

CONSERVATION FABRIC REPAIRS,
BUTTERTON BRIDGE, PICKING GILL,
SAWLEY, NORTH YORKSHIRE

ARCHAEOLOGICAL AND ARCHITECTURAL
OBSERVATION, INVESTIGATION AND RECORDING



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On behalf of

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c/o Mr Steven Fieldsend
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EXECUTIVE SUMMARY

In June 2020, Ed Dennison Archaeological Services Ltd (EDAS) were commissioned by Mr Peter Gaze Pace (architect), on behalf of the Sawley Estate, to undertake a programme of archaeological and architectural observation, investigation and recording (a watching brief) prior to and during a programme of consolidation and repair at Butterton Bridge, Picking Gill, Sawley, North Yorkshire (NGR SE 23838 66468). The work, which was made a condition of Scheduled Monument Consent, was defined by an EDAS 'Written Scheme of Investigation', and the project was funded by Natural England, with other contributions from the landowner and Harrogate Borough Council. The archaeological fieldwork was carried out at intervals between August 2020 and February 2021.

The architectural and archaeological survey equates to a Level 3 analytical record, and includes drawn, photographic and written elements. Existing 2004 survey data was enhanced and altered as necessary, and new records were produced.

The bridge formed part of an important medieval route connecting Fountains Abbey properties in mid-Nidderdale and Craven to the abbey precinct, perhaps adopting a pre-existing track. The form of the bridge, a stone arch carried on ribs, is of the usual construction found in surviving medieval stone bridges in Yorkshire, although the use of rectangular-cut ribs rather than chamfered ribs appears to be less common. It seems most likely that the bridge was built either in the later 12th century or in the first half of the 13th century, when the majority of building work was being undertaken at the abbey. The bridge is similar to several of the surviving bridges within the abbey precinct, and the abbey is known to have been building stone bridges across rivers in West Yorkshire in the later 12th century to facilitate access to its granges and other holdings. Many such bridges were built from the outset, rather than following the usual pattern of development, from a ford to a wooden bridge to a stone bridge. It also seems likely that Butterton Bridge was associated with the movement of stone from quarries within Sawley township to the abbey in the later medieval period. The bridge is suggested to have become redundant after 1539, although the routeway remained in use on a more localised basis, and foot and horse traffic must have continued to pass over it.

Suggestions have previously been made that the visual appearance of Picking Gill may have been enhanced by planting and other improvements to form an ornamental or designed landscape, with Butterton Bridge being incorporated as a romantic landscape feature. This landscape may well have been laid out by Henry Wormald, a noted gardener and arboriculturalist, who bought the Sawley estate in 1828. The grounds and gardens at Sawley Hall were open to the public from the 1860s onwards, and visits often included the nearby Fountains Abbey and Studley Royal gardens. Further enhancements and improvements were probably carried out by the subsequent owners, the Barran family. Further research would be needed to establish precisely how the bridge was used within this designed landscape.

The structural information recorded during the 2020-21 consolidation and repair works shows that there is a clear difference in the quality of the masonry between the central part of the bridge and that of the abutments to either side, the junction between the two being staggered and rather crude. The central part appears to have remained relatively unaltered throughout its history, with the abutments seemingly going through several different phases of repair and rebuilding, some perhaps associated with the incorporation of the bridge into the Picking Gill ornamental landscape. Evidence for possible internal features such as a relieving arch and crude dry stone facing to the rubble core were also recorded, as well as potential phasing to the projections (either buttresses or former returns) flanking the bridge arch. No evidence for a paved, cobbled or otherwise strengthened surface to the causeway over the bridge was exposed by the repair works. No dating evidence, in terms of artefacts or diagnostic architectural features, was recovered, meaning it is difficult to place the structural information that was recorded within its wider historical context.

1 INTRODUCTION

Reasons and Circumstances of the Project

- 1.1 In June 2020, Ed Dennison Archaeological Services Ltd (EDAS) were commissioned by Mr Peter Gaze Pace (architect), on behalf of the Sawley Estate, to undertake a programme of archaeological and architectural observation, investigation and recording (a watching brief) prior to and during a programme of consolidation and repair at Butterton Bridge, Picking Gill, Sawley, North Yorkshire (NGR SE 23838 66468).
- 1.2 The scope of the archaeological and architectural survey and recording work was defined by an EDAS 'Written Scheme of Investigation' (WSI) (see Appendix 2). In summary, this involved the enhancement of existing 2004 survey data and the creation of new photographic, drawn and written records. The work, which equates to a Level 3 analytical record as defined by Historic England (2016, 26-27), was funded by the Sawley Estate with grants provided by Natural England (as part of a Higher Countryside Stewardship Scheme), Harrogate Borough Council and the landowner.

Site Location and Summary Description

- 1.3 Butterton Bridge is located within Picking Gill, c.1.6km south-west of the village of Sawley, and some 4km south-west of Fountains Abbey, in North Yorkshire (NGR SE 23838 66468) (see figures 1 and 2). It lies in the modern civil parish of Sawley at an elevation of c.175m AOD. The bridge lies within the privately-owned Sawley Estate, but is accessible via the public footpath which runs across it. Vehicle access is also possible along a forest track which has a junction with Fountains Abbey Road to the south-east; estate vehicles can also pass over the bridge itself.
- 1.4 The bridge spans the beck, named on historic maps as Hebden Wood Beck, in the base of Picking Gill, and it has long approach abutments to either side which cross the wooded slopes of the valley. The bridge and surrounding area was overgrown with vegetation (principally grass, brambles, ivy and bracken), but this was removed prior to the start of the 2020 survey and repairs. Some clearance of scrub and trees to the north and south of the bridge was also undertaken by the Sawley Estate, allowing the structure to be more clearly visible within its immediate landscape setting.
- 1.5 The bridge is variously ascribed a 12th, 13th or 14th century date (Historic England Research Record 51947; Proctor 2003, 2). It once formed part of the extensive network of medieval routeways connecting the estates of Fountains Abbey, and carried one of the principal routes from the abbey's mid-Nidderdale and Craven properties to the main abbey complex; it is suggested to have become redundant after 1539 (Moorhouse 2003, 196 & 198). There is also some evidence that the visual appearance of the valley in which the bridge stands was enhanced by ornamental tree planting during the 19th century, and it is possible that the bridge itself underwent some renovation in either the 18th or 19th centuries as part of this scheme (English Heritage Field Monument Warden report 2nd March 1994). However, it is not believed that the bridge has undergone any repairs in its more recent history.
- 1.6 Butterton Bridge and part of the abutments to either side are a Scheduled Monument (NY 335; National Heritage List for England 1004202). The bridge is

included in Historic England's Research Records (HERR site 51947; NMR SE 26 NW 4) and the North Yorkshire Historic Environment Record (site MNY7306). The condition of the monument meant that it was included in Historic England's 'Heritage at Risk Registers', the latest stating it was in a 'poor' condition in danger of structural collapse, with a priority grade of 'F(D)', meaning that 'a repair scheme was in progress and (where applicable) end use or user identified, or functionally redundant buildings with new use agreed but not yet implemented; slow decay; solution agreed but not yet implemented' (Historic England 2020, 64). The bridge and its landscape setting lie within the Nidderdale Area of Outstanding Natural Beauty.

Summary of Previous Survey Work

- 1.7 The bridge had been the subject of a pre-intervention survey by EDAS in 2004, in advance of a previous proposed scheme for consolidation and repair. This survey work involved a limited amount of documentary research and collation, the production of a 1:100 scale plan of the bridge and abutments, and a 1:50 scale architectural survey of the north elevation of the bridge and both sides of the internal tunnel or vault, all supplemented by a detailed photographic record and architectural description. It was intended that this survey would be augmented by additional recording once repair and consolidation was underway. However, despite a specification being written (Pace 2005), the proposed scheme never materialised, and no funds were available to produce a survey report. The field records made during the pre-intervention survey were therefore retained by EDAS, and their own report was subsequently produced so that the results of the survey could be disseminated into the public domain (Richardson & Dennison 2015).
- 1.8 The 2004 survey work also included an ecological survey. This involved a desk-top study, a bat survey and a Phase 1 habitat survey. The results of this survey work were incorporated into the EDAS report.

Summary of Current Repair Programme

- 1.9 Before the start of the current repair and consolidation work, the bridge was in poor structural condition. Both the north and south elevations bulged significantly, particularly the upper courses, most likely the result of heavy logging lorries running over the bridge in the past and compressing the earth and rubble core. Several saplings and small trees had also become established in the stonework of the elevations, and there was a great deal of lesser vegetation. The beck which the bridge crosses had eroded or undercut part of the base stonework of the arch over time.
- 1.10 The architect's 2005 specification for fabric repairs was revised and reissued (Pace 2018). In summary, the following works were proposed.

Rebuilding the Stonework Walls and Core to the Trackway

- 1.11 The vegetation would initially be removed from the north and south sides of the bridge (apart from ecologically-significant and sensitive plants). The existing stonework to the two external faces was to be taken down and rebuilt, using those elements which remained as a guide, so that the internal core could be stabilised. The new stonework was to be irregular coursed rubble stone, with some jump stones, two skins thick, with regular through stones, and a batter to the wall faces. New pointing would be recessed to match the original, to retain the impression of a drystone structure. Footings for the trackway would generally be retained where

they exist substantially, but any new footings would be formed of similar large stones spreading out over two or three courses. The core would be built up behind as the structure rises, using broken stones set in lime mortar.

- 1.12 In terms of consolidating the existing stonework, a combination of techniques incorporating deep taping, grouting, inserting stone into eroded pockets to match the coursing and nature of the adjacent stone, and pointing was to be used. In order to reach some deep voids, the removal of selected stone may be required - where large sections required opening up, localised rebuilding or using other techniques such as ground anchor ties or grouted rods would be used, to avoid disturbance of the original structure. Wherever possible, facing stones were to be replaced in their original positions.

Main Structural Elements (main bridge, retaining walls to bridge, and trackway retaining walls)

- 1.13 Again, existing vegetation would be taken off, and significant plants would be temporarily re-planted in nursery beds for eventual re-instatement.
- 1.14 The track over the bridge would be excavated and depressions infilled to create a level surface. This would also create space to reset the top courses of the retaining walls. The new surface would be compacted and seeded over to create a grass sward. The stream bed and the banks to the north of the bridge would be regraded, straightened and reprofiled as necessary, to allow a continual flow under the bridge, to reduce localised erosion. Some of the larger trees close to the bridge were to be cut down by the Estate.
- 1.15 For the south elevation of the bridge, either side of the archway, much of the stonework was seen to be bulging out and would need rebuilding, especially the western section. The upper section of wall face was to be dismantled and rebuilt with two skins, the core behind being consolidated and secured with 1m long stainless steel rods. Other stainless steel rods would be used to set stainless steel plates behind outer face stonework to tie both the south and north faces of the bridge together. Elsewhere, deep tamping and repointing, including of the arch facing stones, would be done.
- 1.16 This south elevation also contains the remains of two buttresses, to the east and west of the central arch, which would require substantial rebuilding, and the replacement of fallen or missing stone work. A section of the western buttress would need rebuilding with large stones, whereas more rebuilding was required to the eastern buttress where only the base remained. Deep tamping and pointing would be undertaken throughout. Moving further out from the central arch, the eastern embankment is eroded quite badly, and the western one is held together by tree roots. Their stabilisation and repair is desirable, and would be undertaken if funds allowed.
- 1.17 Similar dismantling and rebuilding work would also be done to the north elevation. Parts of the eastern buttress appear to have been added later and are not fully toothed in. Much of the western buttress will also need to be rebuilt. It was difficult to assess the condition of the eastern embankment, but it was assumed that the retaining wall survives and will need to be stabilised.

Tunnel Vault

- 1.18 The eastern and western sides were generally sound, but some deep grouting to the fractures and open joints in the vault would be required, leaving some bat holes. In the floor, many stones are lost and would need to be replaced using salvaged stones and dressed appropriately. The stream will also need to be dammed and the water pumped out to allow the mortar to set.
- 1.19 Additional repairs were subsequently authorised to insert tie-bars and drainage chutes across the top of the bridge to prevent water ingress into the body of the structure (Pace 2020).

Amendments to Specified Work

- 1.20 As is usual with such projects, the precise method of working and requirements of the architect's specification were subject to change and alteration as the project progressed, as the required repair and consolidation work was found to be more complex than originally thought. More rebuilding than was originally allowed for was needed, meaning that relatively little work could be carried out in the tunnel vault, although some repointing was able to be done here.

Scheduled Monument Consent

- 1.21 Scheduled Monument Consent (SMC) for the proposed consolidation and repair work was given by the Secretary of State for Digital, Culture, Media and Sport, advised by Historic England, on 10th October 2019 (ref S002227302).
- 1.22 A number of conditions were attached to the consent, some of which were relevant to the archaeological recording, as follows:
- (i) the works to which this consent relates shall be carried out to the satisfaction of the Secretary of State, who will be advised by Historic England. At least 2 weeks' notice (or such shorter period as may be mutually agreed) in writing of the commencement of work shall be given to Dr Keith Emerick, Inspector of Ancient Monuments, Historic England, 37 Tanner Row, York, YO1 6WP in order that an Historic England representative can inspect and advise on the works and their affect in compliance with this consent;
 - (x) equipment and machinery shall not be used or operated in the scheduled area in conditions or in a manner likely to result in damage to the monument or to ground disturbance other than that which is expressly authorised in this consent;
 - (xi) any works to which this consent relates shall be carried out under the archaeological supervision of a suitably qualified archaeological contractor [to be agreed in advance by the Secretary of State as advised by Historic England] who shall be given at least 2 weeks' notice (or such shorter period as may be agreed) in writing of the commencement of work. No works shall commence until the named archaeological contractor has confirmed in writing to Historic England that they are willing and able to undertake the agreed supervision;
 - (xii) a report on the archaeological recording shall be sent to:
Peter Rowe, Principal Archaeologist, NYCC (the County Historic Environment Record) and to

Dr Keith Emerick, Inspector of Ancient Monuments at Historic England within 3 months of the completion of the works (or such other period as may be mutually agreed);

- (xiii) the archaeological contractor shall complete and submit an entry on OASIS (On-line Access to the Index of Archaeological Investigations - <http://oasis.ac.uk/england/>) prior to completion, and shall deposit any digital project report with the Archaeology Data Service, via the OASIS form, upon completion.

2 SURVEY METHODOLOGIES

2.1 As noted above, the scale and scope of the archaeological and architectural recording was defined by an EDAS WSI (see Appendix 2). The work equates to a Level 3 survey as defined by Historic England (2016, 26-27); a Level 3 survey is essentially an analytical record augmented by detailed photographs and appropriate drawings. Additional standards and guidance published by the Chartered Institute for Archaeologists, relating to the investigation and recording of standing buildings or structures, and to archaeological watching briefs (ClfA 2019; 2020a), were also followed.

2.2 The aims of the recording were to:

- record and recover any new information relating to the nature, date, depth, and significance of any archaeological or architectural features and deposits which might be affected or exposed by the proposed conservation, repair and drainage works, in relation to the existing survey report (Richardson & Dennison 2015);
- to analyse and interpret the recorded information in terms of its specialist function, and to place that analysis and interpretation into its wider context;
- to produce an ordered archive and report, and to place this in the public domain; the archive will be deposited with the North Yorkshire Record Office in Northallerton, and copies of the report will be deposited with Natural England, the Sawley Estate, Historic England, the North Yorkshire Historic Environment Record and other interested parties.

Documentary Research and Collation

2.3 A small amount of additional documentary and historical research was undertaken for this report, and that previously used in the earlier survey report (Richardson & Dennison 2015) was re-examined, utilised and repeated as necessary.

Pre-intervention Archaeological and Architectural Survey

2.4 The initial pre-intervention survey work was carried out on 10th August 2020, and involved the following elements.

Measured and Drawn Survey

2.5 The existing EDAS 1:100 scale overall site plan, and the 1:50 scale stone-by-stone drawing of the north elevation of the bridge, produced in 2004, were utilised to produce new pre-intervention drawings. A new 1:50 scale stone-by-stone pre-

intervention elevation drawing for the south side of the bridge was also produced, using the base measurements taken in 2004. No wider topographical survey of the bridge's landscape setting was required to be undertaken as part of the original or current works. The 2004 survey was not tied into the Ordnance Datum AOD, as no nearby benchmarks were available; the same 2004 temporary benchmark was therefore used and the new drawings were tied into the same arbitrary datum.

- 2.6 The new drawings were produced by hand measurement, and show all significant architectural detail such as openings (blocked or unblocked), differences/phases in build, fixtures and fittings, and other constructional detail etc. All the drawings have been produced according to the guidelines established by Historic England (2016, 13-17).

