NAA

ARCHAEOLOGICAL MONITORING REPORT

SHOP BRIDGE, BROUGHTON MILLS, CUMBRIA

prepared for

Metcalfe Civil Engineering

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Associates

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1.0 INTRODUCTION

1.1 This report outlines the results of archaeological monitoring (a watching brief) conducted at Shop Bridge, Broughton Mills, Broughton-in-Furness, Cumbria (NGR SD 22238 90716; Fig. 1). The monitoring was undertaken during remedial work on the 18th century Grade II listed bridge (List entry no. 1086852; Historic England Listings: historicengland.org.uk/listing/the-list/list-entry/1086852). All work was carried out in response to the existing bridge half-arch being deemed structurally unsafe and in danger of collapse (Griffiths 2021).

1.2 Archaeological monitoring was carried out between 26th August and the 1st of September 2021 on behalf of Metcalfe Civil Engineering. The works included the removal of the damaged half-arch and associated features at the north end of the bridge in advance of reconstruction.

2.0 LOCATION, TOPOGRAPHY AND GEOLOGY

2.1 Shop Bridge is located in the village of Broughton Mills, which lies approximately 7 miles from Broughton-in-Furness (Fig. 1). Within the wider Duddon Valley, the bridge is situated in the Lickle River valley and is surrounded by fields of pasture. The bridge carries a minor road (C5008) over the River Lickle between Ulpha and Broughton Mills, all of which are situated within the Lake District National Park.

2.2 The underlying geology of the area consists of Kiln Bank Tuff Member Felsic Igneous Bedrock covered by undifferentiated River Terrace Deposits of gravel, sand and silt (BGS 2019).

3.0 SUMMARY ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

Prehistoric/Roman Period

3.1 The Hawk Settlement (Orrom 1971), lying approximately 2.5km north-east of Shop Bridge, appears to be the only known prehistoric/Romano-British period settlement close to the area of interest. No remains of these periods are known near the site of the bridge.

Medieval

3.2 Lumholme Bloomery, a charcoal fired shaft furnace used for the direct reduction of iron ore to produce wrought iron, lies approximately 600m to the south-west of Shop Bridge. (Archaeological Data Services: www.archaeologydataservice.ac.uk).

Post-medieval and modern

3.3 Post-medieval and modern use of the area is represented by numerous mills, quarries, mines, lime kilns and other industrial works. There are several Grade II listed buildings within the vicinity, all of post-medieval date. Immediately to the south of Shop Bridge is Broughton Mill, a former corn mill. Grade II listed Hesketh Hall lies approximately 135m north-east of the Bridge. The Blacksmiths Arms, a Grade II listed building, lies approximately 200m to the south along the road towards Broughton-in-Furness. Given the proximity and diversity of buildings associated with industrial and agricultural activity, it seems likely that reliable bridges across the river were important structures where valuable loads were being transported locally.

4.0 AIMS AND OBJECTIVES

4.1 The aim of the archaeological work was to identify and record developmental phases of Shop Bridge, from its initial construction through later alterations, in order to provide an understanding of the relative chronology of the different periods of modification of the bridge.

4.2 The requirement for the archaeological monitoring and recording was in response to a Heritage, Design and Access Statement drawn up for Cumbria County Council (Griffiths 2021).

5.0 METHODOLOGY

5.1 Demolition work included the removal of existing road surfaces and underlying packing stones and fill of the bridge deck (**1**; not illustrated). Part of the eastern parapet wall (**2**), the infill- and half-arch (**7** and **6**), and part of a retaining wall (**10**) were also removed (Plate 1). Demolition and excavation were carried out by a tracked 360º back-acting excavator using a toothed bucket under direct archaeological supervision.

5.2 Cleaning of the bridge deck was carried out by hand where it was safe to do so, or by contractors using compressed air. The rubble infill behind the bridge half-arch was not

hand-cleaned, as it was deemed unsafe to enter the area. It was roughly cleaned using the machine.

5.3 Written descriptions of archaeological features/deposits, and associated sketch plans were recorded on pro-forma context sheets, which employ standard archaeological recording conventions.

5.4 A photographic record of the site was taken using digital photography at a minimum resolution of 10 megapixels. Photographs include a north arrow and standard metric scales as appropriate and where possible.

