

TECHNICAL NOTE

Job Name: Burnhope Reservoir

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Prepared By: Matthew Town, Principal Archaeologist, Stantec UK

Reviewed By: Dr. Catherine Barnett, Technical Director, Archaeology and Heritage, Stantec UK

Subject: **Built Heritage Technical Note**

1. Introduction

Stantec, on behalf of Northumbrian Water (the client), are developing an outline design for the remodelling of a washout valve at Burnhope Reservoir (the site), comprising modifications to the pipework and valve arrangement at the end of an outlet tunnel, to enable the testing and operation of the washout and to address Interests of Safety (IOS) under Section 10(3)(c) of the Reservoirs Act 1975.

This technical note has been prepared to provide a summary of built heritage recording undertaken in accordance with the relevant standards and guidance as published by Historic England (2016) and the Chartered Institute for Archaeologists (CIfA 2014), to fulfil Northumbrian Water's obligations under the Water Industry Act 1991, associated Code of Practice 2000 and NPPF 2021, and support good archaeological outcomes for the scheme.

2. The Site

The site is located 1km to the south-west of Wearhead, Stanhope, Co. Durham, and consists of an outlet tunnel and tailbay channel for Burnhope Reservoir, centred on National Grid Reference NY 84910 38982, at approximately 370m above Ordnance Datum (aOD). Burnhope Reservoir is an impounding structure that was formed by the construction of an earthfilled embankment dam with a puddle clay core. The site sits at the base of, and east of, the reservoir embankment, a straight crest 9m wide with a length of about 520m and a maximum height above the valley floor of about 40m. The underlying bedrock geology is recorded as Alston Formation (limestone, sandstone, siltstone, and mudstone); the superficial deposits are Pleistocene age glacial till (Stantec 2022, 10).

3. Project Background

Due to the size of the reservoir, Burnhope Reservoir falls under The Reservoirs Act 1975 (The Act) of UK legislation, an Act to make provision against escapes of water from large reservoirs or from lakes or lochs artificially created or enlarged. To comply with The Act, reservoir structures are subject to regular inspections and several routine maintenance measures are deemed mandatory to ensure the safety, integrity and

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The UK planning framework, including guidance given by the Water Industry Act 1991, the associated Code of Practice (2000), and by the National Planning Policy Framework 2021, require that heritage assets which may be affected by the works are considered, described, and assessed. The Archaeology and Heritage Team at Stantec therefore recommended a Historic England Level 1 photographic building survey (Historic England 2016) of the outlet tunnel prior to the construction of the new valve arrangement, to mitigate the impact of the works on the historic fabric of the outlet tunnel and provide a permanent record of the features.

4. Historical Overview

Burnhope Reservoir is not designated but is considered to hold heritage value. Following the establishment of the Durham County Water Board by a Parliamentary Act in 1920, a further Act in 1922 set out a proposed reservoir at Burnhope, to include an enlarged catchment area with conduits and catchwaters, and the sharing of these waters with Sunderland and South Shields Water Company (who would get 54% of the impounded water from the reservoir).

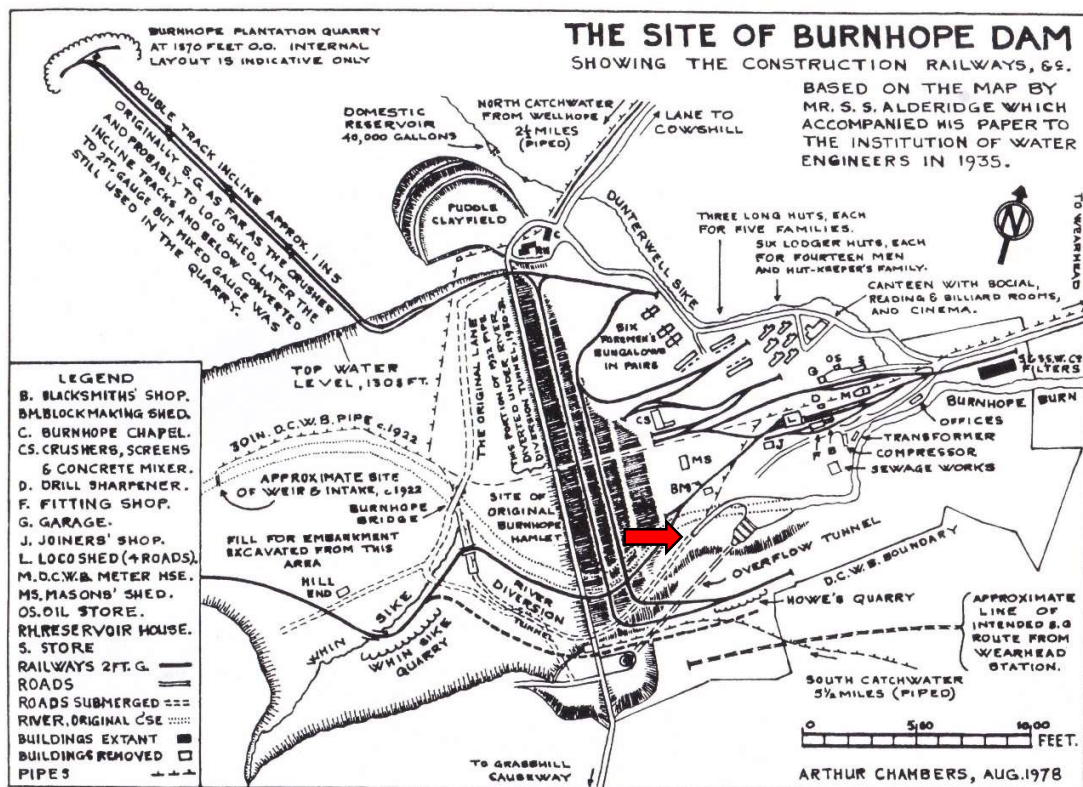


Plate 2: Burnhope Reservoir – works arrangements 1935 (after Bowtell 1994) – outlet tunnel arrowed

The works eventually got underway on the 6th of January 1930 (Plate 2). Excavation of the cut-off trench began in early 1931 and was completed in May 1932. The trench was infilled with concrete and tunnels were constructed in concrete at the same time. The embankment, built of shale and boulder clay with a puddle clay core, was constructed between early 1933 and mid-1935. The overflow channels and weir, turfing and

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fencing were all completed in March 1936. The reservoir was formally opened on the 16th of September 1937 (Bowtell 1994, 41-55).

