownhill to raise the water level at Hurst (Sharpe 2005, 82). The huge projected costs associated with these proposals led to council disputes and suggestions that a cheaper option would be to connect the Hurst Reservoir directly into the mains after filtration (ibid).

3.1.9 The Glossop Corporation Waterworks, including Hurst Reservoir, became part of the Manchester Corporation Waterworks in 1959 as part of a wider regrouping of the water industry (Quayle 2006, 65; Sharpe 2005, 82). Further works were undertaken at Hurst Reservoir, including the completion of works in progress and the construction of the new treatment works, which opened on 18th July 1961 (Quayle 2006, 65; Sharpe 2005, 82). An examination of historic Ordnance Survey (OS) mapping and the plan produced in association with the Glossop Water Act in c. 1952 (DRO Q/RP/1/401/2) shows the considerable alterations that were made to Hurst Reservoir between 1956 and 1968, including modifications detailed in the Glossop Water Act. It is likely that many of these modifications were undertaken between 1959 and 1961, during the alterations by Manchester Corporation Waterworks and these included the addition of a more sophisticated inlet at the south-eastern end of the reservoir and the by-wash system along the northern edge, valve and siphon chambers in the dam, as well as repairs, maintenance, and modifications of existing structures, such as the wave wall.

3.1.10 In April 1974, the water industry was nationalised, with Glossop falling within the Eastern Division of the North West Water Authority (Sharpe 2005, 82). Although the local population increased during the 1960s, as Glossop became part of the Manchester Authority (Stroud 2001, 12), Hurst Reservoir went out of service during the late twentieth century.

3.2 MAP REGRESSION

3.2.1 Whitfield Enclosure Plan of 1813 (D5066/2): the enclosure plan (Plate 3) was produced 24 years before the reservoir company was formed and, therefore, long pre-dates the construction of the reservoir. This was the first plan to show the study area at a scale and to a level of detail that approaches that of the tithe maps (Plate 4). However, similarly to the tithe maps, enclosure plans were not produced as general area surveys, in the way that the OS maps would be, but were commissioned for very specific purposes and were, therefore, selective and schematic in their presentation of data. The enclosure plan is also a record of intended enclosure and, therefore, details sub-divisions within the landscape that would not have existed at the time of the survey, some of which would not necessarily have been instituted. The plan showed that Hurst Brook ran from
Black Moor, before converging with the Span Clough brook. It ran across a large portion of the common measuring 334 acres, 2 roods, and 36 perches that was assigned to Bernard Edward Howard in the enclosure act of 1813. The Howards were a major local landowner, and within 24 years of the enclosure act part of this portion of the former common had been decided upon as the location for Hurst Reservoir, with the part of the reservoir that would occupy the northern side of Hurst Brook being marked on this plan as ‘Hamlet of Glossop’. The ruined building at the eastern end of the reservoir appears to have been depicted on this plan.

Plate 3: An extract from the Whitfield enclosure plan of 1813

Plate 4: An extract from the Whitfield tithe map of 1852
3.2.2 **Whitfield Tithe Map of 1852 (D2360/270a/5628/2):** The Whitfield tithe map (Plate 4) is the only tithe map available that shows part of the study area. The area to the north of Hurst Brook fell within the Glossop township, for which a tithe map is not held by the Derbyshire Record Office. Although part of the western side of the study area was depicted on this map, the whole of the area currently occupied by Hurst Reservoir was not shown. The map presents a somewhat perplexing view of the area, as a partially shown field system appears to lie to the east of a truncated depiction of Hurst Brook (Plate 4). This lies immediately to the east of the ancient enclosure that was shown on the enclosure plan and lies within the area that should have been occupied by the western end of the reservoir. The tithe map was produced in 1852 and, as the reservoir was constructed soon after 1837, it should have been present at the time of the survey. It appears, therefore, that due to the schematic style of the map, and because of the specific purpose of the map, in depicting areas subject to tithe, the reservoir dam was simply poorly illustrated and that the apparent field system does, in fact, represent the dam. This explains why Hurst Brook appears to have been truncated, although the significance of the sub-dividing line running through the apparent dam is unclear. This line might represent the course of the water through the dam via the sluice in the wave wall.

3.2.3 **Hurst Poor Law Map of 1857:** The poor law map was the first map to shown the reservoir with a high degree of detail and accuracy of survey (Plate 5). The map showed the early phase of the reservoir, with the fundamental design and layout that pre-dated twentieth-century additions and modifications. Although it is difficult to ascertain how schematic the plan may have been and, therefore, whether some structural elements may have been considered unnecessary for the purposes of the plan, and been excluded, the layout of the reservoir was depicted as being relatively simplistic. The dam was shown, with overflow channels to the north and south, and a structure was shown close to the base of the dam, in the location of the valve chamber, from which the main outflow from the reservoir flowed into Hurst Brook. No other significant man-made structural elements associated with the dam were shown on this map and the water appeared to follow a natural meandering path north-westwards from the dam, with no obvious indication of sluices, weirs, or man-made channels. A dark dashed line running longitudinally through the centre of the reservoir represented the boundary between the Whitfield and Glossop townships. A large quarry was shown to the north-west of the reservoir and was accessed from the north and north-west by a forking trackway.
Plate 5: An extract from the Hurst Poor Law Map of 1857

3.2.4 **OS first edition map of 1880 at 25” to 1 mile (Fig 4):** this map was more detailed than the poor law map of 1857 and also depicted additional structural elements that might not have been present when the earlier map was produced. Water entered the eastern end of the reservoir from Hurst Brook by two weirs that occupied the general locations of the current inlet flood overflow and inlet penstock overflow, and were positioned to each side of a small island. The weirs and the island were both absent from the earlier mapping. A stretch of walling was depicted running perpendicularly across Hurst Brook, to the east of the location of the double weir. An apparent bund to prevent flood water from Hurst Brook entering the reservoir was present to the south of the weirs.

3.2.5 Quarrying was visible to each side of the reservoir, and overflow weirs and channels were shown at the north-western and south-western corners of the reservoir, although the route of the overflow to the north-west was not plainly visible. A path and bridge were also shown leading to the top of the dam and
crossing the southern overflow channel. The retaining wall to the north of the compensation weir, was depicted as a field boundary on this map. To the north-west of the dam, a weir and sluice were depicted in the location of the present bridge over Hurst Brook.