6.0 RESULTS

6.1 Archaeological monitoring at Shop Bridge has recorded four distinct phases of modification (Phase 1–4) at the east side of the north end of the bridge. The main phased components of the bridge include the original arch (**4**; Plate 2), an infill-arch (**7**) and a back wall (**8**), a half-arch (**6**) and later retaining wall (**10**) (Plate 1). An unphased stage of modification to the bridge included the construction of an arch extension (**5**; Plate 2) on the west side of the bridge and associated infilling of the widened deck (**1**; not illustrated). Some elements of the bridge's structure could not be accurately recorded due to unsafe conditions during some stages of demolition work.

Phase 1

6.2 The original arch (**4**; Plate 2) of Shop Bridge was approximately 18m long and 3m wide. It was aligned north-west to south-east and crossed the River Lickle almost perpendicularly. The bridge was constructed from large slate blocks that were up to 0.5m by 0.3m by 0.2m in size, with smaller slate voussoirs up to 0.3m by 0.2m by 0.2m in size forming the arch. The outer stonework of the original arch (**4**) had been recently repointed, particularly on the underside of the arch (Plate 2).

6.3 At its north end, the deck of the bridge descended from its apex sharply and was flanked by low parapet/spandrel walls that had been constructed during Phase 4 (see below). However, removal of the road surfaces and deck fill (**1**) exposed the footing of the original western parapet wall (**3**) that once lined the west side of the original arch (Plate 3). Footing **3** comprised irregularly coursed slate blocks that were up to 0.5m by 0.3m by 0.2m. Its presence beneath the road surface confirmed the original arch was the earliest recognisable iteration of Shop Bridge.

Phase 2

6.4 Phase 2 included the construction of the infill-arch (**7**), in conjunction with a retaining wall (**8** and **9**; Plate 4). The infill-arch (**7**) was approximately 5m long and was constructed from roughly hewn slate blocks that were up to 0.7m by 0.5m by 0.1m in size. The arch was bonded by friable mortar that had become degraded by water damage.

6.5 The Phase 2 retaining wall comprised the back wall (**8**) and another hidden wall (**9**; Plate 4). The retaining walls served to support the road, which was raised above the level of the river, and mitigated its undermining by river erosion. Wall **9** had been sealed behind the latest Phase 3 retaining wall (**10**; Plate 1). Both elements (**8** and **9**) of the Phase 2 retaining wall were irregularly coursed using river cobbles, which were approximately 0.5m–0.7m by 0.3m by 0.1m in size. The back wall (**8**) was bonded using strong mortar, suggesting recent repointing.

6.6 The infill-arch (**7**) was keyed into, and took support from, the back wall (**8**) and the buried wall (**9**), demonstrating the features were constructed at the same time (Plate 4). The presence of a continuation of the back wall (**9**) behind the Phase 3 retaining wall (**10**) indicates that the Phase 3 half-arch (**6**) was a later addition. This suggests the bridge was in use for a time with only the infill-arch acting to support an initial stage of widening of the north end of the bridge.

Phase 3

6.7 Phase 3 represents the construction of the half-arch (**6**), the existing retaining wall (**10**) and an abutment (**11**; Plate 1). The half-arch (**6**) was approximately 6m long by up to 0.7m high. It was constructed from roughly hewn slate blocks measuring 0.7m by 0.5m by 0.1m and was bonded by mortar that had become friable due to water damage. The half-arch (**6**) had become flattened and was in danger of failure, hence the requirement for remedial structural work.

6.8 The retaining wall (**10**) was irregularly coursed with slate blocks and river cobbles that were up to 0.5m by 0.3m by 0.2m. It was bonded by friable mortar. The interface between the coursing of the retaining wall (**10**), and that of the overlying Phase 4 parapet/boundary wall (**2**) indicated that wall **2** had been constructed later (as visible on Plate 1).

6.9 An abutment (**11**) had been constructed at the base of the half-arch (**6**) to protect it from river erosion. Removal of this feature exposed a continuation of the Phase 2 back wall (**8**) to the level of the river (Plate 4).

Unphased

6.10 The west side of Shop Bridge had been widened through construction of an arch extension (**5**; Plate 2). The extension was approximately 1.1m wide and was not keyed into the original arch (**4**). A gap of 0.1m was present between the arches and Arch **5** sat slightly lower than the original arch (**4**). The arch extension was constructed from roughly hewn slate blocks that were up to 0.5m by 0.3m by 0.2m in size.