Photographic Survey

- 2.7 A general digital photographic record of the bridge and its characteristics, together with close-up photography of significant details, was undertaken prior to the start of the repair and consolidation works. This was achieved using an SLR digital camera with 12 mega-pixel resolution, and Historic England guidelines in relation to digital image capture and file storage were followed (Historic England 2015). The photographs have been clearly numbered and labelled with the subject, orientation, date taken and photographer's name, and a photographic register detailing the location and direction of each photograph has been completed (see Appendix 1). Digital photographs are referenced in the descriptive text below using italics and square brackets, the number before the stroke representing the date on which the photograph was taken and the number after indicating the image number, e.g. [2/032].

Written Accounts

- 2.8 Sufficient written notes were taken on site in order to allow a detailed description of the bridge to be prepared, illustrated with the drawn and photographic records.

Structural Watching Brief

- 2.9 The pre-intervention survey work was enhanced by means of a structural watching brief carried out during the repairs to the bridge, to allow for the identification and recording of any archaeological and architectural features or elements that might be uncovered. The records made during the repair work comprised drawn, photographic and written elements, and the methodologies outlined above were adhered to.
- 2.10 A total of five separate watching brief visits were made, on 10th September, 15th October, 2nd November, 20th November, and 9th December 2020. Close liaison with the building contractor, Gary Payne, as well as receipt of regular progress reports from the project architect, meant that attendance on site was limited to those occasions when significant new information was required to be recorded, to make best use of the available budget. An additional site visit was made once repairs were largely complete, on 5th February 2021.
- 2.11 A final field visit was made on 5th May 2021 to photograph the bridge after the completion of repairs, to produce a set of 'as-complete' records.

Reporting and Archive

- 2.12 This report forms a basic written record of the archaeological and architectural recording undertaken at Butterton Bridge during the 2020-21 repairs, prepared from the sources of information set out above, and analyses the results and places them within their historical, archaeological and landscape contexts where possible. Copies of the final report were produced as an electronic document in pdf format for the landowner, Historic England, Natural England and the North Yorkshire HER. A hard copy has also been included with the site archive. A further copy has been uploaded to Historic England's Online Access to the Index of Archaeological Investigations (OASIS) database, along with other relevant project information.
- 2.13 The archive relating to the project has been ordered and indexed according to the standards set by Historic England and the ClfA (Brown 2011; ClfA 2020b) (EDAS site code BBS 20). It will be deposited with the North Yorkshire County Record Office in Northallerton at the end of the project.

3 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

Introduction

- 3.1 Fountains Abbey, both in its own right and as part of the later Studley Royal landscape, has been subject to much previous research (e.g. Coppack 2006; Newman 2015). However, although the abbey's estates in the Yorkshire Dales have been the subject of some interest (e.g. Moorhouse 1989), apart from a brief summary by Jennings (1983, 37-46), the outlying landscape setting of the abbey, its environs and the nearby estates is less well understood.

The Medieval Period

- 3.2 Butterton Bridge is variously ascribed a 12th, 13th or 14th century date (HERR 51947; Proctor 2003, 2). Although currently isolated within the valley of the Picking Gill, it formed part of the once extensive network of medieval routeways connecting the estates of Fountains Abbey; it carried one of the principal routes from the abbey's extensive mid-Nidderdale and Craven properties, including Warsill grange to the immediate south-west, to the abbey precinct (Moorhouse 2003, 196 & 198; Jennings 1983, 37-38; <http://cistercians.shef.ac.uk/fountains/lands/lands20.php>). The local section of this long distance track is believed to run from Warsill Pasture to beyond Lacon Hall, and the route is marked by a combination of earthworks, cropmarks and soilmarks and, more importantly, the medieval Lacon Cross which lies to the south-west of the hall of the same name (HERRs 1585837 & 15956). The presence of monastic property in an area could have a significant effect on a local road system, with the accumulation of large blocks of land some distance from the main house often meaning that new routes were created or existing ones were adjusted to provide a better system of communication and transport (Moorhouse 1981a, 628-629).
- 3.3 The name 'Butterton' is thought to stem from the 'Butterdene', which is mentioned in a 12th century charter of Fountains Abbey (Wood 1946, 27). It is possible that a valley crossing here developed quickly as the abbey acquired land, and that the bridge was built soon afterwards, perhaps in the 13th century; Moorhouse (1981b, 640) notes that such crossings did not necessarily follow the usual developmental route of ford to wooden bridge to stone bridge, with many being provided with stone bridges at the outset and from an early date. For example, in West

Yorkshire, Fountains Abbey constructed two stone bridges across the rivers Colne and Calder in order to reach their grange at Bradley near Huddersfield, and their successors remain today as important crossing points (<http://cistercians.shef.ac.uk/fountains/lands/lands20.php>). The Colne Bridge had been founded by c.1170-85, and that over the Calder, known as Cooper Bridge, was in existence by c.1165-1177 (Moorhouse 1981a, 628).

- 3.4 Regarding Butterton Bridge, William de la Gressuner held land in Sawley at the turn of the 13th/14th centuries, and had granted the abbot of Fountains and his successors the rights to pasture sheep and to obtain building stone and millstones from his land for their abbey (Bond 2004, 144 & 344). In 1502 John Norton, then Lord of Sawley, granted the abbot free entry and exit over all his land, and an easement in all his quarries to get stone (Chandler 2005, 3). It therefore seems quite possible that the bridge was also connected with the movement of stone to the abbey. The bridge is suggested to have become redundant after the Dissolution in 1539 (Moorhouse 2003, 196), although the route remained in use on a more localised basis, and foot and horse traffic must have continued to pass over it.

The Post-Medieval Period

- 3.5 Once out of monastic hands, maintenance of the bridge would have passed to the local parish or township authorities, in this case Sawley and Warsill, but there appears to be no documentary evidence to suggest that repairs or maintenance were ever carried out (Jennings 1983, 184).
- 3.6 Detailed research into the ownership and history of Picking Gill and the surrounding area during the post-medieval period lies beyond the scope of this report, although it is appropriate to summarise some of the readily-available information to place Butterton Bridge into its later context. Sawley remained with the Nortons of Norton Conyers until they lost their estates through their involvement in the 1569 'Rising of the North', although Edmund Norton of Cloubeck does not appear to have been implicated and so was allowed to settle at Sawley - he originated the Sawley branch of the family (Chandler 2005, 3-4). The existing Sawley Hall dates to the late 18th century with mid to late 19th century alterations, and was apparently built by the Nortons of Grantley, although it is not known if it replaced an earlier house on the same site. Jefferys' 1771 map shows that the hall was occupied by William Norton, the eldest son of Sir Fletcher Norton, 1st Baron Grantley (see figure 3 top). The Nortons of Grantley never settled in Yorkshire, and it appears that the last members of the Nortons of Sawley were occupying the hall in the early 19th century - a deed of 1820 mentions 'Grace Eliza Norton of Sawley Hall, the widow and relict of Edward Norton late of the same place, and Conyers Norton of Sawley Hall' (<https://www.hpg-nidderdale.co.uk/>). Grace Eliza Norton died in 1823, followed by her only son and heir Conyers Norton in 1827. He appears to have left substantial debts, and immediately after his death the entire 1,549 acre estate was put up for sale.
- 3.7 The manor and estate was bought in October 1828 by Henry Wormald (1801-1871), the son of Richard Wormald of the Leeds firm of woollen merchants of Wormald, Gott and Wormalds. Henry Wormald had a considerable interest in horticulture, greenhouses and gardens in general, and several of the gardeners at Sawley Hall were awarded prizes for their fruit and vegetables. There are numerous references in the local press to the beauty of the gardens, which were opened to the general public from the 1860s onwards, and the magnificent displays of rhododendrons and other flowering shrubs were a particular highlight

(<https://www.hpg-nidderdale.co.uk>). An article entitled 'Yorkshire Rambles' in July 1877 noted the central role played by Henry Wormald in the planning of his garden: "*The late Mr Wormald of Sawley was a lover of trees and in his time did a great deal of judicious planting ... the rhododendrons and azaleas in full bloom are finer than anything else that can be seen in the neighbourhood. The late Mr Wormald ... bought these evergreens from Ripley Castle and planted them in this moist glen*" (Leeds Mercury 14th July 1877). Perhaps this 'moist glen' is a reference to Picking Gill?

- 3.8 Henry Wormald died childless in 1871 and so the estate passed to a non-resident nephew, Henry Wormald Armitage. Sawley Hall was thereafter let to various tenants, although the gardens continued to be opened to visitors, and the cultivation of fruit trees, exotics and bedding plants was maintained (<https://www.hpg-nidderdale.co.uk>). By 1919 the hall and estate had passed to the Barran family; Sir John Barran (1821-1905) was a Liberal politician and prominent clothing manufacturer from Leeds who was created a baronet in 1895 (Jenkins 2004). He was succeeded by his 33 year old grandson, Sir John Nicholson Barran (1872-1952), also a Liberal politician, and he and his wife employed at least 18 people on the estate which by 1936 comprised some 3,000 acres (Chandler 2005, 12).
- 3.9 Jefferys' plan of Yorkshire, printed in 1771 (sheet 7), names the bridge as 'Butring Bridge' (see figure 3 top) while the Sawley enclosure plan of 1799 shows and names 'Butterton Bridge' together with the annotation 'Road 12 Feet wide' (see figure 3 bottom). This latter plan also names the stream in the gill as 'Hebden Wood Beck', and the bridge lies on a bridle road and footway linking Warsell [sic] Gate with Lacon Hall and land further east. The annotated names also show that the Picking Gill valley, at least on the north side of the beck, was allocated to Conyers Norton Esq, who also held the land around Sawley Hall.
- 3.10 The 1854 Ordnance Survey 6" to 1 mile map (sheet 136) shows a large sub-rectangular pond, named as a 'fish pond', slightly further up Picking Gill, to the north-west of the bridge (see figure 4). This is still extant, and has a substantial earth dam at its southern end. There are three other 'fish ponds' further up the valley (sheet 118), with the supply seemingly coming from a stone well-head structure named as 'Wine Wife Well'. These ponds form part of a deliberately created ornamental scheme, and it is also possible that the bridge itself underwent some renovation in the 19th century as part of this work (English Heritage Field Monument Warden report 2nd March 1994). The bridge is marked as 'Butterton Bridge' in 1854, and the track/path leading to and from it is clearly visible (see figure 5 top). It is interesting to note that the track from the east side of the bridge runs south-east along the north side of the beck for approximately half its length before turning east to pass through fields to Fountains Abbey Road, north of Hebden Bridge House (i. e. not through the full extent of the valley) (see figure 4). The existing track which follows the north side of the beck for most of its route was in place by 1898.
- 3.11 The 1891 Ordnance Survey 25" to 1 mile map (sheet 136/3) again names the bridge as 'Butterton Bridge' (see figure 5 bottom), and it is depicted as a structure with two sides or faces, these extending further to the west of the beck than they do to the east. A bridle road approaches the bridge from the west, crosses it, and then continues on the east side, where it meets two north-west/south-east tracks running along Picking Gill. A separate footpath takes a steeper route between two old quarries before joining other bridle routes or carriage drives. The pond to the north of the bridge shown in 1854 is now named as 'Low Fish Pond', and it has a

small building at the south-east corner and 'Stepping Stones' extending into the water from the north end. The bridge and surrounding area are similarly depicted on the Ordnance Survey 1909 edition.

- 3.12 There is also some surviving evidence that the visual appearance of the valley in which Butterton Bridge stands was enhanced by ornamental tree planting during the 19th century. A number of impressive examples of specimen trees, especially *Sequoia Wellingtonia*, survive to the south-east of the bridge, closer to Fountains Abbey Road (English Heritage Field Monument Warden report 2nd March 1994) [8/552-8/561] (see plates 1 to 3). Although it is suggested that the appearance of landscape parks generally did not significantly alter in the 19th century (Williamson 1995, 163), there was an increased variety of parkland planting, with horse chestnut and lime often rivalling oak and beech; more exotic trees such as Wellingtonias were also a frequent introduction of this period, and these new species were sometimes massed in the form of an arboretum or pinetum around a house (Klemperer 2010, 40). As noted above, it is presumed that this ornamental, fashionable, landscape along the gill was created or enhanced by Henry Wormald, although it is also possible that additional works towards the east end of the gill, which included the creation of the existing track from Fountains Abbey Road, were carried out by the later owners of the estate, such as the Barran family. There are some large specimen trees around the bridge itself, as well as rhododendrons on the valley sides.
- 3.13 There are many different folkloric associations between the Devil and bridges in Yorkshire, and Butterton Bridge is no exception to this. According to Chandler (2005, 133), the bridge is often referred to as the 'Monk's Bridge' perhaps not surprising given its association with Fountains Abbey), but it is also known as 'Devil's Bridge' where robbers laid in wait for travellers. Roberts (2013) catalogues a different origin for the name, noting that Butterton Bridge is an example of a structure sometimes suggested to have been built by the Devil overnight, but left in a shabby unfinished state as his work was interrupted by the dawn.

4 ARCHITECTURAL DESCRIPTION

Introduction

- 4.1 An architectural description of Butterton Bridge is given below, beginning with its wider landscape setting, location and plan form, the structure and materials, then proceeding to the external elevations and the interior form of the tunnel/vault. Reference should also be made to the survey plans and other drawings (figures 6 to 8), and the plates.
- 4.2 The bridge and associated abutments are aligned slightly north-east to south-west. However, for the purposes of the following description, and to maintain consistency with the specification for the repair works (Pace 2018), the long axis of the bridge is considered to have an east-west alignment across the beck and valley. Finally, in the following text, 'modern' is used to denote features or phasing dating to after c.1945.

Landscape Setting

- 4.3 As has already been noted above, the bridge is located within the central part of Picking Gill, a steep-sided wooded valley with a beck running along its base. The gill is aligned broadly north-west/south-east (see figure 2); the beck which runs

down its base, and which the bridge crosses, has three tributaries, one running from the large pond to the north (named 'Low Fish Pond' in 1891), and two entering the gill from the west, along two smaller valleys, one marked as 'Black Dike' in 1854 (see figure 4). Further to the south-east, the beck becomes the Hebden Beck.

- 4.4 On the west side of the bridge, the route incorporating the bridge is apparent as a well-defined trackway, and it has a junction with a second trackway, well-graded and up to 6.0m wide. This second trackway does not appear to have been used recently by vehicles, and it follows the contour of the west side of the valley as it runs south-eastwards. It is not shown on the Ordnance Survey maps of 1854 or 1891, but does appear on the modern mapping, running into Hebden Wood West. Returning to the main route, this continues west, curving around the north side of a disused quarry. This quarry has working faces standing up to 1.5m high, with widely separated bedding planes. To the west of the quarry, the line of the track is indistinct, and when it re-emerges, there are two possible routes (as shown in 1891; see figure 5 bottom), one above the other, but both following the contour as it curves around to the south-west. The upper route is terraced into the natural slope, and in places appears to be two parallel trackways. The better defined of the two tracks is up to 4.0m wide, and has a decayed, drystone wall of large blocks surviving intermittently to the upslope (south) side; in places, worn paved trods are also visible. Further to the south-west, the upper route comes to resemble a holloway, up to 2.0m deep (see plate 4). This route is marked as a 'B.R.' (bridle road) on the 1891 map, and almost certainly represents the earlier medieval trackway between the bridge and the monastic estates to the west.
- 4.5 The lower route is initially formed by a spread trackway, terraced into the natural slope and up to 6.0m wide. As it curves first to the north-west and then to the south-west, running parallel to the beck below, it narrows to between 2.0m-3.0m wide; the beck is very overgrown in this area, but there appears to be a mill stone rough-out lying in its base. As the lower route starts to climb the natural slope, it becomes a holloway, up to 4.0m wide and 2.0m deep. Both the upper and lower routes converge towards a field wall; they were not followed south of the field wall, but both are visible as earthworks beyond it.
- 4.6 To the east of the bridge, the main route follows the eastern abutment, until its line is crossed by the aforementioned vehicle track running up the east side of Picking Gill. Beyond the track, the footpath shown in 1891 climbs up the steep slope here between disused quarries (see figure 5 bottom); it is now equipped with modern timber-revetted steps. Whilst this route would be suitable for pedestrians, it would not have been useable for wheeled horse-drawn vehicles. It is therefore assumed that, after leaving the eastern abutment, these may have turned left to follow a trackway on the line of that existing, and then after c.75m turned up the slope to the north-east, following a well graded trackway. This links up with the onward route of the bridle road across the field to the north of Picking Gill shown in 1854 and 1891. This bridle road joined the western end of Green Lane. An existing public footpath leaves the north side of Green Lane to run north-eastwards towards Lacon Hall. It passes very close to the base of Lacon Cross, which marked the medieval route towards the abbey precinct (see plate 5) (<http://cistercians.shef.ac.uk/fountains/lands/lands20.php>).
- 4.7 Following vegetation clearance in the area to the south of the bridge undertaken prior to the current consolidation works, a section of ruined wall line was exposed which had not been visible during the previous 2004 survey work. The wall appeared to have been of dry stone construction, and was set on a slight north-

east/south-west alignment on the east side of the beck. It was placed between 5m to 8m south of the bridge, parallel to the east abutment, with an average width of 0.70m and a height of 0.40m. The wall slopes down towards the beck, fading out shortly before it meets the edge. It cannot be seen to continue on the west side of the beck, but there is a denuded linear depression on approximately the same line. The wall does not appear on any of the historic maps consulted for this report.