3.2.6 **OS second edition map of 1898 at 25” to 1 mile (Fig 5):** this map showed a similar depiction of the reservoir to the preceding map of 1880, with some minor variations. The double weir at the eastern end of the reservoir was not shown, and the island that necessitated the double weir appeared to have been removed and consolidated into a single inlet channel. The wall across Hurst Brook, to the south-east of the reservoir, appears to have remained as part of an inlet system for the reservoir, although it is not clear whether either of the earlier weirs had been incorporated into this system and, therefore, remained in use. A small building was shown to the south-west of the wave wall. A footbridge was shown crossing Hurst Brook, to the north-west of the dam, in the location of the current bridge.

3.2.7 **OS map of 1921 at 25” to 1 mile (Fig 6):** the inlet system at the eastern end of the reservoir had been modified and expanded to include a second wall spanning the brook, located to the west of the earlier wall. The system also incorporated two weirs, one of which lay between Hurst Brook and the reservoir, and the second appears to have been placed at the southern end of a channel running north-east/south-west, to the north-eastern side of the reservoir.

Plate 6: An extract from the plan of Hurst Reservoir of c 1952

3.2.8 **Plan of Hurst Reservoir of 1952:** this plan was produced in association with the Glossop Water Act of 1952 (Plate 6). The plan showed additional lands to be acquired to increase the holding associated with the reservoir and also depicted the proposed route of the by-wash channel along the north-eastern edge of the reservoir, which was referred to as ‘intended stream diversion’. The layout of the reservoir and associated structures appeared to have been
almost identical in 1952 to the depiction provided by the OS in 1921, although the weir and sluice to the west of the dam appear to have been removed by the 1952.

3.2.9 OS map of 1968 at 6” to 1 mile 9 (Fig 5): this map was produced nine years after the incorporation of the reservoir into the Manchester Corporation Waterworks in 1959, and showed that significant modifications had been made to the reservoir complex during the 1960s. The inlet system at the south-eastern side of the reservoir had been replaced by a system of sluices and weirs that appears to correspond with the current system. The by-wash channel to the north had also been installed by this date and the southern overflow channel was no longer shown. All of the current structures and elements of the outlet system were depicted on this map, as were the reservoir houses and the water treatment plant to the north-west of the reservoir. The small building to the north-east of the inlet system was no longer shown on this map and neither was the small building to the south-west of the wave wall.
4. FIELDWORK RESULTS

4.1 INTRODUCTION

4.1.1 The following section provides a summary of the results of both the visual inspection combining the UAV survey and subsequent additional walkover survey and, a summary descriptive account of the upstanding structures identified in the ES. The sites will be discussed in turn commencing with Site 01, the inlet flood overflow.

4.2 VISUAL INSPECTION RESULTS

4.2.1 The UAV survey results were combined with information gathered during the walkover survey carried out in June 2012 for the ES as well as a further walkover survey carried out during the latest phase of work in June 2013. Following detailed analysis of the UAV survey results together with the further walkover survey, no further sites of archaeological significance were discovered, other than two additional retaining walls on the north side of the reservoir, (see Section 4.2.41).

4.3 BUILDING SURVEY RESULTS

4.3.1 Site 01, Inlet Flood Overflow: this is situated at the east end of the site and, together with Site 02 forms part of the main inlet/flood arrangements at the head of the reservoir (Fig 8). It consists of a concrete double-sided overflow ramp with a flat top that is approximately 15m wide bounded by the wing wall (Site 21) to the south and the inlet penstock overflow to the north (Plate 7), and is to the south of the main flow of the brook. There is a softwood timber-framed barrier spanning the width of the top of the ramp that appears not to be part of the original fabric of the structure. It is non-removable, being fixed to the ramp with metal brackets, and is probably simply present in order to keep animals out of the reservoir. At the base of the west slope of the ramp, there is evidence for a former debris filter in the form of several rectangular concrete indentations (Fig 8).

4.3.2 Site 02, Inlet Penstock Overflow: this forms the main inlet for the reservoir, and Hurst Brook flows directly towards it (Fig 8; Plate 8). The main body of the structure is of concrete construction, comprising several shaped blocks exhibiting several pouring episodes, probably into timber formwork. There are three sluice gates, two allowing the main flow of the brook to enter the reservoir, together with a further wider gate diverting water to the by-wash channel (Site 03). The gates to the reservoir were closed at the time of the survey.

4.3.3 The main body of the structure is, as already described, constructed from concrete. There was no evidence for reinforcing but the upstream side of the lower part of the structure is sloped in order to account for the force of water. There were originally three steel debris filters (two of which remain) also
sloping, being fitted into recesses on either side of the inlet openings. The recesses for the missing filter is still visible on the by-wash channel opening. The bed of each of the inlet channels is of concrete with large pebbly inclusions, a series of raised concrete blocks (similar to those at Site 01) are visible at the west end of the bed.

Plate 7: Site 01, inlet flood overflow

Plate 8: Site 02, inlet penstock overflow
Plate 9: Worm drive operated sluice gates at Site 02

Plate 10: The sliding mechanism for the gates at Site 02

4.3.4 Access to the top of the structure is via a flight of concrete steps on the north side, which is approximately 3m above the level of the stream bed and is surrounded on all sides by a tubular steel handrail of one or two phases. The sluice gates are fitted to the west side of the openings and are raised and
lowered via a manually operated worm drive system (Plate 9). The gates slide up and down steel channels set into the concrete on either side (Plate 10). The gates, the frame and the worm drives are all of steel construction, no makers’ names are evident.

4.3.5 There are two substantial stone walls abutting and projecting from the west face of the structure which are constructed from random, sawn and pitched-faced sandstone, with sandstone copings (Plate 11). These are of similar appearance to the wing walls (Sites 21 and 22), the meter house (Site 07), the valve chamber (Site 09) and the siphon chamber (Site 10). They are clearly of a later phase than the main concrete structure.

Plate 11: Sandstone walls abutting the west side of Site 02

4.3.6 **Site 03, By-wash Channel:** this is a long channel, following a course around the north side of the reservoir, that connects the north gate of the inlet penstock overflow (Site 02) to the overflow weir (Site 04) (Fig 3 and 9). It is approximately 390m long, with straight sections and three bends. The bed level drops by approximately 5m over the whole length. The west end of the channel is controlled by a sluice gate (see Section 4.2.3) which was open at the time of the survey, allowing Hurst Brook to flow down the channel.