6.11 Following construction of the arch extension, the bridge deck was backfilled by river cobbles and slate blocks that were up to 0.6m by 0.5 by 0.2m in size which formed the deck, upon which subsequent road surfaces were laid (**1**).

6.12 There was little impact on the arch extension (**5**) during the remedial works, other than the removal of the overlying road surface and deck fill, therefore the relationship between of this phase of modification and the construction of the infill-arch (**7**) and half-arch (**6**) remains unknown. However, it is conceivable that the widening of the bridge deck, and its infilling, occurred in conjunction with one of the stages of modification under discussion. It seems most likely that this was during Phase 2, and in conjunction with the initial widening of the north end of the bridge.

Phase 4

6.13 The latest phase of construction was that of the eastern parapet wall (**2**), which continued to the north-east as a boundary wall and defined the road from the river (Plate 1). Construction of the existing parapet/boundary wall (**2**) had occurred later than that of the half-arch (**6**). The parapet/boundary wall was up to 1m high by 0.3m wide. It was constructed using irregularly coursed, roughly squared slate blocks and river cobbles that were up to 0.5m by 0.3m by 0.2m and mortar bonded. The eastern parapet wall (**2**) was removed to the level of the arch during remedial works (Plate 4).

6.14 The opposing, western parapet wall of the bridge was of similar construction to the eastern (**2**) and was most likely constructed at the same time. It included the name-stone of the bridge, and a heavily weathered carved stone. The carved stone contained the remains of a motif in the shape of a shield with underlying text (Plate 5). The text was

illegible. The western parapet wall was not disturbed during the works and the name-stone and carved stone remain in situ.

7.0 DISCUSSION

7.1 Archaeological monitoring during remedial works has identified the various construction phases of Shop Bridge, although it has not been possible to put these phases within a chronological framework as no artefactual material was recovered. Monitoring has identified four phases of modification on the east side of the bridge, which includes the original arch (Phase 1), construction of the infill-arch (Phase 2), construction of the half-arch (Phase 3) and parapet walls (Phase 4). The unphased arch extension to the west, and infilling of the widened bridge deck could not be tied into developments to the east. However, it seems most likely this occurred in conjunction with the initial Phase 2 stage of widening of the north end of the bridge.

7.2 The original 18th century Shop Bridge would have been constructed for light foot traffic or draft animals drawing carts as part of, or feeding into, the turnpike road network. It seems most likely that widening of the bridge deck by the addition of the arch extension and construction of the infill-arch were undertaken in response to the rapid uptake of motorised vehicles during the early 20th century. The construction of the half-arch occurred later and was undertaken to further widen the eastern side of the north end of the bridge. This would have been in response to the presence of longer motor vehicles and to allow a right turn from the north end of the bridge, giving unrestricted access to the villages situated to the north-east of Broughton Mills.

8.0 ARCHIVE DEPOSITION

8.1 The archaeological record and final report resulting from the monitoring undertaken at Shop Bridge will be deposited as a digital archive with the Archaeological Data Service (ADS). A mortar sample recovered from the fabric of the bridge will be retained for one year from the data of deposition of the archive at NAA's main offices at Barnard Castle.

REFERENCES

British Geological Survey (BGS) (2019) *Geology of Britain Viewer*. [Online] Available at: https://www.bgs.ac.uk/map-viewers/geology-of-britain-viewer/ (accessed on 14.09.2021).

Griffiths, N. (2021) *Half Arch Reconstruction and Associated Works, Shop Bridge and Boundary Stone, Broughton Mills – Listed Building Consent*. Unpublished Heritage, Design and Access Statement. Unpublished report CS 100463.

Orrom, M. H. (1971) A Settlement on the Hawk, Broughton Mills. *Transactions of the Cumberland & Westmoreland Antiquarian & Archaeological Society* **71** (series 2) 12-17.