The Bridge

Plan Form (see figure 6)

- 4.8 Taken as a whole, both abutments and the bridge have a total length of 48.0m, although the western abutment accounts for almost 32.0m of this alone; the abutments give the appearance of a raised causeway.
- 4.9 Prior to the start of the repair and consolidation works, the grass-covered western abutment appeared to have been constructed by dumping earth as a linear bank out from the west side of the valley towards the beck, and then facing the north and south sides with stone [1/896] (see plate 6). The top of the grassed causeway, between the stone facings, has an average width of 7.70m, although this probably increases to c.8.50m at the base due to the batter of the facings. The facing stands to a maximum height of 3.20m immediately adjacent to the bridge, but is generally less than 2.20m high. It is built of roughly coursed and squared stone rubble, largely unmortared. The top of the western abutment is relatively level, sloping slightly down towards the bridge; there is no visible evidence of paving or any other surface, although there are two well-defined modern vehicle ruts. The junction between the masonry of the bridge and that of the abutments to either side is staggered and rather crude, perhaps suggesting several different phases of repair and rebuilding.
- 4.10 The grass-covered eastern abutment, although much shorter than that to the west, is of a similar form [1/885] (see plate 7). At the top, it has an average width between the stone facings of 6.70m, although this probably increases at the base due to the batter of the facings. The facing stone stands to a maximum height of 3.30m immediately adjacent to the bridge, but is generally less than 2.20m high. It is built of roughly coursed and squared stone rubble, largely unmortared. The top of the eastern abutment is relatively level, sloping very slightly down towards the bridge; again, there is no visible evidence of paving or any other surface, although there are two well-defined modern vehicle ruts.
- 4.11 The bridge itself comprises a single two-centred arched span; each face or elevation of the arch is of two orders, and is built of relatively well squared and coursed local gritstone, with traces of a lime mortar in places [1/883, 1/907] (see plates 8 and 9). The maximum north-south width across the top of the bridge is 5.50m, including any parapet walls that may have been present; this appears to be wider than both the original larger medieval bridges at Sheffield (4.50m) and Rotherham (4.60m) in South Yorkshire (Ryder 1982, 150). The span has an average east-west width of 3.45m and a maximum height of 3.60m internally above the base of the beck. All parts of the bridge appear to be built of local gritstone.
- 4.12 The tunnel, or more properly vault, is supported by four rectangular-cut pointed ribs which die into the responds; the outer ribs are 0.55m wide, whereas the inner ribs are only 0.30m wide, but all stand 0.25m proud of the vault. The gap between the ribs is 0.95m. The ribs and voussoirs of the arch are well dressed and of relatively large dimensions, as are the lower parts of either side of the vault, while the stones

of the vault arch are more thinly coursed [1/891, 1/909, 1/912, 1/913; 3/296, 3/297, 3/301, 3/303, 3/304] (see plate 10). On either side, the lowest course of the vault projects very slightly, and rests on a bed of smooth rectangular stones or cobbles, laid north-south along the bed of the beck; a section of east-west laid stones on the south side of the bridge may represent a later repair. The northern edge of these stones corresponds with the north face or elevation of the bridge, and so they were almost certainly laid to form a base upon which to erect the structure, rather than forming the remains of an earlier ford, for example. Beyond the south face of the bridge, the stones are again set north-south, and slope gently downwards away from the bridge to form a small weir. No masons' marks or putlog holes were noted on the bridge during the course of the archaeological field work, although there are several recesses or sockets in the vault, set above the level from which the ribs spring, which may once have housed the wooden centring or form over which the vault was constructed.

North Elevation (see figure 7 top)

- 4.13 On the north face or elevation, both sides of the base of the arch rise from a chamfered offset. This elevation is faced with relatively well squared and coursed local gritstone, with traces of a lime mortar surviving in places. The uppermost course over the arch is formed by a square projecting stringcourse; there is no surviving parapet, but the stringcourse may once have carried one (see plate 9). To the east of the arch, there is a c.3m long section of thinly coursed stone (although there are levelling courses of deeper stone within this), set back very slightly from the arch face. Some of the courses curve slightly upwards towards the east end of this section, almost certainly because they are built over a slightly projecting pier of stone, measuring c.0.70m wide by 0.50m high. This may be the remnants of a buttress, or a former return to the wall face. Above and to the east again, there is an area of collapsing rubble facing with much vegetation.
- 4.14 Approximately 1.30m to the west of the arch, there is a staggered joint, sloping slightly from east to west as it rises up the elevation. Beyond this joint, the facing stonework projects c.0.10m from the wall face of the arch, and this projecting section is on average 0.80m wide. It then meets what appears to be another staggered joint, again sloping slightly from east to west, with a semi-ruinous pier at the base projecting up to 0.70m from the wall face. The pier is up to 1.00m wide and may have risen as high as 2.30m above ground level, almost certainly forming another buttress or perhaps a former return to the wall face [1/906] (see plate 11). Beyond this, the facing of the abutment is of rubble, sometimes squared and roughly brought to courses, incorporating pieces of stone up to 0.80m long, again much obscured by vegetation [7/061-7/065; 8/597-8/600, 8/602, 8/605, 8/606] (see plate 12).

South Elevation (see figure 7 bottom)

- 4.15 On the south face or elevation of the bridge, only the east side of the base of the arch rises from a chamfered offset. The lowest two visible courses of the west side project slightly, but there is no indication that a chamfered offset was ever present here. This elevation is also faced with relatively well squared and coursed local gritstone, with traces of a lime mortar surviving in places [1/884, 1/886, 1/892, 1/893, 1/895] (see plates 8 and 13). The two uppermost surviving courses over the arch form a square projecting stringcourse; as with the north elevation, there is no surviving parapet, but the stringcourse may once have carried one [3/290] (see plate 14).

- 4.16 Approximately 1.50m east of the arch, there are the remains of a crude buttress or perhaps more likely a former return which projects on average c.0.50m from the wall face. It is slightly battered to both the west and south faces, c.1m wide and survives to a visible height of 0.80m. However, there is an area of collapse to the wall face directly above the buttress/return rising to a height of nearly 2m; this collapse has created a void. It is probable that the buttress/return originally stood this high, but it has since collapsed as it was poorly tied into to the facing stonework [1/897, 1/903] (see plate 15). To the east of the buttress/return, the rubble used to face the east abutment is relatively well coursed and squared, although it survives well only to c.1m above ground level, having collapsed above this [1/904, 1/905; 8/579, 8/580] (see plate 17).
- 4.17 There is a better preserved buttress/former return to the west of the arch, although it is in poor structural condition and is poorly tied into the wall face. This buttress/return projects up to 0.50m from the adjacent wall face of the arch and has a battered east face, rising to a visible height of c.3m [1/898] (see plates 13 and 16). To the west of the buttress/return, the facing of the west abutment is built of roughly coursed and squared stone rubble, largely without mortar, partly collapsed and partly overgrown [1/899]. Generally, the stones are better coursed to the west of a large tree [1/900], whilst further to the west again there are some large stones up to 0.80m long incorporated into the abutment facing [1/901, 1/902; 7/059, 7/060; 8/573, 8/574-8/577] (see plate 18).

5 INFORMATION RECORDED DURING THE WATCHING BRIEF

- 5.1 At the start of the repair and consolidation works, both elevations of the entire bridge structure were scaffolded to allow close working access [3/313, 3/314, 3/316, 3/317] (see plate 19). However, this made detailed archaeological recording, and in particular photography, difficult as it was not possible to view exposed sections and stonework from any distance. Recording, and indeed the repair and consolidation work generally, was also problematic on occasions due to very wet weather.
- 5.2 Initially, the ground surface of the causeway across the central 18m of the bridge and abutments was reduced by an average depth of 0.30m below ground level (BGL), and the exposed surface was then boarded to allow a mini-digger to access the sides of the structure; dismantled stonework was also stacked along the sides of the newly-exposed surface. The reduction in ground level revealed a clean, compacted mid-brown/orange sandy silt, but no finds or any traces of metallurgy or any other kind of surface were uncovered [3/286, 3/287] (see plate 20).

North Elevation (see figure 8 elevation)

- 5.3 In total, a c.5.30m long section of the facing stone of the north elevation, to the east side of the arch, was removed to an average height of 2.30m below the reduced causeway ground surface. The core behind was then cut back for an average depth of c.1.5m from the former wall face and any collapsed core was consolidated and secured with lime mortar grout. This operation showed that the facing stones had an average depth of 0.40m back from the wall face [2/115] (see plate 21). Behind the facing stones, close to the arch, the remains of a crude relieving arch formed from rubble voussoirs were exposed [2/118] (see plate 22). This relieving arch was only visible for a length of c.0.70m and the upper surface was set 0.20m lower than the apex of the bridge arch itself. Around the relieving arch, and in the western part of the exposed section generally, behind the facing stone, the body of the abutment was formed from loose rubble that appeared to

have been thrown in behind; there were many voids, but only a small amount of sandy silt within them. However, towards the eastern end of the exposed section, a 'face' was visible for a length of least 1.30m, where the rubble within the abutment appeared to have been laid roughly to form a dry stone inner structure [2/116].

- 5.4 A c.3.30m long section of the facing stone to the west side of the arch was removed to a maximum height of c.4.00m below the reduced causeway ground surface, including the buttress/return here; this was subsequently extended to a length of 6.50m. As to the east, the core behind was then cut back for an average depth of c.1m from the former wall face. No significant archaeological features were exposed as part of this work, the majority of the core of the bridge and abutment comprising loose rubble with a small amount of soil. In addition to the parts of the north elevation which were dismantled, a 0.50m high section of the reduced ground surface along the top of the elevation was graded back for a width of 1m. No evidence for former surfaces was exposed.
- 5.5 As part of the consolidation works, the largest stones taken down from the wall face were reset back in the same positions wherever possible. The new facing was not pointed, but the mortar recessed deeply, so that the appearance of a drystone construction was maintained. The buttresses either side of the arch were rebuilt using original and salvaged stone, and the tops capped with flat stones [7/067, 7/068, 7/070; 8/587] (see plates 23 and 24). A number of record photographs were taken of the north elevation while consolidation work was in progress [3/305, 3/308, 3/309, 3/311, 3/312; 7/066, 7/071-7/073, 7/075].

South Elevation (see figure 8 plan)

- 5.6 In total, a c.6.25m long section of the facing stone of the south elevation, to the east side of the arch, was removed to a maximum height of c.3.00m below the reduced causeway ground surface, including the buttress/former return here. The core behind was then cut back for an average depth of c.0.50m from the former wall face, and any collapsed core was consolidated and secured with lime mortar grout. This operation showed that the facing stones had an average depth of 0.50m back from the wall face. Behind these facing stones, both the bridge and the abutment had a core of roughly coursed and squared dry stone rubble, more neatly 'laid' than that seen to the north elevation [3/291, 3/292]. Within the rubble, there were at least two 'courses' of deeper stones, set c.0.50m apart vertically [3/293] (see plate 25). Further cleaning showed that this rubble was laid over the well-cut arch stones of the bridge.
- 5.7 To the west side of the arch, a c.5.00m long section of the facing stone was removed to an average height of 2.50m below the reduced causeway ground surface, including the buttress/return. The core behind was then cut back for an average depth of 1m from the former wall face. As was the case on the east side of the arch, the facing stones had an average depth of 0.50m back from the wall face.
- 5.8 During the dismantling of the facing stone to the west of the arch, the building contractor noted what he thought were either several possible different phases of construction, or perhaps different elements of a single phase, and this was discussed with EDAS on site. However, due to heavy rainfall creating muddy conditions on site, and the loose nature of much of the material immediately behind the facing stones, it was difficult to ascertain the exact relationship of these exposed features to one another. Behind the facing stones, there was what

appeared to be a 'face' within the core of roughly coursed and squared dry stone rubble, set back an average of 0.75m from the main face and set on a slight west-north-west/east-south-east angle. A single shaped stone was also uncovered near the top of the face which was thought might represent evidence that the western buttress/return had once been set an angle to the main face. However, subsequent discussions with the contractor and further dismantling work suggested that it was more likely to be associated with a return to the main face. At the base of this buttress/return, further dismantling revealed two apparently separate faces, one relatively straight and the other slightly curvilinear, within the core work [4/436, 4/438, 4/441-4/443] (see plate 26).

- 5.9 In addition to those parts of the south elevation which were dismantled, a 0.50m high section of the reduced ground surface along the top of the elevation was graded back from the outer face for a width of 1m [3/288, 3/289, 3/295] (see plate 27). As before, no evidence for any former surfaces or artefactual dating evidence was exposed.
- 5.10 Once again, as part of the consolidation works, the largest stones taken down from the wall facing were reset in the same positions as in the original elevation. The new facing was not pointed, but the mortar recessed deeply, so that the appearance of a drystone construction was maintained. The buttresses/returns either side of the arch were rebuilt using original and salvaged stone, and the tops capped with flat stones [7/049, 7/052; 8/570, 8/568] (see plates 28 and 29); both buttresses were rebuilt with a slightly curving parapet face above [5/633, 5/634; 8/570, 8/572] (see plate 30). Some repointing work was also done to the inside of the bridge vault [7/058; 8/590-8/592]. Once again, a number of photographs were taken of the south elevation while consolidation work was in progress [5/629, 5/631; 7/048, 7/050, 7/051].

Drainage Works (see figure 8)

- 5.11 Two cross-trenches were excavated across the previously reduced causeway surface of the bridge, in order to facilitate the laying of two drains and the laying of two tie-bars with plates (see figure 8 plan) [6/775, 6/778]. These drains fed into spouts which projected beyond the external elevations to ensure water was shed away from the wall faces.
- 5.12 The east trench (Trench A) measured c.6.00m long overall (c.4.80m inside the rebuilt parapet walls), with an average width of 0.80m and a maximum depth of 0.60m BRGL. At either end, modern disturbance/backfill associated with the current consolidation works extended up to 1.35m from the external elevations of the bridge. Between these sections, the central part of trench had two distinct layers. The uppermost layer comprised a layer of compacted stone rubble and sandy silt, which extended to a maximum of 0.20m BRGL. It overlay a clean, compacted, mottled orange sand, which continued below the base of the trench. Both of these layers sloped slightly downwards away from the centre of the bridge (see figure 8 section) [6/779, 6/780, 6/785, 6/786] (see plate 31).
- 5.13 The west trench (Trench B) was c.5.70m long overall (c.4.80m inside the rebuilt parapet walls), and had an average width of c.1.00m and was excavated to a maximum depth of 0.80m below the previously reduced ground level (BRGL). At either end of the trench, the first 1.50m in from the external elevations of the bridge was formed by modern disturbance/backfill associated with the consolidation works. Beyond this, was a 0.5m wide deposit of the same rubble core noted previously, comprising angular stone rubble up to 0.40m across. The central c.3m

of the trench then exposed a different sequence of deposits, although there was no clear division between these and the flanking rubble. The uppermost 0.10m BRGL comprised modern disturbance. This overlay a clean, compacted, mottled orange sand, which extended to a maximum of 0.30m BRGL. Beneath this, there was a layer of compacted stone rubble mixed with sandy silt; the rubble was up to 0.15m across. This continued below the base of the trench. Both the sand and the compacted rubble sloped slightly downwards away from the centre of the bridge (see figure 8 section) [6/776, 6/781, 6/782].

- 5.14 The tie-bars and drains were laid into the two excavated trenches [6/777] (see plate 32) which were then backfilled. Chutes were also placed into the parapet walls to allow water to be shed from the wall faces below [5/635; 7/053; 8/582, 8/585, 8/586]. The top of the causeway was re-surfaced with road stone and topsoil, and then re-sown with grass seed, restoring the ground surface to approximately the same level it had been prior to the start of the works [7/069].

'As completed' records

- 5.15 A final visit was made to the bridge on 5th May 2021, to record the structure in its completed state. Both elevations were photographed (north elevation [8/583, 8/584, 8/589, 8/593-8/595]; south elevation [8/565-8/567, 8/569, 8/571, 8/581]), as well as the top of the bridge [8/562, 8/563] (see plates 33 to 36).