4.3.7 The channel sides are constructed from sectional concrete of similar appearance to that used at Site 02, with a clearly visible horizontal pouring scar and formwork impressions. The external faces of the sides are mainly sunken into the ground but concrete copings are visible (Plate 12). The bed of the channel is of rough concrete, with large pebbly inclusions laid in sections. It dips in the centre to allow water to flow more easily. Close to Site 04, the overflow weir, the channel measures some 4m wide by 2m deep (Fig 10).
4.3.8 **Site 04, Overflow Weir:** situated at the north-west corner of the reservoir, this structure serves two purposes: to allow for the control of water flowing down the by-wash channel (Site 03) via a ladder weir; and to provide overflow for the main body of the reservoir via a crest weir (Plate 13).

4.3.9 The walls and bed of the ladder weir are constructed in exactly the same manner as the by-wash channel (Site 03) (Plate 14), and it connects the by-wash channel to the overflow channel (Site 05). There are nine steps down
from the by-wash channel, the level dropping by approximately 2m down to where the channel widens out to accommodate the overflow crest weir from the main reservoir. This is approximately 35m long and forms a curving concrete convex wall. The reservoir side of the weir was obscured at the time of the survey due to the presence of mesh, but could be seen to be constructed from large blocks of sandstone.

4.3.10 **Site 05, Overflow Channel:** this curves around the north-west corner of the main dam (Site 18) and connects the overflow weir (Site 04) to the compensation weir (Site 08). The feature is raised above the main slope of the dam. The channel is constructed from concrete in the same manner as Site 03 and Site 04 (Plate 14), although the width varies along the length. A concrete footbridge (Site 06) spans the channel where it meets the overflow weir (Fig 9).

![Plate 14: Wall construction details of the by-wash channel (Site 03), the overflow weir (Site 04) and the overflow channel (Site 05)](image)

4.3.11 The bed of the channel drops in height by approximately 16m from the top to the bottom, a ladder weir with 24 steps forming a cascade down the slope of the dam (Plate 15) toward the compensation weir (Site 08). The walls of the channel vary in height down the slope as does the thickness of the walls, those being thicker at the base of the weir. The walls have sandstone copings along their entire length. A further footbridge of concrete construction spans the channel at the base, identical to that at the top (Site 06).

4.3.12 At the base of the ladder weir, the channel flattens and widens out (Fig 2) the flow of water slows, eventually meeting the compensation weir (Site 08) (Plate 16). There is a slipway allowing access to the channel from which is constructed from a slab of concrete, 2.9m wide, of similar appearance to the bed of the channel (Plate 17). The slipway is angled in to the direction of flow.
and there is a gap below part of it to allow water to pass beneath. It appears that the slab of the slipway rests directly on top of the bed of the channel.

4.3.13 There are a number of outflows and pipes in the east wall of the overflow channel close to where it meets the compensation weir (Site 08) most of which appear to emanate from the direction of the valve chamber (Site 09).

Plate 15: Site 05, the overflow channel

Plate 16: The overflow channel (Site 05) where it meets the compensation weir (Site 08)
Plate 17: Slipway at the base of the overflow channel (Site 05)

Plate 18: Footbridge spanning the top of the overflow channel (Site 05)

4.3.14 **Site 06, Footbridge:** there are two footbridges, of identical construction at the top bottom of the ladder weir within Site 05 (Fig 12). The footbridges are constructed from a single span of (presumably) reinforced concrete, and appear to have been constructed at the same time as the main channels (Plate 18). The footbridge at the top allows access to and from the footway at the top of the dam, while that at the bottom allows access to and from the valve chamber (Site 09).
4.3.15 The bridges are 1.22m wide and approximately 0.25cm thick with two supporting concrete brackets at either end (Plate 18). Each bridge has a handrail identical to those on the walkway of the inlet penstock overflow (Site 02).

4.3.16 **Site 07, Meter House:** this is a small flat-roofed building situated adjacent to the compensation weir (Site 08) at the west end of the site, close to where the semi-natural flow of Hurst Brook resumes (Plate 19; Fig 12). It is of a single-storey and is constructed of sawn-and-pitched faced random sandstone blocks in a manner identical to the wing walls (Sites 21 and 22) and the walls abutting the inlet penstock overflow (Site 02). The corners of the building, and window and door apertures exhibit furrowed rustication. There was no access to the building at the time of the survey.

4.3.17 There is a single doorway in the east elevation, which is accessed via a flight of concrete steps with tubular steel handrail of similar appearance to those elsewhere on the site. The door is modern in appearance and has a sandstone lintel that continues around the upper part of the building as a band (Plate 19). The single window in the north elevation has a steel casement with a protective mesh grille and a flush sandstone lintel with a slightly projecting sandstone sill.

4.3.18 The building abuts against, and is constructed around, the concrete wall of the adjacent compensation weir (Site 08) suggesting it is either later than it or has been rebuilt. The concrete steps appear to be replacements for an earlier arrangement and a blocked aperture is visible in the east elevation below the steps.

Plate 19: Site 07, the meter house
4.3.19 **Site 08, Compensation Weir:** there was no access to the compensation weir at the time of the survey and all observations were made from north side of the bank. The weir is situated at the end of the overflow channel (Site 05; Fig 12) and consists of a straight concrete crest weir with a central recess, together with a lower block stone ramp with alternating raised concrete blocks at the top to catch debris (Plate 20). The weir is approximately 12.6m wide and spans the whole width of the channel. The lip of the concrete crest weir is
approximately 0.7m high and the stone ramp is approximately 10m long. Two cast iron pipes project from either side of the face of the concrete weir. The ramp and weir are separated by a flat concrete section that is approximately 3m wide.

4.3.20 The end of the concrete channel walls are clearly visible where they butt against the stone walls of the Outflow Channel (Site 13; Plate 21). The outflow channel runs to the concrete bridge over Hurst Brook (Site 12). It is of random, squared, coursed stonework with numerous drainage slits and pipes (Plate 21).