5. Methodology

The Historic England Level 1 Photographic Survey (Historic England 2016) was carried out by this author on the 10th of May 2022, in optimal weather conditions. Full access was possible to the structure, apart from the interior of the tunnel, which was restricted due to it being classed as a Confined Space under the Confined Spaces Regulations 1997. Views into the tunnel were possible from the exterior. The photographic record comprised high-quality digital format (RAW and jpg) taken with a Pentax K70 full frame digital camera (with 24-megapixel capability). All photography complied with Historic England guidance (Historic England 2015 and 2016). A photographic scale of an appropriate size was included in all general and detailed views, where possible and safe to do so. Accompanying photographic registers recorded, as a minimum, the direction of the view and a brief description of the subject and location.



Plate 3: general arrangement showing the overflow tunnel (left) and outlet tunnel (right) with draw-off tower above

6. Results

The outlet tunnel, which is concrete and c.3m wide, connects to a draw-off tower located on the reservoir embankment, which controls the flow of water to the outlet portal. South of the draw-off tower is an overflow weir and sump, which connect to a further tunnel (the overflow tunnel) which runs broadly parallel with the outlet tunnel and exits further to the east (Plate 3). The distance from the draw-off tower to the outlet portal is approximately 200m.

The main walls of the outlet tunnel portal are constructed of regular blocks of evenly coursed dressed sandstone with rusticated facing, extending to approximately 6.3m in height from the base of the tailbay

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culvert (Plate 4). The walls are approximately 600mm thick. The portal walls project above ground surface to the west to 1.2m, with the upper courses marked by a projecting rounded string course on the eastern side, with large rusticated rectangular blocks (c 750mm by 500mm) forming the coping stones for the walls.



Plate 4: the portal facing west



Plate 5: the portal, side walls and channel

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The portal rests on large foundation blocks of chamfered sandstone, c.1.3m in width, which project out from the line of the portal entrance; the springers for the outer arch comprise projecting rectangular blocks to the same width as the foundations. The outer portal arch is round with rusticated voussoirs with a chamfered interior edge. A further inner horse-shoe arch within the portal is built of dressed ashlar blocks. This sits on the concrete base of the tunnel, which projects forwards to the lip of the outer arch, forming a threshold into the tunnel. The tunnel is secured by a modern metal gate; internally the concrete tunnel is lined with modern brick forming the supporting structure for the outlet valve (Plate 7).



Plate 6: tailbay channel facing north-east

The tailbay channel is 5.9m in width, and curves 68m north-eastwards to a large basin, which in turn empties into Burnhope Burn via a series of weirs (Plate 6). The portal is abutted on the north and south sides by retaining walls which extend eastwards for 20m and step down from the full height of the wall, and then one course further at their midpoint; these walls mirror the stonework of the portal being also constructed of regular blocks of evenly coursed dressed sandstone with rusticated facing and topped by large rusticated rectangular blocks forming the coping stones for the wall. At the eastern end of the walls are large pillars, 2.25m in height, which mark the upper edge of a slope in the tailbay channel. These pillars are built of the same rusticated stone but have much larger square coping stones forming the pillar caps. A further pillar on the north side of the tailbay channel marks the lower edge of the slope in the channel, but without an equivalent pillar on the south side. The walls for the rest of the channel are lower and plainer, with rounded coping stones, and may be a later construction. The base of the tailbay channel comprises granite setts.

On each side of the portal are two flights of up to 25 concrete steps, set into the bank with concrete edging; the southern set are almost entirely buried and turfed over.



Plate 7: tunnel interior facing west

7. Conclusions

A complete archive of digital photographs from the survey will be deposited with Archaeological Data Services (ADS) and a copy of the report with Durham County Council Historic Environment Record. This report and the archive are considered a complete record of outlet portal, and no further work was recommended prior to the installation of the new valve.

Bibliography

Bowtell, HD 1994. *Dam Builders' Railways: From Durham's Dales to the Border*. Plateway Press, Brighton.

Her Majesty's Government 1991. *Water Industry Act 1991*

Her Majesty's Government 2000. *The Water and Sewerage (Conservation, Access and Recreation) (Code of Practice) Order 2000*. Statutory Instrument No. 477

Historic England 2016. *Understanding Historic Buildings: A Guide to Good Recording Practice*. <https://historicengland.org.uk/images-books/publications/understanding-historic-buildings/heag099-understanding-historic-buildings/>

Ministry of Housing, Communities & Local Government 2021. *Policy Paper: The National Planning Policy Framework (NPPF)*, updated 20 July 2021.

Stantec 2021. Environmental Screening Document - Northumbrian Water: Burnhope Reservoir. Unpublished Report.

Stantec 2022. Burnhope Reservoir: Geotechnical Desk Study Report. Unpublished report Ref: 55039-002-DOC-SIN-B07-001