6 DISCUSSION AND CONCLUSIONS

- 6.1 The structural information recorded during the repair and consolidation work at Butterton Bridge can be summarised as follows. There is a clear difference in the quality of the masonry between the central part of the bridge and that of the abutments to either side, the junction between the two being staggered and rather crude (see figure 9). The central part (essentially the arch and facing stone of the arch) appears to have remained relatively unaltered throughout its history, with the abutments seemingly going through several different phases of repair and rebuilding. This is particularly noticeable to the east part of the north elevation, where a distinctive thinly coursed stone facing with deeper levelling courses was used. To both main elevations, the projections flanking the arch were poorly tied in to the main wall faces; it was not possible to determine with any certainty whether these projections were buttresses or former returns.
- 6.2 To the north elevation, dismantling revealed that the facing stone of the arch extended to an average depth of 0.40m back from the wall face. To the east side of the arch, the remains of a crude relieving 'arch' formed from rubble voussoirs were exposed, and also a possible crude 'face' within the abutment, where rubble appeared to have been laid roughly to form a drystone inner structure. This was in contrast to the majority of the exposed core of both the arch and the abutment, which comprised random rubble mixed with sandy silt, and containing many voids.
- 6.3 To the south elevation, dismantling revealed that the facing stone of the arch extended to an average depth of 0.50m back from the wall face. On the east side of the arch, both the arch and the abutment had a core of roughly coursed and squared dry stone rubble, more neatly 'laid' than that exposed to the north elevation. To the west side of the arch, a single surviving shaped stone at the top of the projection was initially thought to show that the wall face had once returned at an angle here, but further dismantling suggested that it was more likely to be a return to the main face, and so perhaps the projection never actually formed a buttress. This projection may once have been set at a shallow angle to the

elevation, but if so it was later rebuilt at something closer to a right angle. Some 0.75m behind the facing stones, what appeared to be a 'face' within the core of roughly coursed and squared dry stone rubble was exposed, set at a slightly different angle to the main elevation.

- 6.4 No evidence for a paved, cobbled or otherwise strengthened surface to the causeway over the bridge was exposed during any part of the consolidation works, and no dating evidence whatsoever was recovered from any part of the structure.
- 6.5 There are two key periods which would clearly benefit from more detailed research when trying to consider the bridge as part of a wider, functioning landscape. The first is the period of monastic ownership and influence. The bridge formed part of an important route, connecting Fountains Abbey's properties and estates in mid-Nidderdale and Craven to the abbey precinct. As such, it may have partly made use of a pre-existing route, or perhaps only became fully developed as the Nidderdale and Craven properties were acquired or gained in importance. In terms of date, the bridge is variously ascribed to the 12th, 13th or 14th centuries; an arch (either single or multiple) carried on ribs is the usual construction of surviving medieval stone bridges in Yorkshire (Ryder 1982, 150), although the use of rectangular-cut ribs at Butterton rather than chamfered ribs appears to be less common. Butterton Bridge has been described as 'a duplicate of the bridge at the west end of the Abbey' (HERR 51947), the latter presumably referring to the bridge close to the West Gate. In overall form, it is also similar to the bridge leading to the mill in the abbey precinct, although this is of two spans, with both the orders and ribs being chamfered. It therefore seems most likely that Butterton Bridge was built either in the later 12th century or in the first half of the 13th century, when the majority of building work took place in the abbey complex. The bridge was probably originally provided with low parapet walls, carried on the slightly projecting stringcourses.
- 6.6 Butterton Bridge could have replaced an earlier crossing point, such as a ford or wooden bridge, but this may not necessarily have been the case, and it may well have been built in stone from the start. It is assumed that the bridge took both horse and foot traffic. It is certainly strong enough to have also carried wheeled vehicles such as carts, and if so it would have required abutments of a similar length and height to those which survive, which provide a level approach to the central part. This level approach and the overall strength of the bridge could reflect the fact that an important part of the traffic across it included the transport of stone from quarries to the west to the abbey precinct to the east. The lack of any evidence for any more permanent surfacing to the bridge is slightly puzzling, as some would be expected, although during the medieval period the practice of laying hurdles or brushwood on bridges to prevent damage from cart wheels is documented (Moorhouse 1981b, 639). It is, of course, possible that any surfacing was completely removed for re-use elsewhere, or perhaps it survives on those parts of the bridge which were not affected by the current phase of consolidation works. The alternating layers of sand and compacted rubble seen in the two trenches dug across the top of the bridge, close to the arch, might be part of the original surfacing but, given the lack of any dating evidence, they could equally relate to later repairs or maintenance. Similarly, the apparent relieving 'arch' noted behind the north elevation, and the apparent laid or stacked nature of some of the rubble exposed to the internal core, could also be original construction features but again these features cannot be closely dated.
- 6.7 The bridge would have been maintained by the abbey throughout the medieval period, and then by the township authorities after the Dissolution - it may be that

some of the evidence recorded during the survey relates to medieval and/or later repairs, although without any dating evidence it is difficult to be certain. The routes approaching the bridge from either side are also likely to have been modified on a local basis to cope with erosion or weathering. The earthworks forming the holloways to the west of the bridge may be evidence for a slight change in course when one branch became too worn or too poor to traverse in bad weather, or was perhaps found to be unsuitable for heavily laden horses or even carts; multiple parallel holloways, the course shifting many times, are a common feature on packhorse routes, particularly where they ascend or descend slopes.

- 6.8 The second key time period in understanding the structural development of the bridge which would benefit from more research is the 18th and 19th centuries. It has previously been suggested that the visual appearance of Picking Gill was enhanced during this period, possibly by both planting and other landscaping works (Richardson & Dennison 2015, 5-6), and that Butterton Bridge may well have been incorporated into this as a romantic landscape feature (English Heritage Field Monument Warden report 2nd March 1994). Such works may have required the bridge to be renovated or repaired as part of the landscaping scheme, and these repairs may have been reflected in the pre-consolidation projections flanking the arch and the abutments, for example. However, the possible existence of such a scheme raises numerous additional questions, none of which can be easily answered presently. Was it done in a single phase, or did it occur in several different phases?
- 6.9 It was noted in the Background chapter above that a prime candidate for the laying out of a pleasure ground or wooded landscape in Picking Gill was Henry Wormald (1801-1871), who bought the Sawley manor and estate in 1828. He had a considerable interest in horticulture, greenhouses and gardens in general, and there are numerous references in the local press to the beauty of the gardens which were opened to the general public from the 1860s onwards. A newspaper account of July 1877 suggests that he bought evergreens from Ripley Castle and planted them in this 'moist glen', and this planting may have included at least some of the impressive examples of specimen trees, especially *Sequoia Wellingtonia*, which survive to the south-east of the bridge, as well as the rhododendrons and azaleas which line the valley floor and which could be seen from a carriage drive leading up the gill from Hebden Bank.
- 6.10 The 1854 Ordnance Survey map shows that several 'fish ponds' had been created in the gill by this date to the north of the bridge. It is not known whether these are part of the Wormald's ornamental scheme or whether they are the work of the later owners, the Barran family. They could well have improved or added to the planting, for example some the ornamental coniferous trees closer to Hebden Bank at the end of the 19th century. The incorporation of a medieval structure like Butterton Bridge into a later designed landscape, as opposed to the creation of a new bridge or a sham ruin for example, is also of interest, as there is local precedent for such an act; the incorporation of the ruined chapel of St Michael Archangel on the summit of How Hill into John Aslabie's designed landscape at Studley Royal in the 1720s appears to be a very early example of the use of an antiquity as a garden detail (Newman 1998, 8; Dennison & Richardson 2007; Newman 2015, 83-85).
- 6.11 Establishing the date at which Butterton Bridge was incorporated into a wider ornamental landscape created within Picking Gill is also crucial to understanding how it was used within that landscape. It seems to be the case that Picking Gill was modified during the mid-later 18th century in conjunction with the erection of

Sawley Hall, and that its gardens were later open to the public, in conjunction with visits to nearby Fountains Abbey and Studley Royal. The fact that the abutments to either side of the bridge arch were maintained suggests that part of the visitor experience was walking or riding over it, as well as viewing it within the wider valley setting. More detailed research and mapping of the various existing and redundant tracks through the gill might be useful in this regard, as a similar study at Harewood Castle in West Yorkshire helped to understand how a combination of approaches by foot or carriage formed part of the experience of the ruined medieval castle within the setting of an early 19th century pleasure ground (Dennison & Richardson 2008 17-19, 35-36).

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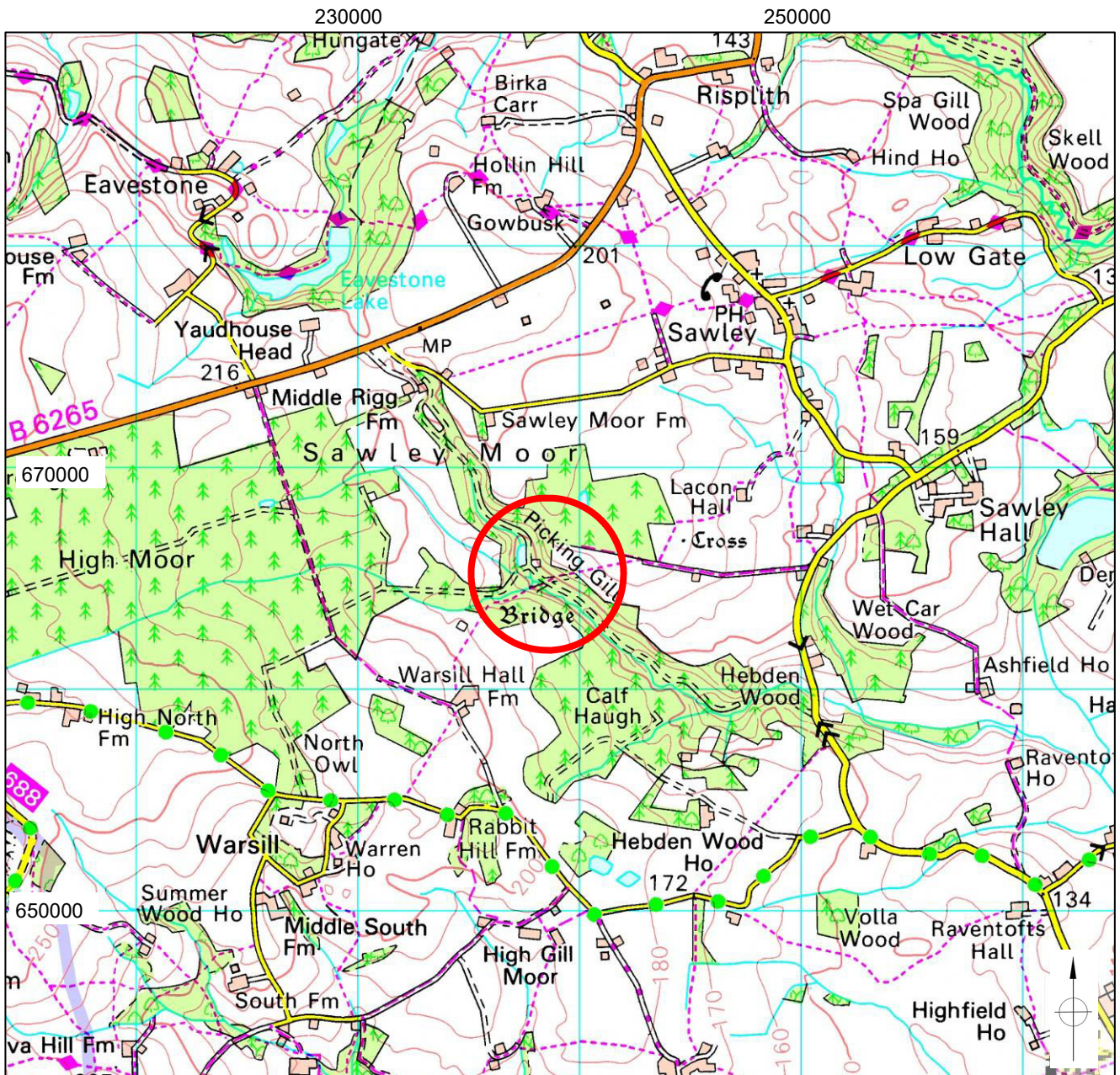
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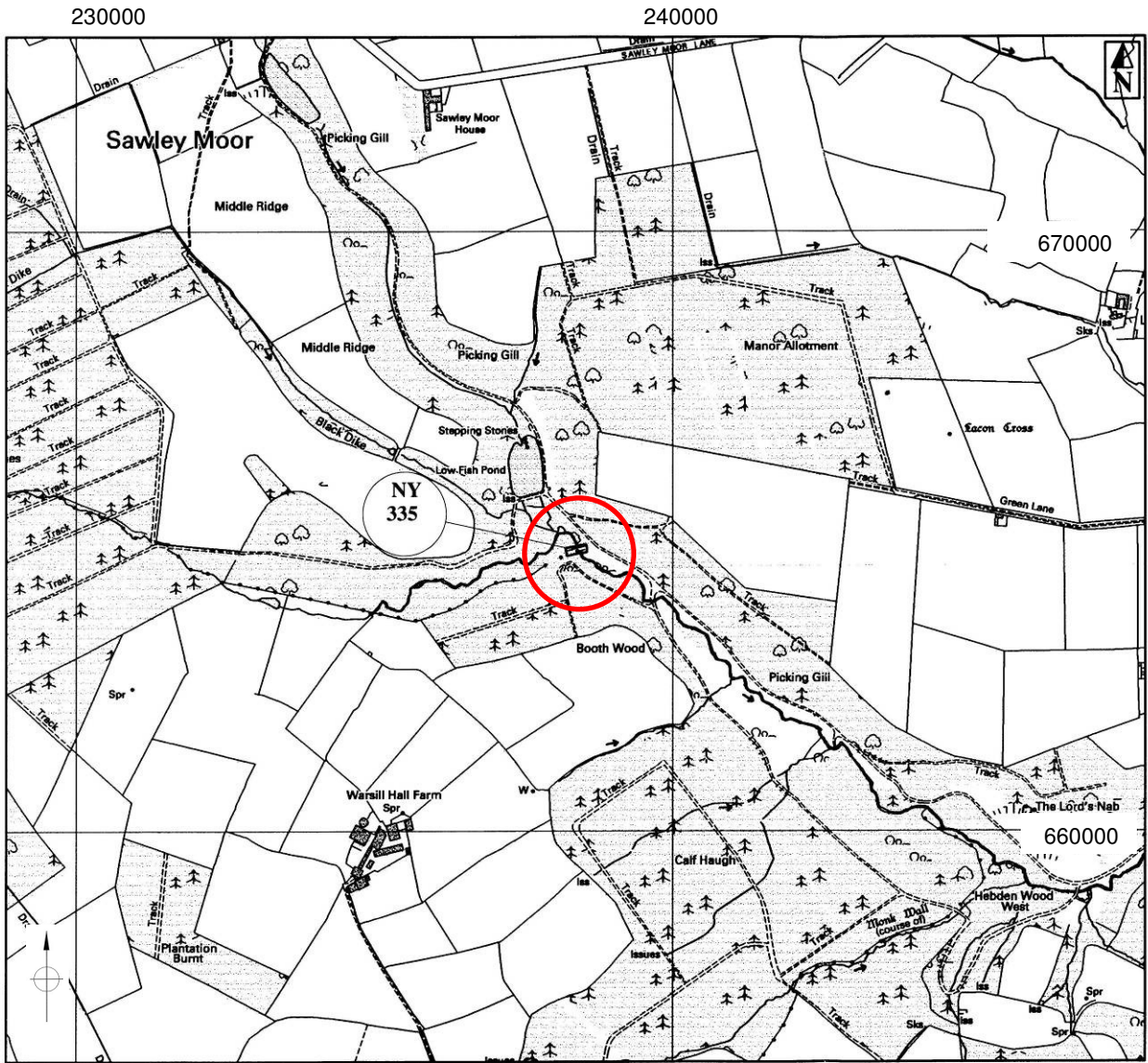
8 ACKNOWLEDGEMENTS

8.1 The archaeological watching brief was commissioned by project architect Peter Gaze Pace, on behalf of the Sawley Estate and in accordance with the Scheduled Monument Consent. EDAS would like to thank all individuals and organisations for their help and co-operation in carrying out the work, particularly the owner Mr Steven Fenby, Steven Fieldsend of Land Management Partnership (estate manager), Mr Gary Payne of G P M (Ripon) Ltd, and Peter Pace. The archaeological recording was undertaken by Shaun Richardson of EDAS, assisted by Richard Lamb and Ed Dennison. The final report and other drawings were produced by Ed Dennison, who retains responsibility for any errors or inconsistencies.