4.3.21 **Site 09, Valve Chamber:** this building is situated at the base of the dam (Site 18) at one end of the concrete Culvert (Site 17) between this building and the Siphon Chamber (Site 10; Fig 12). The building is constructed in a similar manner and materials as the meter house (Site 07), the main difference being the larger quoins on this building (Plate 22). The building is of a single-storey with a flat roof, and there was no access to the building at the time of the survey.

4.3.22 The building is rectangular in plan and measures approximately 6.7m by 4.9m, and has three blocked windows (one on each of the north, south and west elevations), and a double steel door entrance on the north elevation. All of the openings have concrete sills and projecting concrete lintels. A low parapet wall with concrete copings surrounds the flat, bitumen roof. Surrounding the building is a 1.2m wide stone flagged pathway which is partially overgrown.

Plate 22: Site 09, the valve house

4.3.23 To the east of the building is a retaining wall constructed from random and coursed, roughly-squared sandstone with a canted sandstone coping (Plate 23). The wall is approximately 1.6m high by 8.9m long, and is present due to the building platform being cut into the slope. A flight of concrete steps allows
access to a walkway above the wall that continues to the base of the culvert (Site 17).

Plate 23: Retaining wall and steps adjacent to the valve chamber (Site 09)

Plate 24: The main elevation of the siphon chamber (Site 10).

4.3.24 **Site 10, Siphon Chamber:** this building is situated at the top of the culvert (Site 17) that runs between it and the valve chamber (Site 09) (Fig 13). Much of the building is below ground, within the main body of the upper dam (Site 18), only the west elevation (with two side walls and two wing walls), and the
eastern part of the building being visible above ground (Plate 24). There was no access to the interior of the building at the time of the survey.

4.3.25 The main visible part of the building is the west elevation together with the wing walls that cut into the slope of the dam (Fig 13). The walls are constructed from similar stone work as other buildings elsewhere on site, and are plain with substantial canted sandstone copings. The tops of the side walls slope down to match the slope of the dam, and the wing walls project perpendicularly from the end of these. The principal elevation is set deep in to the body of the dam, and contains a single doorway with a timber door and a flush sandstone sill. The recessed area contains a substantial concrete step, together with smaller concrete steps allowing access to the main door.

4.3.26 The two side walls butt against the main elevation, the vertical joins being clearly visible at each side. Attached to the ends of the side walls are two wing walls that act as retaining walls. The south wall is of random rubble construction with a smooth sandstone coping, whilst the other side is shorter and is of the same fabric as the main structure. A flight of concrete steps allow access to the walkway at the top of the dam, are identical to those at the base of, and up the side of, the culvert.

4.3.27 The east side of the siphon chamber is visible as a structure projecting from the east-facing slope of the dam (the reservoir lining). Unfortunately, this was unable to be inspected due to the whole extent of the lining being covered with fine plastic mesh. The structure did, however, appear to be of concrete construction.

4.3.28 **Site 11, Wave Wall:** the wave wall runs along the crest of the dam and curves around the south-west corner of the reservoir (Plate 25). It is mainly constructed from partly-coursed squared, rock-faced sandstone with mainly cement-based mortar (Plate 26) (Fig 14). The wall is approximately 1.25m high for much of its length on the west side and over 2m high on the east, and has substantial sandstone coping stones. The wall is battered, being approximately 0.25-0.3m wide at the coping and approximately 0.5m wide at the base (Plate 26). Some rebuilding and repair is evident and the extreme south-west section of wall (where it curves around the reservoir lining) has been removed. The remaining south-west section of wall is constructed of slightly smaller stones than the main body of the wall.

4.3.29 The base of the wall at the southern end is partly visible and concrete footings can clearly be observed. The concrete appears to be of relatively recent origin indeed; the cross-section through the wall in this area (Plate 26) shows cement-based mortar in the interior of the wall indicating that the wall has been rebuilt. There was no such footing visible on the main part of the wall along the crest of the dam. Parts of the wave wall may date to the nineteenth century phases of the reservoir.
Plate 25: General view of the wave wall (Site 11)

Plate 26: Cross-section through the wave wall at the southern end, showing the general method of construction

4.3.30 **Site 12, Concrete Bridge over Hurst Brook:** this bridge lies at the end of the outflow channel (Site 13) and forms the boundary between the managed and unmanaged parts of the system (Fig 15). Below this bridge, the brook appears to flow in its natural channel. The bridge is of single span concrete beam construction, the east end of which rests on a stone abutment while the west end is supported by a stone pier (Plate 27). The bridge is approximately 3.7m wide by 14.5m long, the deck being approximately 0.35m thick.
There are two main concrete ribs that support a concrete deck (covered in tarmacadam) either side of which are tubular steel guard rails identical to those used elsewhere across the site. The stone pier and abutment are of similar construction to other buildings on site but appear to have been rebuilt relatively recently. There are substantial concrete copings on each. Although access to the area below the bridge was limited, it could be observed that a large diameter cast-iron pipe ran along the underside of the deck between the ribs. The purpose of this remains unknown. The stream bed below the bridge is of a single large slab of concrete that forms the crest of a weir on the west side.

Site 13, Outflow Channel: this sinuous channel connects the compensation weir (Site 08) with the weir below the concrete bridge described in Section 4.2.31 (Plate 28). For much of the length, the sides are lined with random squared-stone walls that are approximately 1.2m deep, although the height reduces toward the west end and there are various drainage slits in both walls. The tops of the walls are simply cemented. The bed of the channel consists partly of what appears to be a natural stony stream bed and large concrete slabs of similar appearance to the pebbly concrete used in the bed of the other channels (Sites 03 and 05).

Close to the bridge, at the west end of the channel, the slope steepens on the south side necessitating the construction of a retaining wall (Plate 29; Fig 15). This is of random, squared-stone, unlike any of the walls described so far. Some of the blocks exhibit toolmarks and the wall may be of nineteenth-century origin.
4.3.34 **Site 17, the Culvert:** this runs up the slope of the dam (Site 18) between the valve chamber (Site 09) and the siphon chamber (Site 10) (Plate 30; Fig 13). It consists of a sunken concrete culvert with 76 individual concrete covers fixed with steel bolts (Plate 31). A flight of steps (67 in all) with kerbstones is situated to one side, which allow pedestrian access between Sites 09 and 10. Each of the covers measures 1.46m by 0.38m, the whole width of the steps and culvert measuring some 2.63m wide. Although none of the covers could be lifted, several pipes were observed to be present within the culvert.
4.3.35 **Site 18, the Dam:** the dam is a massive earthwork construction spanning the valley bottom of the former Hurst Brook (Figs 2 and 3; Plate 32). The overflow channel (Site 05) is built onto the northern part of the slope and an access road climbs the southern side. The valve house (Site 09), the culvert (Site 17) and the siphon house (Site 10) are built into the centre of it. It is grassed on the west slope, whilst the east slope forms part of the reservoir lining (Plate 33; Fig 13). This was unable to be inspected at the time of
fieldwork due to it being covered in fine mesh. It appeared to be covered with large stone blocks, however, which is similar to areas observed on the south side of the reservoir (Site 29).