Online resources

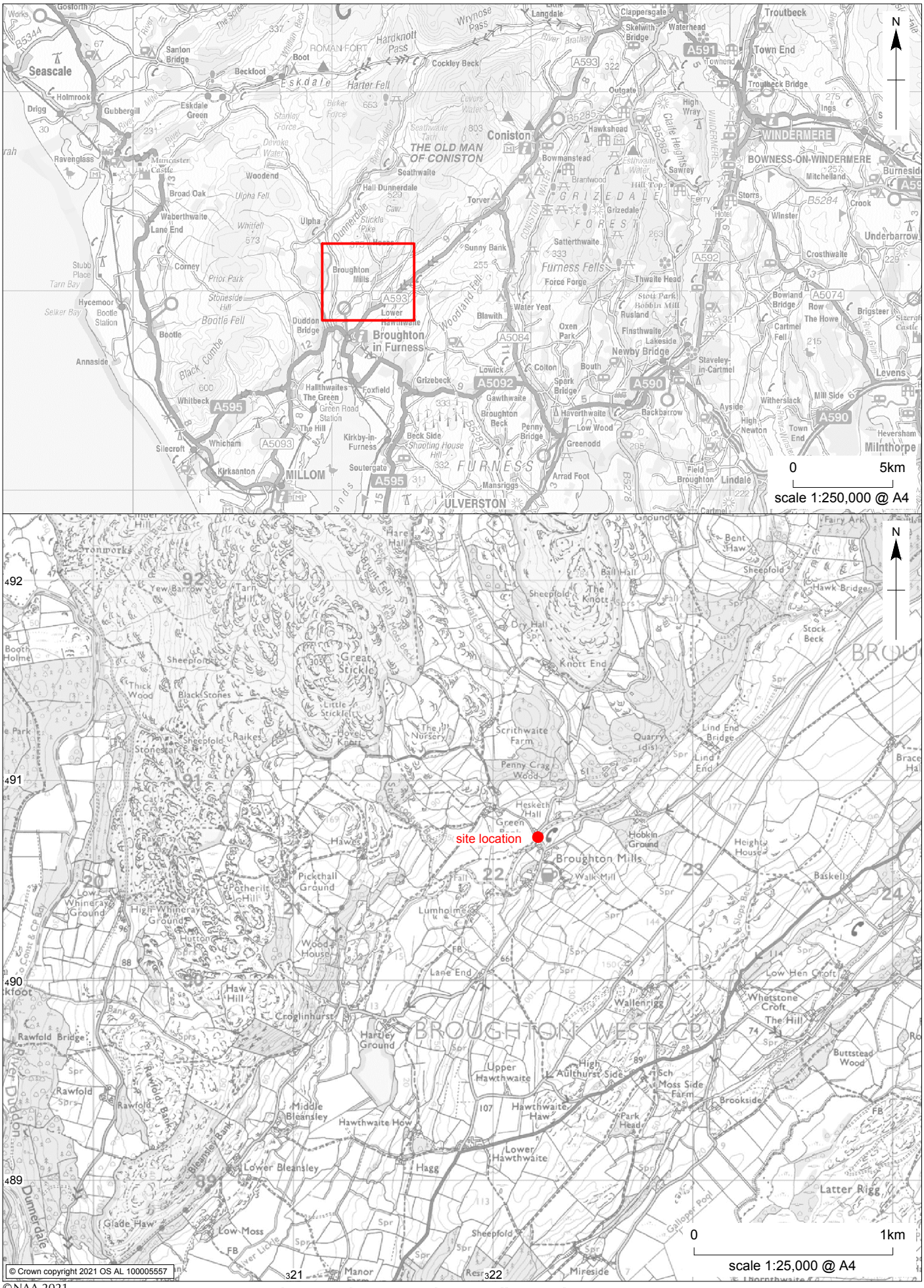
Archaeological Data Service: www.archaeologydataservice.ac.uk

Historic England Listings: https://historicengland.org.uk/listing/the-list/list-entry/1086852

APPENDIX A:

CONTEXT CATALOGUE

Context	Phase	Interpretative description
1	Unphased	Deck fill and road surfaces
2	4	Eastern, existing parapet wall
3	1	Western buried spandrel wall associated with the original arch
4	1	Original arch
5	Unphased	Arch extension
6	3	Half-arch
7	2	Infill-arch
8	2	Back wall
9	2	Hidden retaining wall
10	3	Current retaining wall
11	3	Half-arch abutment



Shop Bridge, Broughton Mills: site location *Figure 1*

Shop Bridge, Broughton Mills: phased components located on the east side of the north end of the bridge

Plate 1

Shop Bridge, Broughton Mills: the original arch (4) and arch extension (5)

Plate 2

Shop Bridge, Broughton Mills: original western spandrel / parapet wall (3) buried below deck fill and road surfaces

Plate 3

Shop Bridge, Broughton Mills: infill-arch (7), back wall (8), and hidden retaining wall (9) following removal of half-arch (6)

Plate 4

Plate 5

Shop Bridge, Broughton Mills: carved stone present upon western parapet wall