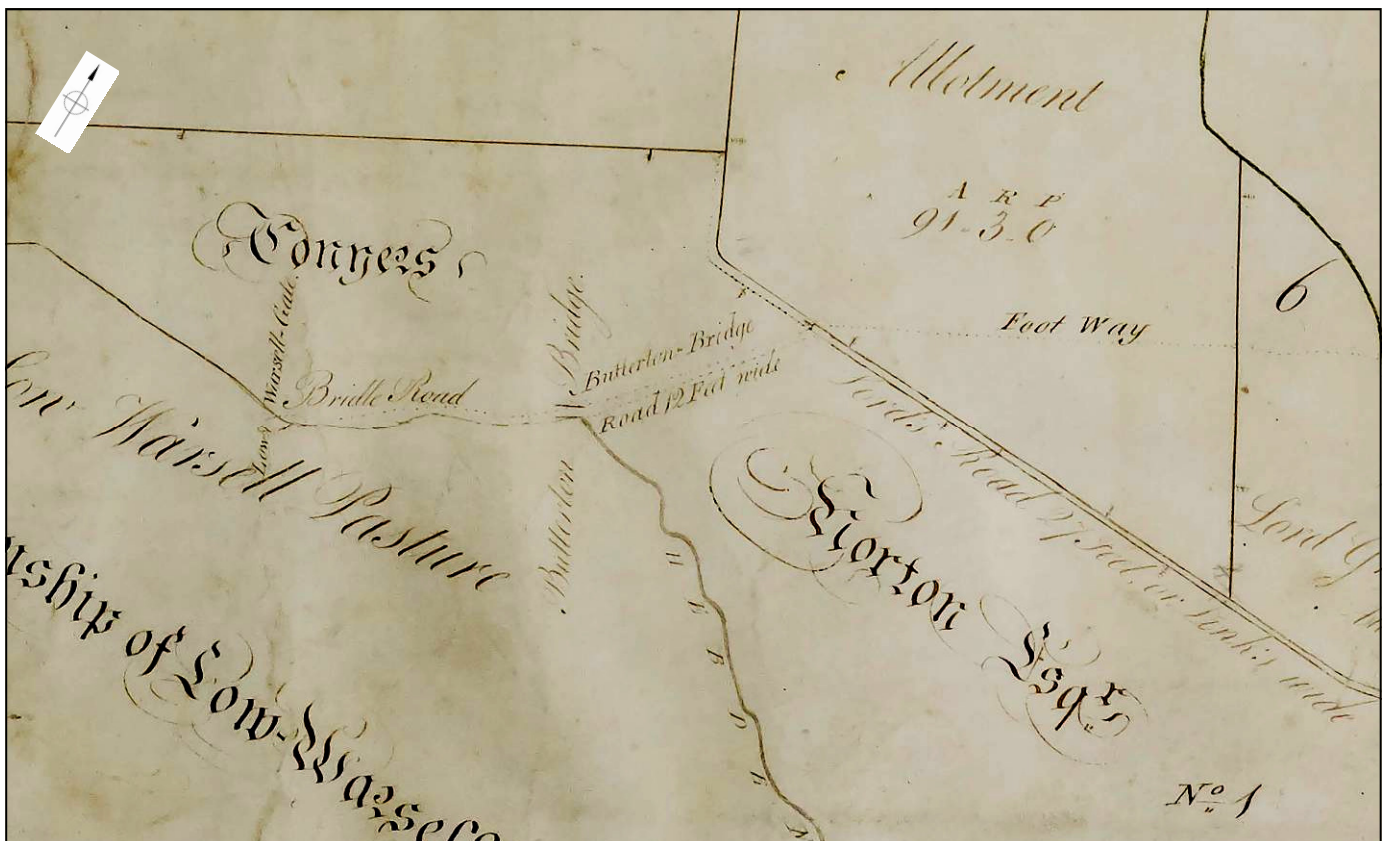
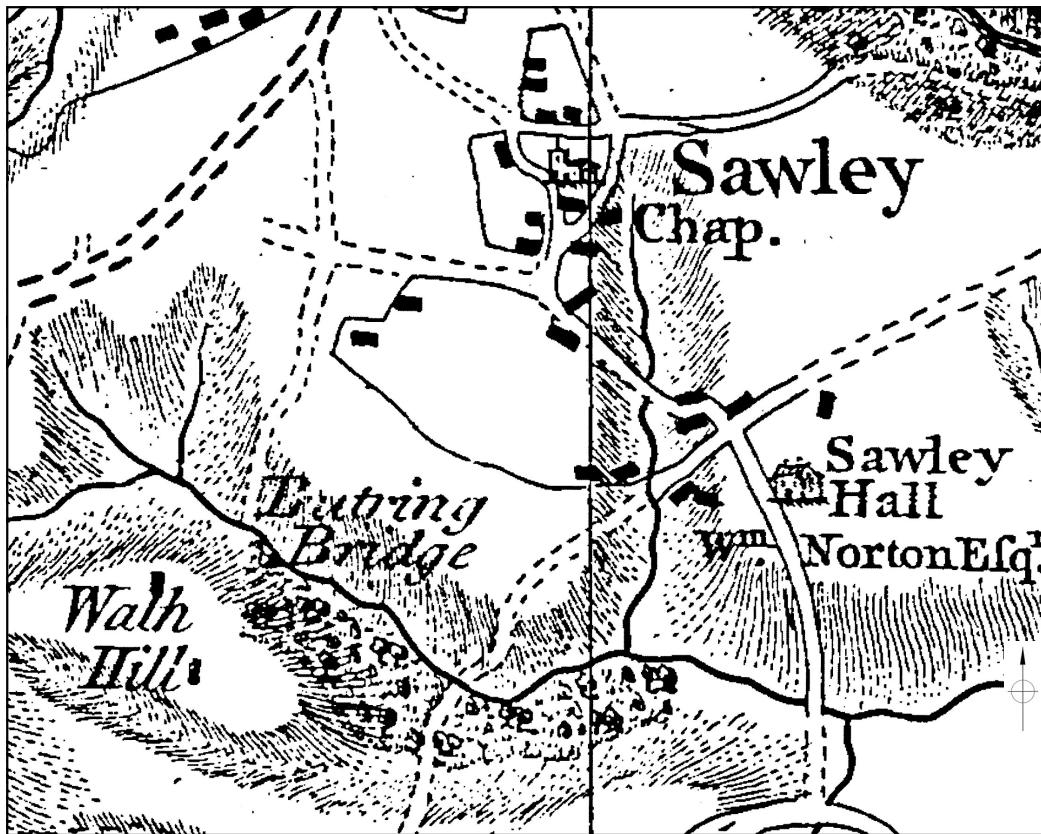
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PROJECT BUTTERTON BRIDGE, SAWLEY	
TITLE GENERAL LOCATION	
SCALE AS SHOWN	DATE MAY 2021
EDAS	FIGURE 1



Map extract taken from Historic England's Scheduled Monument description (NHLE 1004202).

PROJECT		BUTTERTON BRIDGE, SAWLEY	
TITLE		DETAILED LOCATION	
SCALE	AS SHOWN	DATE	MAY 2021
	EDAS	FIGURE	2



Top: Section of 1771 Jefferys' Map of Yorkshire (sheet 7).

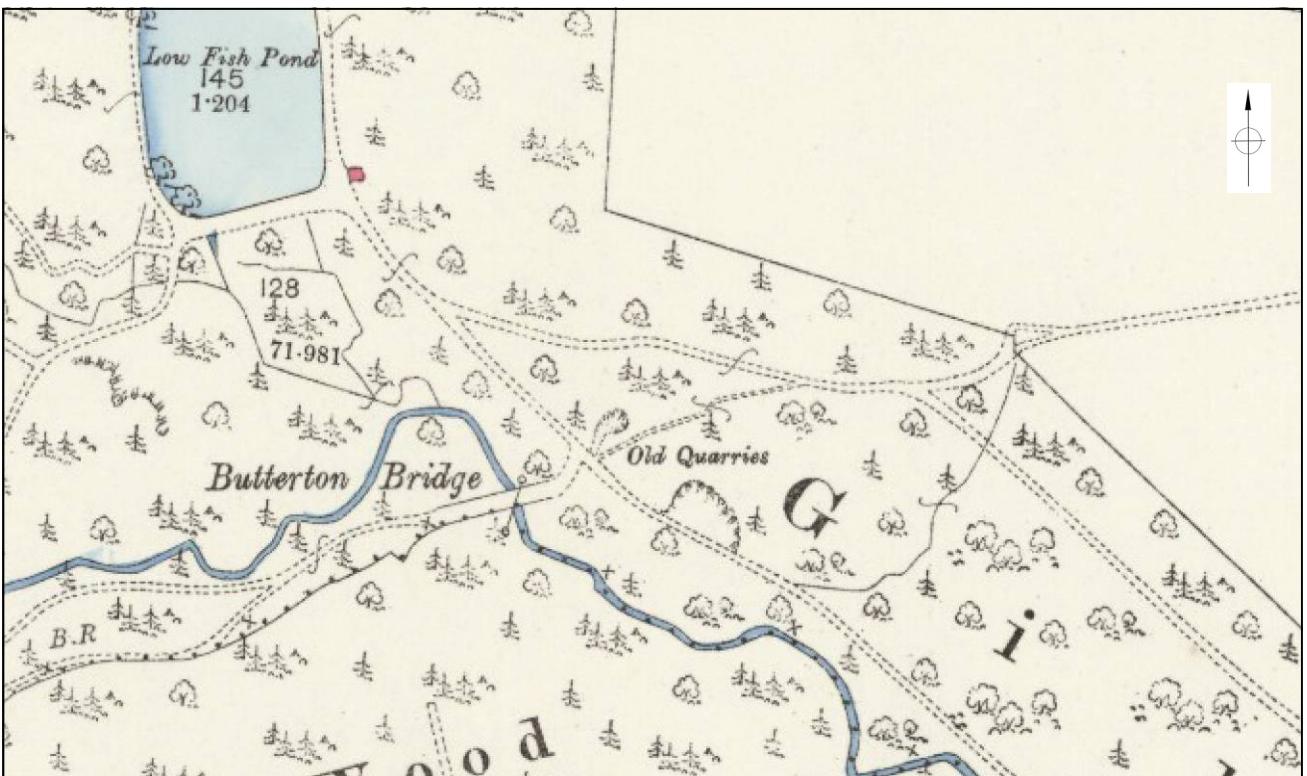
Bottom: Section of 1799 Sawley enclosure plan (NYCRO I).

PROJECT		BUTTERTON BRIDGE, SAWLEY	
TITLE			
HISTORIC MAPS			
SCALE	NTS	DATE	MAY 2021
EDAS		FIGURE	3



Source: Ordnance Survey 1854 6" map Yorkshire sheet 136 (surveyed 1848-49).

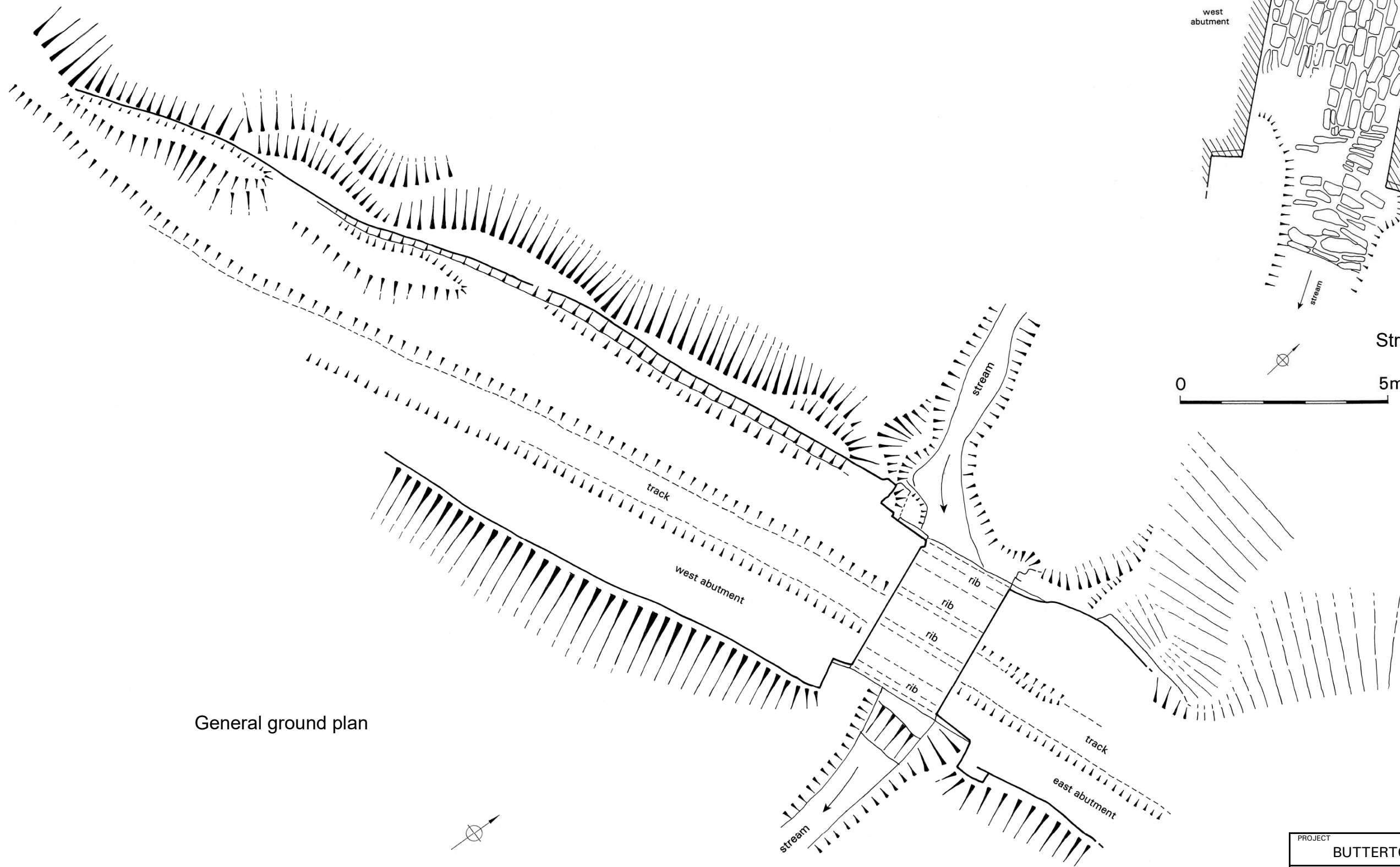
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TITLE		1854 ORDNANCE SURVEY MAP	
SCALE	NTS	DATE	MAY 2021
EDAS		FIGURE	4



Top: Section of 1854 Ordnance Survey 6" to 1 mile map, Yorkshire sheet 136 (surveyed 1848-49).

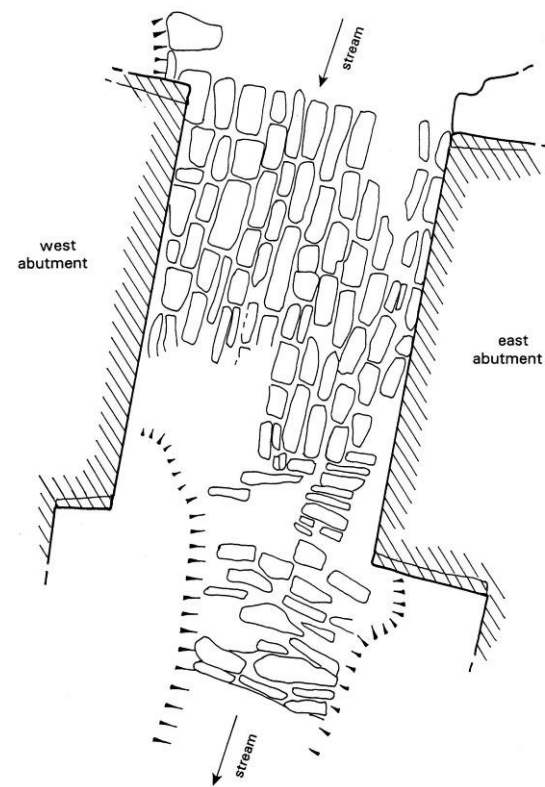
Bottom: Section of 1891 Ordnance Survey 25" to 1 mile map, Yorkshire sheet 136/3 (surveyed 1889-90).