Plate 32: General view of the west slope of the dam (Site 18)

Plate 33: General view of the east slope of the dam (Site 18)

4.3.36 The dam is asymmetrical, the slope on the west side being longer and shallower than that on the east (Fig 16). The crest of the dam is flat, upon which the wave wall and a narrow concrete flagged footway is present. There is no evidence for former overflows or other structures.
4.3.37 **Site 21, Wing Walls:** these are situated at the east end of the reservoir flanking the inlet overflow (Site 01) and inlet penstock overflow (Fig 8). The walls are identically constructed (Fig 16) and are of similar appearance to the valve chamber (Site 09) and siphon chamber (Site 10) (Plates 34 and 35). They are also identical in construction to the walls abutting the west side of the inlet penstock overflow. The average height of both of these walls is approximately 1m but the height is variable along the length of the walls due to the terrain. The walls both have sandstone copings.

Plate 34: The south wing wall (Site 21)

Plate 35: The north wing wall (Site 21)
4.3.38 **Site 22, Channel Consolidation:** the area immediately to the east of Sites 01 and 02, contains a series of earthworks, together with a low wall and a stone rectangular structure. The earthworks were discussed in some detail in the ES (OA North 2012). The low wall is constructed from random rubble with flat sandstone coping, which slopes to the west. It is approximately 0.9m high by 0.4m wide and follows a curvilinear course along the north bank of Hurst Brook, and appears to have been constructed to consolidate the bank and to direct water toward the inlet penstock overflow (Site 02).

4.3.39 To the north-east of this, the remains of a rectangular dry-stone structure (Site 23) are visible, also discussed in some detail in the ES (*ibid*). It is approximately 6.5m long by 4m wide and survives to a height of not more than 0.5m. A large amount of stone debris is present, probably from the building itself.

4.3.40 **Site 27, Retaining Wall:** this retaining wall, (*ibid*), was situated on the south side of the reservoir but is no longer visible. The wall was 2m high by 1m wide and was probably removed prior to, or during recent visible ground works. There is however, a further retaining wall on the north side of the reservoir at the top of the lining and below the by-wash channel (Site 03). The wall, although continuous, consists of two separate sections, each of differing construction (Plate 36).

Plate 36: Retaining wall on the north site of the reservoir, also showing the fine mesh lining on the reservoir lining

4.3.41 The western section is approximately 33m long and around 1.5m high, and is constructed from quite large sawn-and-pitched sandstone blocks, with little mortar (Fig 18) and a large sandstone coping. The wall curves at the western end and butts against the south concrete wall of the by-wash channel (Site 03). The other section of the wall is longer, running to approximately 100m, following a sinuous course along the contour. This wall is constructed from
coursed, squared sandstone, without a coping (Fig 18). The wall is battered slightly, and there are numerous equally-spaced drainage holes, that have been filled with expanding polyurethane foam. Where the two walls meet is rough and unfinished, the western wall probably being the more recently constructed of the two (Plate 37). The footings of both of the walls are visible and appear to be of stone overlaid with a course of concrete (Plate 38). This may indicate that either the walls have been repaired, or even rebuilt.

Plate 37: Meeting point between the two sections of retaining wall on the north side

Plate 38: The footings of the retaining wall on the north side of the reservoir
4.3.42 **Sites 28 and 29, the Reservoir Lining:** for the most part, the lining of the reservoir is hidden beneath a blanket of very fine mesh which prohibits inspection (Plate 36). Access to the lining was limited due to health and safety concerns as the underlying surface was uneven and covered in vegetation in places. An area of lining was visible however, on the south side of the reservoir and comprised randomly-laid, large sandstone blocks of varying sizes (Plate 39). Approximately 50m of this survives in a band around 3m wide.

Plate 39: Surviving length of visible reservoir lining
5. CONCLUSION

5.1 INTRODUCTION

5.1.1 The UAV survey, walkover survey, and building investigation have revealed that, for the most part, much of the visible structures associated with Hurst Reservoir appear not to date to the original construction in 1838.

5.2 DISCUSSION

5.2.1 The first detailed map of the reservoir, the Hurst Poor Law Map of 1857 (Section 3.2.3) shows the extents of the reservoir (probably with some of the structures omitted), as constructed. The following maps of 1880, 1898 and 1921-22 shows the reservoir in greater detail, including changes to the weirs at the eastern end. None of the main structures associated with the layout illustrated on these maps are visible on the ground. Most of the structures recorded as part of the building survey appear to date to the time of major modifications to the reservoir between 1956 and 1968, including modifications detailed in the Glossop Water Act in 1952. It is likely that many of these modifications were undertaken between 1959 and 1961, during the alterations by Manchester Corporation Waterworks. These alterations were the end result of a decline in economic activity in the area in the earlier twentieth century meaning that the need for water to supply mills in Glossop reduced dramatically. Ultimately, the reservoir was converted for domestic supply use.

5.2.2 The modification of the existing fabric probably also included structures that may have belonged to the original phases of the reservoir, such as the wave wall, as an exposed section of the base of this wall at the south end of the dam shows it to have been constructed on concrete footings. It is possible however, that some parts of the wall may be as originally constructed, as the footings were below ground for much of the length.

5.2.3 It is possible that the reservoir lining dates to the first phases of the construction of the dam but much of it was covered with fine mesh sheeting and was, therefore, unable to be inspected. The dam is certainly part of the original fabric of Hurst Reservoir, and its current appearance is similar to that illustrated in the nineteenth century maps. It has been slightly modified, however, by the installation of the overflow channel (Site 05) and the construction of the valve chamber (Site 09), the siphon chamber (Site 10) and the culvert (Site 17).