PROJECT		BUTTERTON BRIDGE, SAWLEY	
TITLE			
SCALE		DATE	
NTS		MAY 2021	
EDAS		FIGURE	
		5	



General ground plan

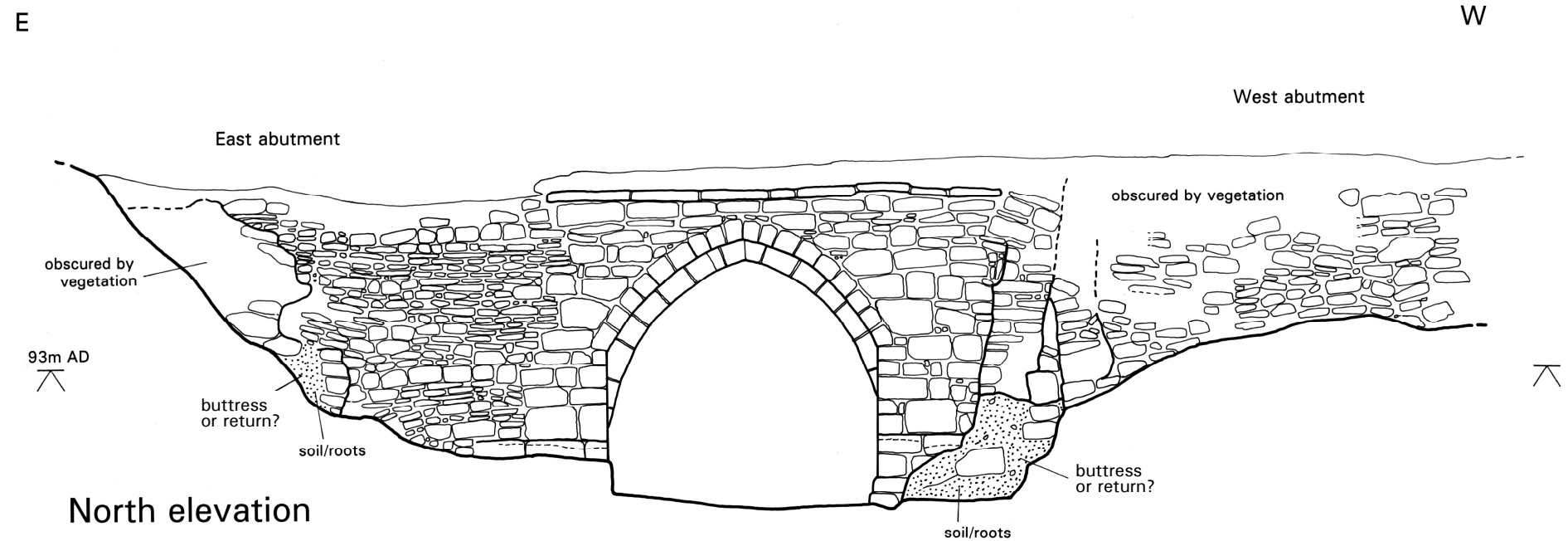
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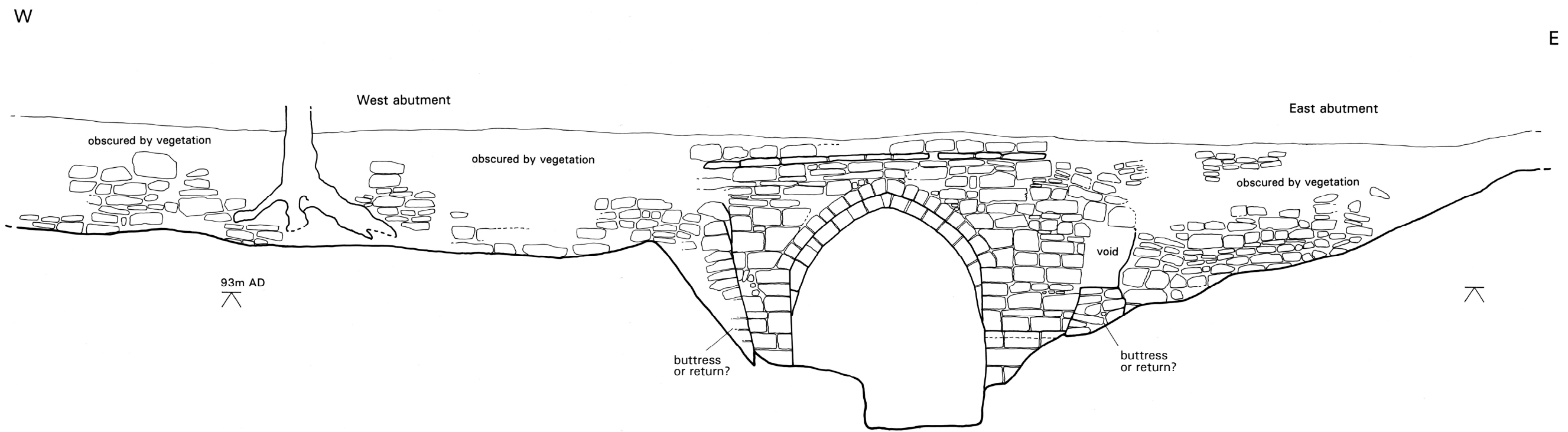
Stream bed plan



PROJECT		BUTTERTON BRIDGE, SAWLEY	
TITLE		GROUND PLANS	
SCALE	AS SHOWN	DATE	MAY 2021
EDAS		FIGURE	6



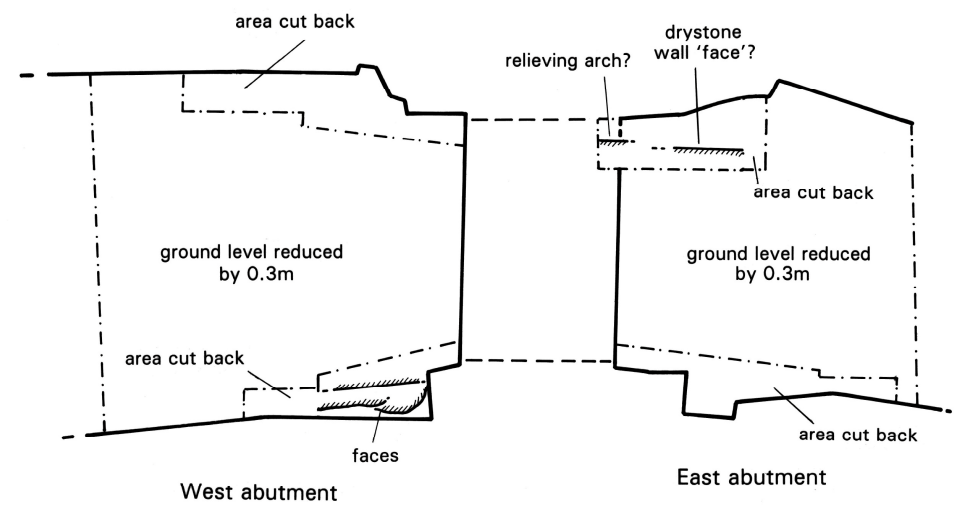
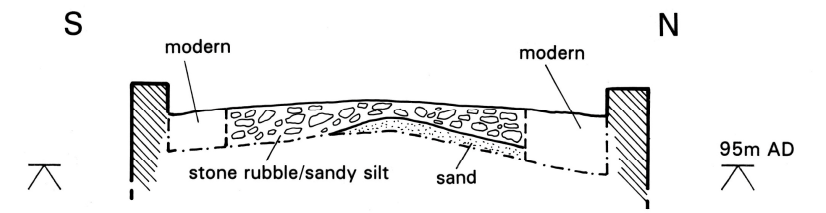
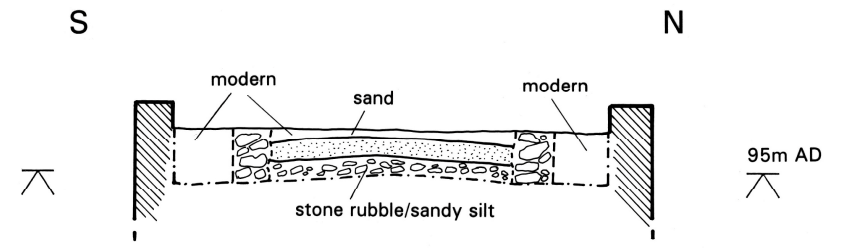
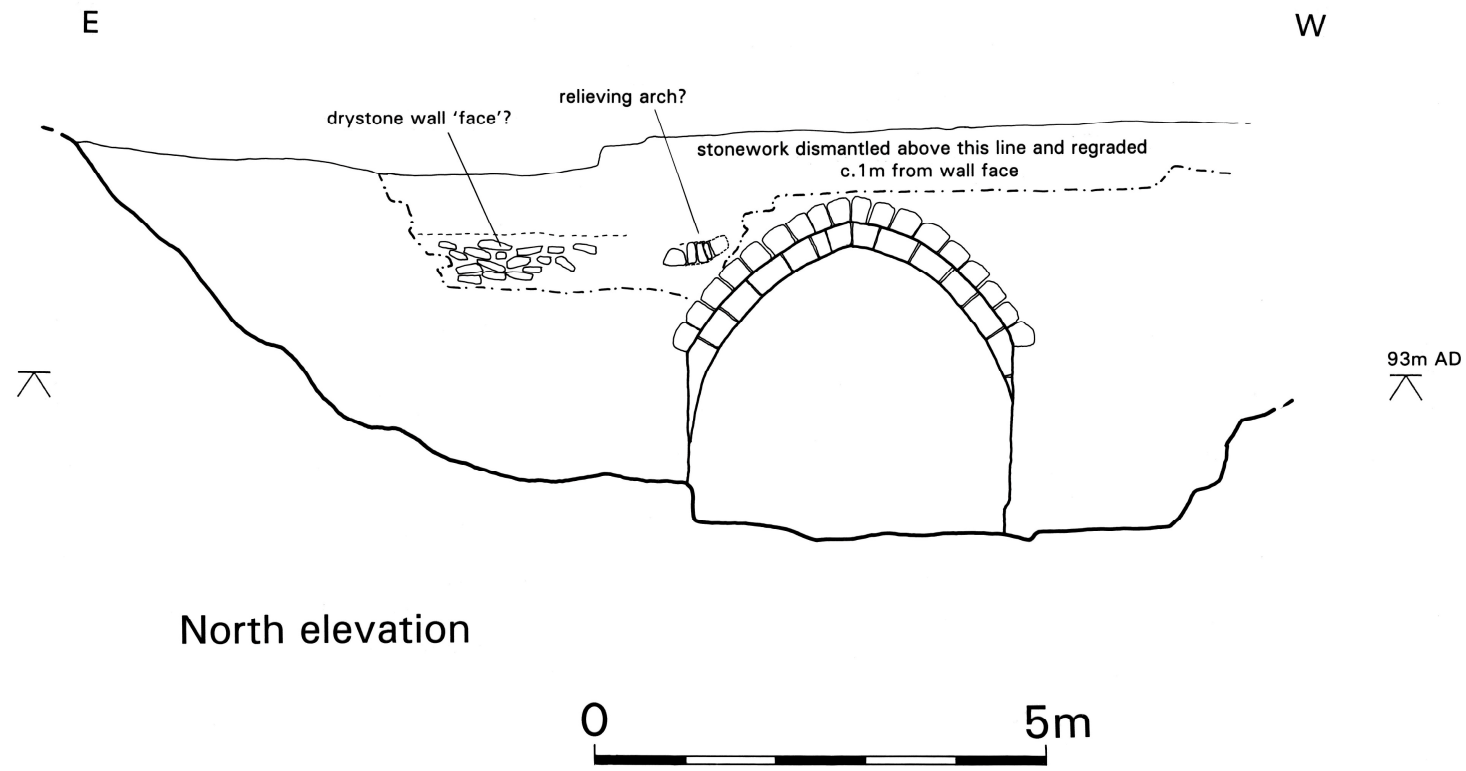
North elevation



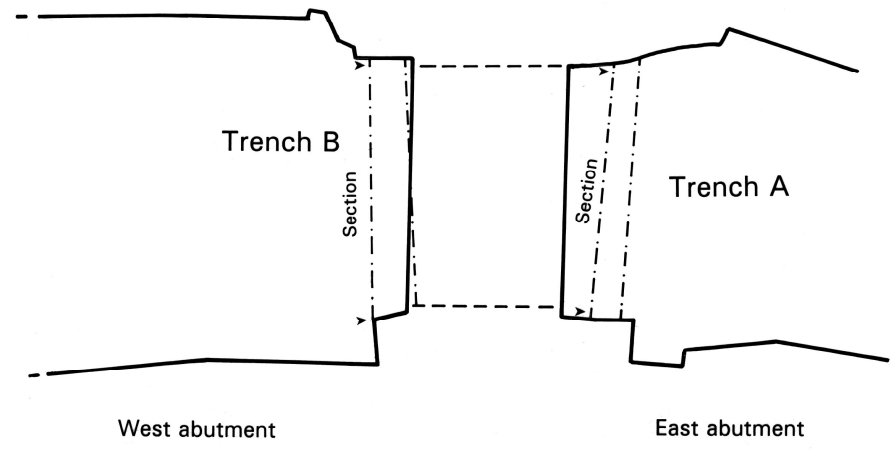
South elevation



PROJECT		BUTERTON BRIDGE, SAWLEY	
TITLE		PRE-INTERVENTION ELEVATIONS	
SCALE	AS SHOWN	DATE	MAY 2021
EDAS		FIGURE	7

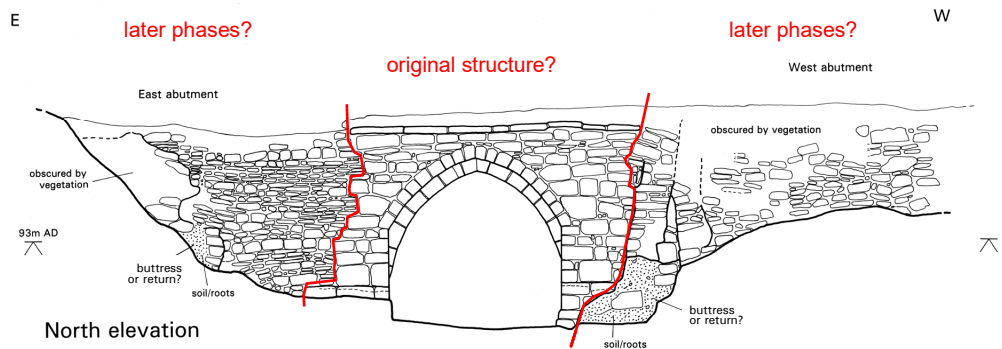


Areas of ground reduction

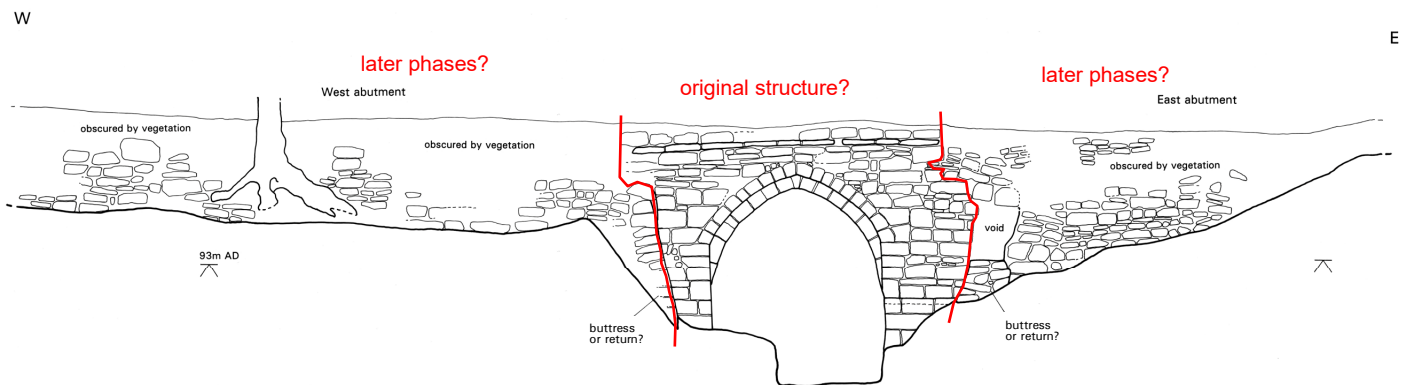


Section locations

PROJECT		BUTTERTON BRIDGE, SAWLEY	
TITLE		WATCHING BRIEF RESULTS	
SCALE	AS SHOWN	DATE	MAY 2021
EDAS		FIGURE	8



North elevation



South elevation



PROJECT		BUTTERTON BRIDGE, SAWLEY	
TITLE		SUGGESTED PHASING	
SCALE	AS SHOWN	DATE	MAY 2021
EDAS		FIGURE	9



Plate 1: Specimen tree planting along track to Butterton Bridge, looking W (photo 8/554).

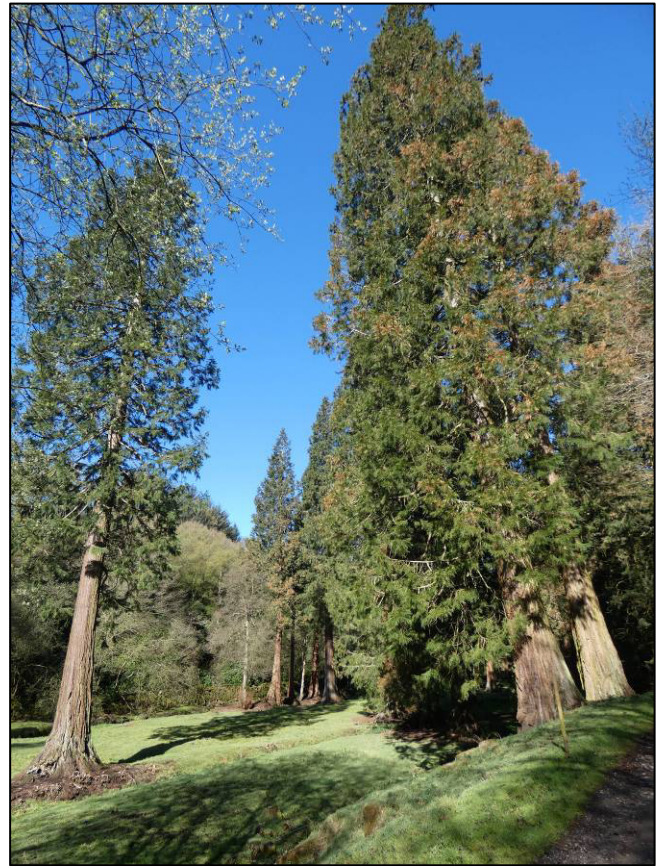


Plate 2: Specimen tree planting in Picking Gill, looking W (photo 8/555).



Plate 3: Specimen tree planting along track to Butterton Bridge, looking NW (photo 8/560).



Plate 4: Holloway through plantation west of Butterton Bridge, looking E.



Plate 5: Remains of Lacon Cross, looking N (<https://www.geograph.org.uk/photo/6124487>).



Plate 6: View of south elevation and west abutment, prior to repairs, looking NE (photo 1/896).



Plate 7: View of south elevation and east abutment, prior to repairs, looking NW (photo 1/885).



Plate 8: South elevation, prior to repairs, looking N (photo 1/883).



Plate 9: North elevation, prior to repairs, looking SE (photo 1/907).



Plate 10: North side of arch and ribs of vault, prior to repairs, looking SW (photo 1/912).



Plate 11: North elevation, west buttress/return and abutment, prior to repairs, looking SW (photo 1/906)



Plate 12: North elevation, west abutment, looking S (photo 7/064).



Plate 13: South elevation and west buttress/return, prior to repairs, looking NE (photo 1/893).



Plate 14: South elevation under repair, showing exposed stringcourse, looking NE (photo 3/290).



Plate 15: South elevation, east buttress/return, prior to repair, looking N (photo 1/903).



Plate 16: South elevation, west buttress/return, prior to repair, looking NW (photo 1/898).



Plate 17: South elevation, east abutment, looking E (photo 1/905).



Plate 18: South elevation, section of west abutment, looking N (photo 8/574).



Plate 19: South elevation undergoing repair, looking NE (photo 3/316).



Plate 20: Surface of bridge after ground reduction, looking E (photo 3/287).



Plate 21: North elevation, area east of arch during clearance, looking W (photo 2/115).



Plate 22: North elevation, area east of arch during clearance, showing section of relieving arch in section, looking S (photo 2/118).



Plate 23: North elevation after repairs, showing rebuilt west buttress/return, looking SE (photo 7/068).



Plate 24: North elevation, east buttress/return after repairs, looking S (photo 8/587).



Plate 25: South elevation, area east of arch under repair, showing central core, looking N (photo 3/293).



Plate 26: South elevation, area west of arch under repair, showing possible internal faces to core, looking E (photo 4/441).



Plate 27: South elevation, under repair, looking E (photo 3/288).



Plate 28: South elevation, east abutment and buttress/return, repairs complete, looking NE (photo 8/572).



Plate 29: South elevation, west abutment and buttress/return, repairs complete, looking N (photo 8/570).



Plate 30 South elevation, rebuilt parapet to west of arch, looking NW (photo 5/633).



Plate 31: Excavated east trench (Trench A) across bridge top, looking W (photo 6/780).



Plate 32: Excavated west trench (Trench B) across bridge top, with tie bar inserted, looking W (photo 6/777).



Plate 33: North elevation, repairs complete, looking SE (photo 8/593).



Plate 34: South elevation, repairs complete, looking N (photo 8/566).



Plate 35: South elevation, details, of drains and ties, looking NW (photo 8/582).



Plate 36: Top of bridge, repairs complete, grass to be sown, looking E (photo 8/562).

APPENDIX 1
EDAS PHOTOGRAPHIC CATALOGUE

BUTTERTON BRIDGE PHOTOGRAPHIC CATALOGUE

Film 1: Colour digital photographs taken 10th August 2020

Film 2: Colour digital photographs taken 10th September 2020

Film 3: Colour digital photographs taken 15th October 2020

Film 4: Colour digital photographs taken 2nd November 2020

Film 5: Colour digital photographs taken 20th November 2020

Film 6: Colour digital photographs taken 9th December 2020

Film 7: Colour digital photographs taken 5th February 2021

Film 8: Colour digital photographs taken 5th May 2021

<i>Film</i>	<i>Frame</i>	<i>Subject</i>	<i>Scale</i>
1	883	S elevation after vegetation clearance, looking N	2 x 1m
1	884	S elevation after vegetation clearance, looking N	2 x 1m
1	885	S elevation and E abutment, after vegetation clearance, looking NW	2 x 1m
1	886	S elevation after vegetation clearance, looking NW	2 x 1m
1	891	S elevation, arch and ribs to vault, W side, looking NW	1m
1	892	S elevation after vegetation clearance, looking NW	2 x 1m
1	893	S elevation after vegetation clearance, looking NE	2 x 1m
1	894	S elevation and abutments after vegetation clearance, looking NE	1m
1	895	S elevation after vegetation clearance, looking NE	1m
1	896	S elevation and W abutment after vegetation clearance, looking NE	-
1	897	S elevation, E buttress/return, looking E	1m
1	898	S elevation, W buttress/return, looking NW	1m
1	899	S elevation, W buttress/return and abutment, looking N	1m
1	900	S elevation, W abutment - central part, looking N	1m
1	901	S elevation, W abutment - central part, looking N	1m
1	902	S elevation, W abutment - western part, looking W	1m
1	903	S elevation, E buttress/return, looking N	1m
1	904	S elevation, E abutment, W part, looking N	1m
1	905	S elevation, E abutment, E part, looking NE	1m
1	906	N elevation, W abutment and buttress/return, after vegetation clearance, looking SW	1m
1	907	N elevation after vegetation clearance, looking SE	1m
1	909	N elevation, arch and ribs to vault, E side, looking SE	1m
1	912	N elevation, arch and ribs of vault, W side, looking SW	1m
1	913	N elevation, arch and ribs to vault, W side, looking SW	1m
2	115	N elevation, area E of arch under repair, looking W	2 x 1m
2	116	N elevation, area E of arch under repair, looking E	2 x 1m
2	118	N elevation, area E of arch, relieving arch in section, looking S	1m
3	286	Bridge surface after ground reduction, looking W	1m
3	287	Bridge surface after ground reduction, looking E	1m
3	288	S elevation, parapet area after ground reduction, looking E	-
3	289	S elevation, parapet area after ground reduction, looking W	-
3	290	S elevation, stringcourse under repair, looking NE	1m
3	291	S elevation, area E of arch under repair, looking NW	1m
3	292	S elevation, area E of arch under repair, looking E	1m
3	293	S elevation, area E of arch under repair, looking N	1m
3	295	S elevation, area E of arch under repair, looking E	1m
3	296	Ribs to interior of vault, W side, looking NW	1m
3	297	Ribs to interior of vault, E side, looking NE	1m
3	301	Ribs to interior of vault, W side, looking SW	1m
3	303	Ribs to interior of vault, E side, looking SE	1m
3	304	Ribs to interior of vault, E side, looking SE	1m
3	305	N elevation, repaired face to E of arch, looking E	1m
3	308	N elevation, repaired face to E of arch, looking W	1m
3	309	N elevation, repaired face to E of arch, looking S	1m
3	311	N elevation, repaired face to W of arch, looking W	1m
3	312	N elevation, W buttress/return under repair, looking SW	1m

3	313	N elevation scaffolded, looking S	-
3	314	N elevation scaffolded, looking S	-
3	316	S elevation scaffolded, looking NE	-
3	317	S elevation scaffolded, looking N	-
4	436	S elevation, area W of arch under repair, looking W	1m
4	438	S elevation, area W of arch under repair & rebuilt face to arch, looking W	1m
4	441	S elevation, area W of arch under repair, looking E	1m
4	442	S elevation, W of arch under repair, looking W	1m
4	443	S elevation, W of arch under repair, looking W	-
5	629	S elevation, E buttress/return under repair, looking E	1m
5	631	S elevation, W buttress/return under repair, looking W	1m
5	633	S elevation, W of arch, rebuilt parapet, looking NW	1m
5	634	S elevation, W of arch, rebuilt parapet, looking NW	1m
5	635	S elevation, W of arch, rebuilt parapet, drain detail, looking NW	1m
6	775	Bridge top during excavation for ties/drains, looking W	1m
6	776	Bridge top, W trench (B) for ties/drains, E facing section, looking W	1m
6	777	Bridge top, W trench (B), tie bar inserted, W facing section, looking SE	1m
6	778	Bridge top, W trench (B) for ties/drains, looking E	1m
6	779	Bridge top, E trench (A) for ties/drains, W facing section, looking SE	1m
6	780	Bridge top, E trench (A) for ties/drains, E facing section, looking W	1m
6	781	Bridge top, W trench (B) for ties/drains, E facing section, looking W	1m
6	782	Bridge top, W trench (B) for ties/drains, E facing section, detail, looking W	1m
6	785	Bridge top, E trench (A) for ties/drains, E facing section, looking W	1m
6	786	Bridge top, E trench (A) for ties/drains, E facing section, looking W	1m
7	048	S elevation after repairs, looking N	2 x 1m
7	049	S elevation, E buttress/return and abutment after repairs, looking N	2 x 1m
7	050	S elevation after repairs, looking NW	1m
7	051	S elevation after repairs, looking NE	1m
7	052	S elevation, W buttress/return after repairs, looking N	2 x 1m
7	053	S elevation, detail of drain and tie plate after repairs, looking N	-
7	058	Re-pointing to ribs and underside of arch, looking N	-
7	059	S elevation, W abutment, looking N	1m
7	060	S elevation, W abutment, looking N	2 x 1m
7	061	N elevation, W abutment (E end), looking S	1m
7	062	N elevation, W abutment, looking SE	1m
7	063	N elevation, W abutment, looking S	1m
7	064	N elevation, W abutment, looking S	1m
7	065	N elevation, W abutment, looking S	1m
7	066	N elevation, W buttress/return and abutment after repairs, looking S	1m
7	067	N elevation, W buttress/return after repairs, looking S	1m
7	068	N elevation and W buttress/return after repairs, looking SE	1m
7	069	Bridge top after re-surfacing, looking E	1m
7	070	N elevation, E buttress/return after repairs, looking S	1m
7	071	N elevation, E buttress/return and abutment, after repairs, looking S	2 x 1m
7	072	N elevation after repairs, looking SW	1m
7	073	N elevation, detail of drain and tie plate after repairs, looking SW	-
7	075	N elevation after repairs, looking S	1m
8	552	Coniferous planting (redwoods?) at entrance to access track off road (Hebden Bank), looking W	-
8	553	Single specimen conifer, looking W	-
8	554	Stand of redwoods?, The Lord's Nab, looking W	-
8	555	Stand of redwoods?, The Lord's Nab, looking W	-
8	556	Stand of redwoods?, The Lord's Nab, looking E	-
8	557	Stand of redwoods?, The Lord's Nab, looking E	-
8	558	Stand of redwoods?, The Lord's Nab, looking E	-
8	559	Coniferous planting, looking NW	-
8	560	Coniferous planting, looking NW	-
8	561	Coniferous planting, looking NW	-
8	562	Bridge top after re-surfacing, looking W	2 x 1m

8	563	Bridge top after re-surfacing, looking E	2 x 1m
8	565	S elevation, general view after repairs, looking N	2 x 1m
8	566	S elevation after repairs, looking N	2 x 1m
8	567	S elevation W abutment after repairs, looking N	1m
8	568	S elevation, E abutment and buttress/return after repairs, looking N	1m
8	569	S elevation after repairs, looking NE	2 x 1m
8	570	S elevation, W buttress/return after repairs, looking N	1m
8	571	S elevation after repairs, looking N	1m
8	572	S elevation, E abutment and buttress/return, after repairs, looking N	1m
8	573	S elevation, W abutment, looking N	1m
8	574	S elevation, W abutment, looking N	1m
8	575	S elevation, W abutment (W end), looking NW	1m
8	576	S elevation, W abutment (W end), looking N	1m
8	577	S elevation, W abutment (W end), looking N	1m
8	579	S elevation, E abutment (E end), looking N	1m
8	580	S elevation, E abutment (E end), looking NE	1m
8	581	S elevation after repairs, looking NW	1m
8	582	S elevation, detail of drains and tie plates after repairs, looking NW	-
8	583	N elevation, E abutment after repairs, looking SE	1m
8	584	N elevation, E abutment and buttress/return after repairs, looking S	1m
8	585	N elevation, detail of drain and tie plate, after repairs, looking S	-
8	586	N elevation, detail of drain and tie plate, after repairs, looking SW	-
8	587	N elevation, E buttress/return after repairs, looking S	1m
8	589	N elevation after repairs, looking SE	2 x 1m
8	590	Re-pointing to ribs and underside of arch, looking SE	1m
8	591	Re-pointing to ribs and underside of arch, looking S	1m
8	592	Re-pointing to ribs and underside of arch, looking S	1m
8	593	N elevation after repairs, looking SE	2 x 1m
8	594	N elevation after repairs, looking SE	2 x 1m
8	595	N elevation after repairs, W abutment, looking S	1m
8	597	N elevation, W abutment, central part, looking SW	1m
8	598	N elevation, W abutment, central part, looking S	1m
8	599	N elevation, W abutment, central part, looking W	1m
8	600	N elevation, W abutment, central part, looking S	1m
8	602	N elevation, W abutment, W part, looking S	1m
8	605	N elevation, W abutment, W end, looking S	1m
8	606	N elevation, W abutment, looking S	1m

APPENDIX 2
EDAS WRITTEN SCHEME OF INVESTIGATION

CONSERVATION FABRIC REPAIRS, BUTTERTON BRIDGE, SAWLEY ESTATE, SAWLEY, HARROGATE, NORTH YORKSHIRE: WRITTEN SCHEME OF INVESTIGATION FOR A PROGRAMME OF ARCHAEOLOGICAL AND ARCHITECTURAL OBSERVATION, INVESTIGATION AND RECORDING

1 INTRODUCTION

- 1.1 This Written Scheme of Investigation (WSI) details a programme of archaeological and architectural observation, investigation and recording (a watching brief) that will be carried out during various repair and conservation works at Butterson Bridge on the Sawley Estate, Sawley, Harrogate, North Yorkshire (NGR SE 23838 66468). The bridge and part of the abutments to either side are a Scheduled Monument (NY 335; National Heritage List for England 1004202). This WSI has been produced by Ed Dennison Archaeological Services Ltd (EDAS), on behalf of the project architect, Peter Gaze Pace, Historic England and the Sawley Estate (site owners).
- 1.2 The repair and conservation works are primarily being funded by Natural England, with other contributions from the landowner and Harrogate Borough Council. Scheduled Monument Consent (SMC) for the works was given on 10th October 2019 (see below).

2 SITE LOCATION

- 2.1 Butterson Bridge is located within Picking Gill, c.1.6km south-west of the village of Sawley, and some 4km south-west of Fountains Abbey, in North Yorkshire (NGR SE 23838 66468) (see figures 1 and 2); the stream through the gill is named on historic maps as Hebden Wood Beck. It lies in the modern civil parish of Sawley, at an elevation of c.175m AOD.
- 2.2 The bridge lies within the privately-owned Sawley Estate, but is accessible via a public footpath which runs across it. Vehicle access is also possible along a forest track which has a junction with Fountains Abbey Road to the south-east; estate vehicles can also pass over the bridge itself. The bridge spans the beck in the base of Picking Gill, but has long approach abutments to either side, which cross the densely wooded slopes of the valley.

3 ARCHAEOLOGICAL INTEREST

- 3.1 The bridge is variously ascribed a 12th, 13th or 14th century date (http://www.pastscape.org.uk/hob.aspx?hob_id=51947; Proctor 2003, 2). It once formed part of the extensive network of medieval routeways connecting the estates of Fountains Abbey, and carried one of the principal routes from the mid Nidderdale and Craven properties of the abbey to Fountains Abbey itself; it is suggested to have become redundant after 1539 (Moorhouse 2003, 196 & 198). There is also some evidence that the visual appearance of the valley in which the bridge stands was enhanced by ornamental tree planting during the 19th century, and it is possible that the bridge itself underwent some renovation in either the 18th or 19th centuries as part of this scheme (Historic England SM Description). However, it is not believed that the bridge has undergone any repairs in recent times.
- 3.2 The structure was subject to an archaeological and ecological survey in 2004 (Richardson & Dennison 2015). In terms of the archaeology, an accurate plan of the bridge and its abutments, at ground level, was produced at 1:100 scale,

together with a similar plan of the base of the stream bed beneath the bridge. Stone-by-stone elevation drawings, at 1:50 scale, were also produced of the north elevation, and both sides of the internal tunnel or vault. It had been proposed to similarly survey the south side of the bridge, but this was heavily obscured by vegetation, and so it was planned to record this once it had been cleared at a later date. However, this was able to be done as the proposed repair and conservation project did not progress. The ecological elements comprised a Phase 1 habitat survey, a bat survey, and a survey of the flora. The cessation of the repair project meant that the resulting archaeological and ecological report, detailing the recording work that had been done, was not produced until 2015, at EDAS's own expense.