5.2.4 The east end of the reservoir contains several features discussed in some detail in the ES (OA North 2012) (Site 22). These appear as several areas of spoil heaps, together with a retaining wall and collapsed stone building. The nature of the inlet system was modified during the changes in the late 1950s and early 1960s and this appears to have necessitated a change in the channel of Hurst Brook. It is probable that these spoil heaps relate to this period of change. The low rectangular stone structure is in the same general location as a building
illustrated on mapping until 1921-22. This building is not illustrated on the 1968 map. It is probable that this structure was a former field barn of unknown date.

5.2.5 The outflow channel (Site 13) exits the west end of the reservoir from the compensation weir (Site 08) and flows through a semi-natural and stone-lined channel with a part-concrete bed, toward the natural course of the brook. The current channel follows a course similar to that illustrated on the map of 1968, and differs considerably from that illustrated on the maps prior to this date. The channel and its lining probably date to the twentieth century modifications. The survey has revealed that most of the features pertaining to the original phases of the reservoir have not survived the mid-twentieth century alterations to the reservoir.

5.3 **RECOMMENDATIONS**

5.3.1 The removal of much of the earlier, original fabric and replacement by mid-late twentieth century structures negate the requirement for further investigative works.
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APPENDIX 1: PROJECT DESIGN

1 INTRODUCTION

1.1 PROJECT BACKGROUND

1.1.1 United Utilities (hereafter the ‘client’) has requested that Oxford Archaeology North (OA North) consult with the Peak District National Park Authority (PDNPA) Archaeologist regarding the work required to fulfil the planning conditions associated with the decommissioning of the nineteenth century Hurst impounding reservoir and restoration of Hurst Brook, to the east of Glossop, Derbyshire (NGR centred SK 057 937). An Environmental Statement (ES) was prepared and submitted with the planning application (ref NP/HPK/1212/1230), which included an assessment of the impact upon archaeology and cultural heritage. A consequence of the ES was the proposal to mitigate the disturbance or complete removal of heritage assets relating to the nineteenth century industrial heritage of Glossop, as well as any earlier, possibly prehistoric, below-ground remains through a programme of archaeological assessment and recording.

1.1.2 The following project design, for approval by the PDNPA Archaeologist, details the first phase of investigation of the potential for below ground remains identified in the ES, as well as mitigation recording of those known standing remains. The proposed programme of work includes:

- a visual inspection of the reservoir basin and valley sides, using a high resolution digital photographic record obtained from OA North’s Unmanned Aerial Vehicle (UAV) during April 2013, combined with a detailed walkover. Any archaeological remains identified will be discussed with the PDNPA Archaeologist and an appropriation mitigation agreed for Phase 2.

- a programme of building recording to English Heritage Level 2 (English Heritage 2008) of all the standing structural remains (Sites 01-13, 17-18, 21-22, and 27-29 in the ES), which will preserve the features by record.

- detailed historical research of any available archives for the water company that focuses on the establishment, construction and use of the reservoir, in which to set the results of the building recording and any other site work into context.

- watching brief during removal and associated groundworks of Sites 01, 04, 11, 19, 25, 27-9, 30-31, 35, 52-3 and 55-6 of the ES.

1.1.3 A programme of palaeoenvironmental work is also currently being carried out by OA North, which will inform the potential for unknown buried archaeological remains. This will contribute to a proposal to investigate and mitigate such previously remains, some of which may be also discovered as a result of the visual inspection. Any further work for a Phase 2 assessment and/or mitigation programme, e.g. geophysical survey or trial trenching, will be dealt with in a separate project design.

1.2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

1.2.1 Hurst Reservoir was constructed in, or soon after, 1837, in response to the need for water power to power mills during an era of local industrial expansion. Following the passage of the reservoir into the hands of the Manchester Corporation Waterworks in 1959, modifications and additions were made to the complex of structures that combine to form the reservoir. The current proposed construction works will comprise the removal of many of the components of the reservoir.
1.2.2 In total, 55 non-designated heritage assets were identified during the Environmental Impact Assessment, within the study area consisting of the proposed development area and a 1km buffer zone. Of these sites, 34 lie within the application site and most of these are components of Hurst Reservoir. Due to the long history of human activity and habitation in the surrounding area, there is potential for the presence of previously unidentified sub-surface remains, including sites that might qualify as heritage assets, within the outlined development site. In addition to the likelihood of sites associated with earlier phases of the reservoir, it is also possible that sites pre-dating the establishment of the reservoir might survive within the area.

1.2.3 Twenty of the identified heritage assets will be impacted upon as a direct result of demolition works, and 12 sites will be impacted upon as a result of profiling work and the movement of plant and vehicles. All of the predicted impacts on known heritage assets will occur within the construction phase. In the absence of mitigation, the overall impact of the proposed development on the known archaeology and cultural heritage resource was assessed as moderate, but this could be reduced by the implementation of mitigation measures such as building recording, an archaeological watching brief, and detailed historical research to contextualise the findings of these investigations. The implementation of these mitigation measures would reduce the overall impact of the proposed development to minor/negligible.

<table>
<thead>
<tr>
<th>Gaz. No.</th>
<th>Heritage Asset</th>
<th>Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>inlet flood overflow</td>
<td>Building recording and watching brief</td>
</tr>
<tr>
<td>02</td>
<td>Inlet Penstock Overflow</td>
<td>Building recording and watching brief</td>
</tr>
<tr>
<td>03</td>
<td>By-wash Channel</td>
<td>Building recording</td>
</tr>
<tr>
<td>04</td>
<td>Overflow Weir</td>
<td>Building recording and watching brief</td>
</tr>
<tr>
<td>05</td>
<td>Overflow Channel</td>
<td>Building recording</td>
</tr>
<tr>
<td>06</td>
<td>Footbridge</td>
<td>Building recording</td>
</tr>
<tr>
<td>07</td>
<td>Meter House</td>
<td>Building recording</td>
</tr>
<tr>
<td>08</td>
<td>Compensation Weir</td>
<td>Building recording</td>
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<tr>
<td>09</td>
<td>Valve Chamber</td>
<td>Building recording</td>
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<tr>
<td>10</td>
<td>Siphon Chamber</td>
<td>Building recording</td>
</tr>
<tr>
<td>11</td>
<td>Wave Wall</td>
<td>Building recording and watching brief</td>
</tr>
<tr>
<td>13</td>
<td>Outflow Channel</td>
<td>Building recording and watching brief</td>
</tr>
<tr>
<td>14</td>
<td>Outflow Pipe</td>
<td>None</td>
</tr>
<tr>
<td>15</td>
<td>Track</td>
<td>Watching brief</td>
</tr>
<tr>
<td>17</td>
<td>Culvert</td>
<td>Building recording and watching brief</td>
</tr>
<tr>
<td>18</td>
<td>Dam</td>
<td>Building recording and watching brief</td>
</tr>
<tr>
<td>19</td>
<td>Quarry</td>
<td>Watching brief</td>
</tr>
<tr>
<td>21</td>
<td>Wing Walls</td>
<td>Building recording and watching brief</td>
</tr>
<tr>
<td>22</td>
<td>Channel Consolidation</td>
<td>Building recording</td>
</tr>
<tr>
<td>25</td>
<td>Bund</td>
<td>Watching brief</td>
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<td>27</td>
<td>Retaining Wall</td>
<td>Building recording and watching brief</td>
</tr>
<tr>
<td>28</td>
<td>Reservoir Lining</td>
<td>Building recording and watching brief</td>
</tr>
<tr>
<td>29</td>
<td>Reservoir Lining</td>
<td>Building recording and watching brief</td>
</tr>
<tr>
<td>30</td>
<td>Quarry</td>
<td>Watching brief</td>
</tr>
</tbody>
</table>
1.3 **OXFORD ARCHAEOLOGY NORTH**

1.3.1 Oxford Archaeology North has considerable experience of sites of all periods, having undertaken a great number of small and large scale projects throughout Northern England during the past three decades. Evaluations, assessments, watching briefs and excavations have taken place within the planning process, to fulfil the requirements of clients and planning authorities, to very rigorous timetables.

1.3.2 OA North has the professional expertise and resources to undertake the project detailed below to a high level of quality and efficiency. OA North is an Institute for Archaeologists (IfA) registered organisation, registration number 17, and all its members of staff operate subject to the IfA *Code of Conduct* (2012).

2. **OBJECTIVES**

2.1 The following programme has been designed to identify any archaeological deposits or features that may be present within the reservoir basin and areas of the valley sides to be impacted by the proposed decommissioning and reconstruction works in order that a mitigation strategy may be agreed. In addition, work will also be undertaken in order to mitigate the impact by means of preservation by record of any known heritage assets, and will be carried out in accordance with best practice guidelines, including English Heritage (1991 and 2006) and IfA (2008a, b and 2012), and in line with the requirements of the National Planning Policy Framework (NPPF; DCLG 2012).

2.2 **Visual Inspection:** a detailed high resolution topographic record has been undertaken by means of a UAV. This will be examined and analysed in detail and combined with information from a detailed walked inspection for any previously unknown heritage assets that may require mitigation recording.

2.3 **Standing Building Recording and Watching Brief:** upstanding structures such as walls, adits, dams and other associated buildings/structures associated with the reservoir, and identified in the ES (Sites 01-13, 17-18, 21-22, and 27-29) will be subject to an English Heritage Level 2 measured survey (English Heritage 2006). The work will also adhere to IfA standards (IfA 2008). The watching brief will aim to record any features previously obscured from view during the main phase of building recording that is revealed during demolition.

2.4 **Historical Research:** any surviving archives of the construction and running of the reservoir during the early phases will be examined in order to inform the field work.

2.5 **Report Production:** a written report will be produced following completion of the fieldwork and research, and will assess the significance of the data generated by this programme within the context of the previous investigations. A site archive will be produced to English Heritage guidelines (1991) and in accordance with the *Guidelines for the Preparation of Excavation Archives for Long Term Storage* (UKIC 1990).
3. METHOD STATEMENT

3.1 VISUAL INSPECTION

3.1.1 Following a detailed photogrammetric survey undertaken using a UAV in April 2013, a 3D model has now been generated, using Agisoft Photoscan Pro software to combine the photographs and to compute the positions that the images were taken from, that can be viewed as 2D plans or in 3D within Adobe Acrobat. The level of the image is such that individual stones are clearly defined. This model will be inspected, along with a walkover inspection, to identify previously unknown heritage assets that will be impacted. The positions of such sites will be recorded by means of GPS and plotted on a plan of the site. The aim is to propose appropriate mitigation to record or further investigate the assets, which will be agreed with the PDNPA Archaeologist.

3.2 BUILDING RECORDING

3.2.1 Introduction: measured survey of features associated with the reservoir will be carried out to English Heritage Level 2 guidelines (English Heritage 2006). This level of recording is essentially descriptive and is generally carried out when a fuller record is not required.

3.2.2 Descriptive Record: written descriptive records of all upstanding elements will be captured using OA North pro forma record sheet. These will be carried out to English Heritage Level 2 guidelines. Level 2 descriptive records provide a summary account of a building’s/structure’s type, form, function, date and sequence of development.

3.2.3 Survey Drawings: as part of the project, OA North has already carried out a photogrammetric survey of the wider area and core part of the reservoir. This will be used together with Ordnance Survey base plans for the drawings which will be annotated and enhanced with relevant detail for a Level 2 record. Manual annotation will be carried out by hand drawing on measured detail using a Leica Disto laser measure accurate to +/- 1mm over 100m. Instrument survey will be carried using a Leica TCR 805 reflectorless total station. The plans will be digitised and presented using an industry standard CAD package. The plans that will be produced are as follows;

- ground level plans of all features associated with the reservoir. This includes walls, weirs, inlet and outlet systems, dams, overflows, channels and any other pertinent structures and buildings.

- cross-sections through the main dam and main channels.

- one representative elevation drawing of main walls to be produced by rectified photography (see below).

- drawings of features, such as functional and operational detail, not more readily captured through photography.

3.2.4 Photographic Archive: a photographic archive will be produced to English Heritage Level 2 guidelines using full frame Canon EOS 5D digital SLR cameras. A variety of lenses will be used in order to gain maximum coverage and images will be saved in .CR2, .TIFF and .JPG formats. General scaled views from multiple angles will be taken together with detailed scaled views of relevant details of constructional, operational and functional detail. Rectified photography will be produced using the specialist rectification software packages Kubit PhotoPlan or Agisoft Photoscan Pro. Targets will be surveyed using a Leica TCR 805 reflectorless total station. A full photographic index will be produced.

3.2.5 Watching Brief: following the building investigation and during the demolition works a watching brief will be maintained by a buildings archaeologist in order to inspect areas of the
structures that had been obscured. The time scale of this will depend upon the results of the initial survey and the demolition timetable.

3.2.6 The watching brief will consist of a buildings archaeologist being present on site when areas identified as being of particular interest are being demolished. Demolition will need to be temporarily suspended if any features of interest are discovered. These will be recorded in the same manner as above.

3.3 Detailed Historical Research

3.3.1 Introduction: research has been carried out for the purposes of the ES prepared in 2012, although it was of a more general level within the timescale allowed in order to appraise the site and the heritage assets that may be affected. Therefore, it is intended that this research will be supplementary to the existing work for the ES, and will not aim to replicate any research already carried out. It will concentrate specifically on the outlined application area, focusing on the reservoir buildings and their context within their immediate environs. The research is aimed at examining documents and plans available within the water companies’ archives or held within local archive repositories.

3.3.2 The following research will be undertaken as appropriate, depending on the availability of source material. The level of such work will be dictated by the time scale of the project. This aids in the presentation of the significance or otherwise of the site and will inform the fieldwork findings.

3.3.3 Documentary and Cartographic Material: this work will include consultation primarily of the company archives and the library in Glossop. A review of all known and available resources of information relating specifically to the reservoir. These include documentary sources, maps and other photographic/illustrative evidence.

3.4 Report Production

3.4.1 Final Report: a digital copy of the final report will be submitted to the client for approval. Once finalised, hard copies can be supplied to the client if required. Copies will also be forwarded to the PDNPA Archaeologist for reference and a copy to the Derbyshire HER. The report will include:

• a site location plan related to the national grid,

• a front cover to include the planning application number and the NGR,

• the dates on which the fieldwork was undertaken and by whom,

• a concise, non-technical summary of the results,

• the precise location, address and NGR will be provided,

• a description of the methodology employed, work undertaken and results obtained,

• plans, sections drawings and photographs at an appropriate scale,

• the report will also include a complete bibliography of sources from which data has been derived,

• a copy of this project design in the appendices, and indications of any agreed departure from that design.

3.4.2 This report will be in the same basic format as this project design.
3.5 **ARCHIVE**

3.5.1 The results of all archaeological work carried out will form the basis for a full archive to professional standards, in accordance with current English Heritage guidelines (*Management of Archaeological Projects*, 2nd edition, 1991). The project archive represents the collation and indexing of all the data and material gathered during the course of the project. OA North conforms to best practice in the preparation of project archives for long-term storage.

3.5.2 This archive will be provided in the English Heritage Centre for Archaeology format and a synthesis will be submitted to the Derbyshire HER (the index to the archive and a copy of the report). OA North practice is to deposit the original record archive of projects with the appropriate County Record Office.

3.5.3 The Arts and Humanities Data Service (AHDS) online database project *Online Access to index of Archaeological Investigations* (OASIS) will be completed as part of the archiving phase of the project.

3.5.4 **Confidentiality:** all internal reports to the client are designed as documents for the specific use of the Client, for the particular purpose as defined in the project brief and project design, and should be treated as such. They are not suitable for publication as academic documents or otherwise without amendment or revision. Any requirement to revise or reorder the material for submission or presentation to third parties beyond the project brief and project design, or for any other explicit purpose, can be fulfilled, but will require separate discussion and funding.

4. **HEALTH AND SAFETY**

4.1 OA North provides a Health and Safety Statement for all projects and maintains a Unit Safety policy. All site procedures are in accordance with the guidance set out in the Health and Safety Manual compiled by the Standing Conference of Archaeological Unit Managers (1997). A risk assessment will be completed in advance of any on-site works and copies will be made available on request to all interested parties. The principal archaeologist on site will hold a copy of the risk assessment at all times. It has been assumed that the client and/or principal contractor will notify OA North of any induction procedures prior to commencement of work. All project staff will be CSCS qualified.

5. **WORK TIMETABLE**

5.1 **Visual Inspection:** the UAV photogrammetric recording has been undertaken already, although there is still a requirement to complete the survey by walkover inspection. This is anticipated to take one day.

5.2 **Building Recording:** approximately 4-5 days will be required on site for this element. The duration of the archaeological presence for the watching brief will be dictated by the client’s schedule of on-site works.

5.3 **Detailed historical research:** it is expected that with easy access to any water company archives, 2-3 days will be required for this element.

5.4 **Final Report:** the final report will be completed approximately six to eight weeks after the final element of site work.

6. **OTHER MATTERS**

6.1 **Access:** liaison for access to the reservoir during the assessment will be arranged with the client, unless otherwise instructed prior to commencement of the archaeological investigation.
6.2 **Project Monitoring:** whilst the work is undertaken for the client, the PDNPA Archaeologist will be kept fully informed of the work and its results, and will be notified in advance of the commencement of the fieldwork. Any proposed changes to the project design will be agreed with the PDNPA Archaeologist and the client.

7. **STAFFING PROPOSALS**

7.1 The project will be under the direct management of **Emily Mercer BA MSc MIfA** (OA North senior project manager) to whom all correspondence should be addressed.

7.2 The project will be supervised in the field by **Karl Taylor AIfA** (OA North project officer) who has a great deal of historic building recording experience in the North West on sites of many periods, as well as general survey techniques.

7.3 The documentary research will be undertaken by **Alastair Vannan** (OA North HMS project officer) who is an experienced member of the Heritage Management Services at OA North, and undertook the technical chapter for the ES.

**BIBLIOGRAPHY**

Department of Communities and Local Government (DCLG), 2012 *NPPF: National Planning Policy Framework*


IfA, 2012 *Code of Conduct*, Reading

Institute for Archaeologists, 2008a *Standard and Guidance for an Archaeological Watching Brief*, Reading

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Institute for Archaeologists, 2008c *Standard and guidance for archaeological Desk-Based Assessments*, Reading

SCAUM (Standing Conference of Archaeological Unit Managers), 1991 *Health and Safety Manual*, Poole

United Kingdom Institute for Conservation (UKIC), 1990 *Guidelines for the preparation of archives for long-term storage*