4 SCHEDULED ANCIENT MONUMENT CONSENT

- 4.1 As noted above, Butterton Bridge is a Scheduled Monument, and Scheduled Monument Consent for the repair and conservation works was given by the Secretary of State for Digital, Culture, Media and Sport, advised by Historic England, on 10th October 2019 (ref S00227302).
- 4.2 A number of conditions were attached to consent; those most relevant to the archaeological recording and this WSI are as follows:
- (i) The works to which this consent relates shall be carried out to the satisfaction of the Secretary of State, who will be advised by Historic England. At least 2 weeks' notice (or such shorter period as may be mutually agreed) in writing of the commencement of work shall be given to Dr Keith Emerick, Inspector of Ancient Monuments, Historic England, 37 Tanner Row, York, YO1 6WP in order that an Historic England representative can inspect and advise on the works and their affect in compliance with this consent;
 - (ix) All those involved in the implementation of the works granted by this consent must be informed by the owner that the land is designated as a scheduled monument under the Ancient Monuments and Archaeological Areas Act 1979 (as amended); the extent of the scheduled monument as set out in both the scheduled monument description and map; and that the implications of this designation include the requirement to obtain Scheduled Monument Consent for any works to a scheduled monument from the Secretary of State prior to them being undertaken.
 - (x) Equipment and machinery shall not be used or operated in the scheduled area in conditions or in a manner likely to result in damage to the monument or to ground disturbance other than that which is expressly authorised in this consent;
 - (xi) Any works to which this consent relates shall be carried out under the archaeological supervision of a suitably qualified archaeological contractor [to be agreed in advance by the Secretary of State as advised by Historic England] who shall be given at least 2 weeks' notice (or such shorter period as may be agreed) in writing of the commencement of work. No works shall commence until the named archaeological contractor has confirmed in writing to Historic England that they are willing and able to undertake the agreed supervision;

- (xii) A report on the archaeological recording shall be sent to: Peter Rowe, Principal Archaeologist, NYCC (the County Historic Environment Record) and to Dr Keith Emerick, Inspector of Ancient Monuments at Historic England within 3 months of the completion of the works (or such other period as may be mutually agreed);
- (xiii) The archaeological contractor shall complete and submit an entry on OASIS (On-line Access to the Index of Archaeological Investigations - <http://oasis.ac.uk/england/>) prior to project completion, and shall deposit any digital project report with the Archaeology Data Service, via the OASIS form, upon completion.

5 NATURE OF THE REPAIR AND CONSERVATION WORKS

- 5.1 The proposed repair and conservation works are detailed in the project architect's revised specification dated May 2018 (Pace 2018). The proposed works are summarised below.

Rebuilding the stonework walls and the core to the trackway

- 5.2 In summary, the proposed works initially involve removing the vegetation from the north and south sides of the bridge (apart from ecologically-significant and sensitive plants). The existing stonework to the two external faces will be taken down and rebuilt, using those elements which remain as a guide, so that the internal core can be stabilised. The new stonework is to be irregular coursed rubble stone, with some jump stones, two skins thick, with regular through stones, and a batter to the wall faces. New pointing will be recessed to match the original, to retain the impression of a drystone structure. Footings for the trackway will generally be retained where they exist substantially, but any footings will be formed of similar large stones spreading out two or three courses. The core should be built up behind as the structure rises, using broken stones set in lime mortar.
- 5.3 In terms of the consolidating the existing stonework, a combination of deep taping, grouting, inserting stone into eroded pockets to match the coursing and nature of the adjacent stone, and pointing. In order to reach some deep voids, the removal of selected stone may be required - where large sections require opening up, localised rebuilding or using other techniques such as ground anchor ties or grouted rods will be used, to avoid disturbance of the original structure. Wherever possible, facing stones are to be replaced in their original positions.

Main structural elements (main bridge, retaining walls to bridge, and trackway retaining walls)

- 5.4 Again, existing vegetation will be taken off, and significant plants will be temporarily re-planted in nursery beds for eventual re-instatement.
- 5.5 Where built up and pushed out by previous vehicular movement, the trackway over the bridge will be excavated and depressions infilled to create a level surface. This will also allow space to reset the top courses of the retaining walls. The new surface will be compacted and seeded over to create a grass sward. The stream bed and the banks to the north of the bridge will be regraded, straightened and reprofiled as necessary to allow a continual flow under the bridge, to reduce localised erosion. Some of the larger trees close to the bridge will be cut down by the Estate.

- 5.6 For the south elevation of the bridge, either side of the archway, much of the stonework is bulging out and will need rebuilding, especially the western section. The upper section of wall face will be dismantled and rebuilt with two skins, the core behind will be consolidated, and secured with 1m long stainless steel rods. Other stainless steel rods will be used to set stainless steel plates behind outer face stonework to tie both the south and north faces of the trackway together. Elsewhere, deep tamping and repointing, including the arch facing stones, will be done.
- 5.7 This south elevation also contains the remains of two buttresses, to the east and west of the arch, which will require substantial rebuilding, and the replacement of fallen missing stone work. A section of the western buttress will need rebuilding with large stones, whereas more rebuilding is required to the east buttress where only the base remains. Deep tamping and pointing is required throughout. Moving further out from the central arch, the eastern embankment is eroded quite badly, and the western one is held together by tree roots. Their stabilisation and repair is desirable, and will be undertaken should funds allow.
- 5.8 Similar dismantling and rebuilding work will also be done to the north elevation. Parts of the eastern buttress appear to have been added later and are not fully toothed in. Much of the western buttress will also need to be rebuilt. It is difficult to assess the condition of the eastern embankment, but it is assumed that the retaining wall survives and will need to be stabilised.

Tunnel/Bridge

- 5.9 The eastern and western sides are generally sound, but some deep grouting to the fractures and open joints in the vault will be required, leaving some bat holes. In the floor, many stones are lost and will be replaced using salvaged stones and dressed appropriately. The stream will need to be dammed and the water pumped out to allow the mortar to set.

6 FIELDWORK METHODOLOGIES

General Comments

- 6.1 The scale and scope of the archaeological and architectural recording will be determined by this WSI. The architectural elements will correspond to a Level 3 record, defined as an analytical record by Historic England (2016, 27). Additional standards and guidance published by the Chartered Institute for Archaeologists, in relation to historic building recording and archaeological watching briefs, will also be followed (CIfA 2019a & 2019b)
- 6.2 The archaeological and architectural recording work should not unduly delay the overall programme of site works, although there will need to be effective liaison and co-operation with the building contractor/developer. All parties will need to ensure that EDAS have sufficient time and resources to ensure compliance with all elements of this WSI. It is likely that the survey work will be accomplished through a limited number of separate site visits, and so access to the site will therefore need to be afforded to EDAS at all reasonable times.

Aims of the Project

6.3 The aims of the recording are as follows:

- to record and recover any new information relating to the nature, date, depth, and significance of any archaeological or architectural features and deposits which might be affected or exposed by the proposed conservation, repair and drainage works, in relation to the existing survey report (Richardson & Dennison 2015).
- to analyse and interpret the recorded information in terms of its specialist function, and to place that analysis and interpretation into its wider context;
- to produce an ordered archive and report, and to place this in the public domain; the archive will be deposited with the North Yorkshire Record Office in Northallerton, and the report will be deposited with Natural England, the Sawley Estate, Historic England, the North Yorkshire Historic Environment Record and other interested parties.

Structural Watching Brief

Documentary and Historical Research

6.4 No additional documentary or historical research will be undertaken, although that already available in the existing survey report (Richardson & Dennison 2015) will be examined, utilised and repeated as necessary.

Measured and Drawn Survey

6.5 The existing EDAS 1:100 scale overall site plan, and the 1:50 scale elevation drawings utilised and enhanced to produce a new set of pre-intervention drawings. As previously noted, the drawing showing the south elevation of the bridge was not able to be completed, and it is expected that this is where the bulk of the enhancement work will be concentrated. The new pre-intervention plans and section drawings will then be enhanced or expanded during the proposed repair and conservation works, most likely from the scaffolding erected for the works, to record any new structural information that might be uncovered or revealed.

6.6 The drawings will be produced by hand measurement, and will show all significant architectural detail such as openings (blocked or unblocked), differences/phases in build, fixtures and fittings, and other constructional detail etc. New plans will be supplemented by more detailed drawings (e.g. at 1:20 and/or 1:10 scales), as appropriate and relevant. All drawings would be produced according to the guidelines established by Historic England (2016, 13-17).

Photographic survey

6.7 General photographic recording of the site and its significant parts, together with close-up photography of significant details, will be undertaken. The guidelines produced by Historic England (2015; 2016, 17-21) will be followed. The photographic survey will record the existing structure prior to any of the proposed works as part of the pre-intervention record, and these will be added to once the repair and conservation work is underway. A further set of site photographs will be taken once the works are complete, once scaffolding has been removed, to create an 'as-built' record.

- 6.8 Photographs will be taken with a SLR digital camera which has a minimum of 12 megapixel resolution. Both general shots and details of specific structural elements or features will be taken. Artificial lighting will be used where necessary and all photographs will contain a photographic scale, subject to practicalities and access. The photographs will be taken in jpeg format. All photographs will be clearly numbered and labelled with the subject, orientation, date taken and photographer's name, and will be cross referenced to film and frame numbers. A photographic register detailing (as a minimum) the location and direction of each shot will be completed.

Written Accounts

- 6.9 Sufficient notes will be taken on site in order for detailed descriptions and accounts to be prepared, both in terms of the pre-intervention work and during the programme of repair, in combination with the drawn and photographic records.

Reporting

Project archive

- 6.10 On completion of the archaeological and architectural fieldwork, a fully indexed and ordered field archive will be prepared, following the guidelines produced by Historic England. The archive will comprise primary written documents, plans, sections and photographs, and an index to the archive will also be prepared. Subject to the agreement of the landowner, the site archive will be deposited with the North Yorkshire Record Office (where the archive from the previous 2004 survey was deposited). A copy of the Archive Index will also be sent to the North Yorkshire Historic Environment Record.

Reporting

- 6.11 Within six weeks of the completion of the site work, an archive report detailing the results from the site recording will be produced. This report will include the following (as appropriate):
- A non-technical summary;
 - Site code/project number;
 - Dates of fieldwork visits;
 - National grid reference;
 - A brief account of the project plan, research objectives, survey methodology, procedures and equipment used;
 - A summary of the historical and archaeological background to the site;
 - The results of the architectural and archaeological recording work, and an account of the overall form and development of the structure and of the evidence supporting any interpretation;
 - Conclusions, including an assessment of the importance of the findings in relation to the other remains on the site and in the region as a whole;
 - A bibliography and list of sources consulted;
 - A location plan, with scale;
 - Survey plans and section drawings at appropriate scales (e.g. 1:500, 1:50, 1:20 and/or 1:10) and tied into published Ordnance Survey boundaries;
 - Selected illustrative material, including general site photographs and photographs;
 - Destination of the site archive and timetable for deposition;

- Appendices containing a copy of this WSI, together with the details of any departures from that design, survey data and photographic registers and catalogues.
- 6.12 Appropriate drawn records of the structures and the complex as a whole would be produced as reduced A4 or A3 size paper copies within the body of the report; full scale drawings would be included within the site archive.
- 6.13 An electronic copy of the final report will be supplied, for distribution to the Sawley Estate, Natural England, Historic England, the North Yorkshire Historic Environment Record, and other interested parties. A copy of the final report will also be included within the site archive.
- 6.14 EDAS also subscribe to Historic England's OASIS (Online Access to Index of Archaeological Investigations) project, and all EDAS projects are fully OASIS compliant. Prior to the start of the fieldwork, an OASIS online record will be initiated and key fields completed on Details, Location and Creators forms. All parts of the OASIS online form will be subsequently completed for submission to Historic England and the North Yorkshire HER. This will include an uploaded pdf version of the entire report.

Other Considerations

Health and Safety

- 6.15 EDAS and any sub-contractors will comply with the Health and Safety at Work Act of 1974 while undertaking the work. A full copy of their Health and Safety Policy will be made available on request. All archaeological work on site will be carried out with due regard for all Health and Safety considerations, and Health and Safety will take priority over archaeological matters, and a risk assessment would be produced prior to any work on site. Due regard will be made for any constraints or restrictions imposed by the building contractor.
- 6.16 The archaeologists undertaking the investigations will be equipped with a mobile phone that will be switched on at all times during fieldwork operations to enable contact to be made between the site and other interested bodies.

Insurance

- 6.17 The site is privately owned and EDAS would indemnify the landowner in respect of their legal liability for physical injury to persons or damage to property arising on site in connection with the recording brief, to the extent of their Public Liability Insurance Cover (£5,000,000).

Modifications

- 6.18 The programme of recording work outlined above may be modified in accordance with the professional judgement of the staff undertaking the work, insofar as the overall provisions and objectives of this WSI would not be changed. Any variations in the project would be discussed and agreed in advance with the project architect and Historic England.

7 REFERENCES

ClfA (Chartered Institute for Archaeologists) 2019b *Standard and Guidance for an Archaeological Watching Brief*

ClfA (Chartered Institute for Archaeologists) 2019a *Standard and Guidance for the Archaeological Investigation and Recording of Standing Buildings or Structures*

Historic England 2016 *Understanding Historic Buildings: a Guide to Good Recording Practice*

Historic England 2015 *Digital Image Capture and File Storage: Guidelines for Best Practice*

Holloway, M 2005 *Butterton Bridge, North Yorkshire: Ecology Report (Final)* (unpublished Ecological Information Network Consultants report for EDAS)

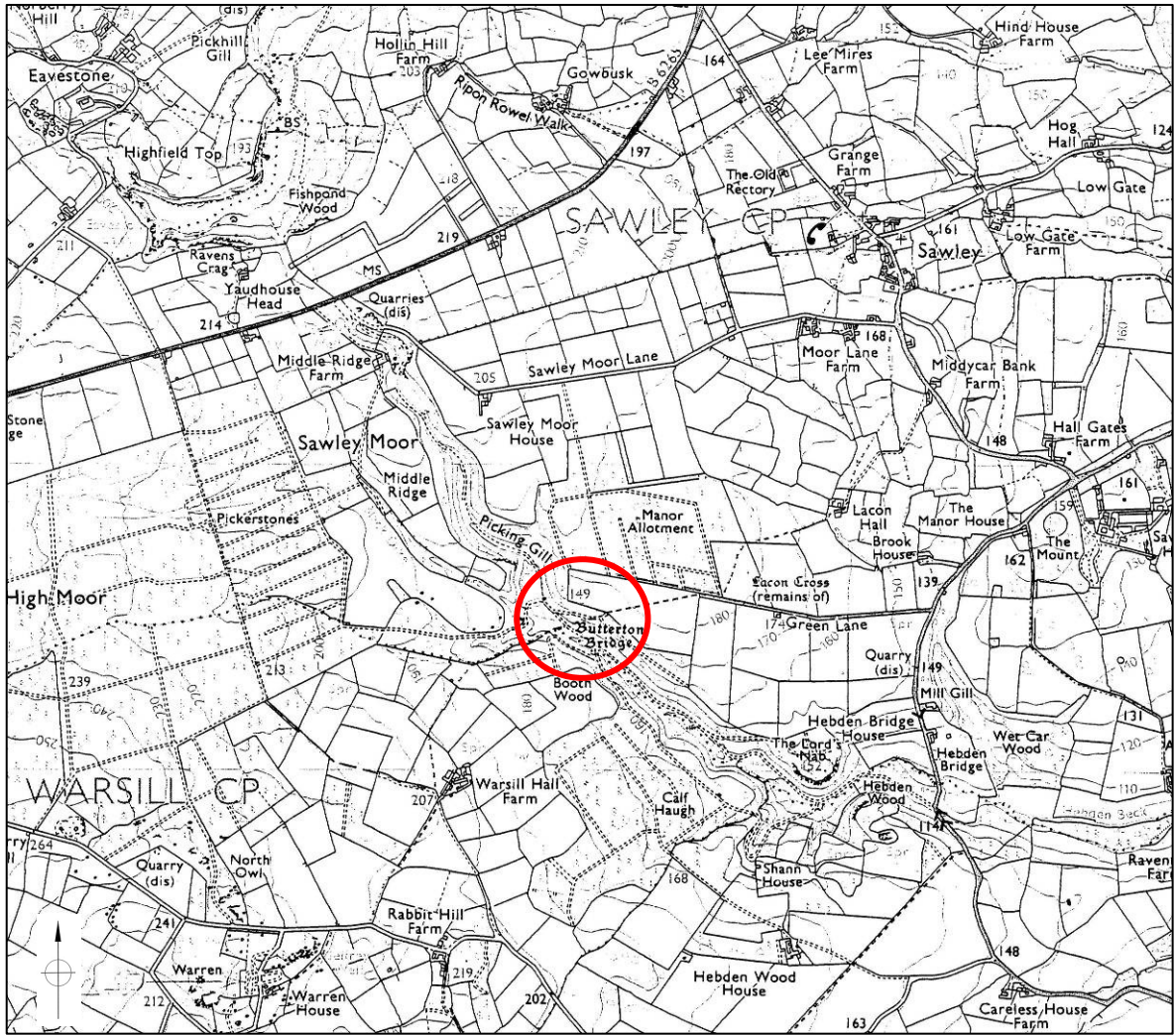
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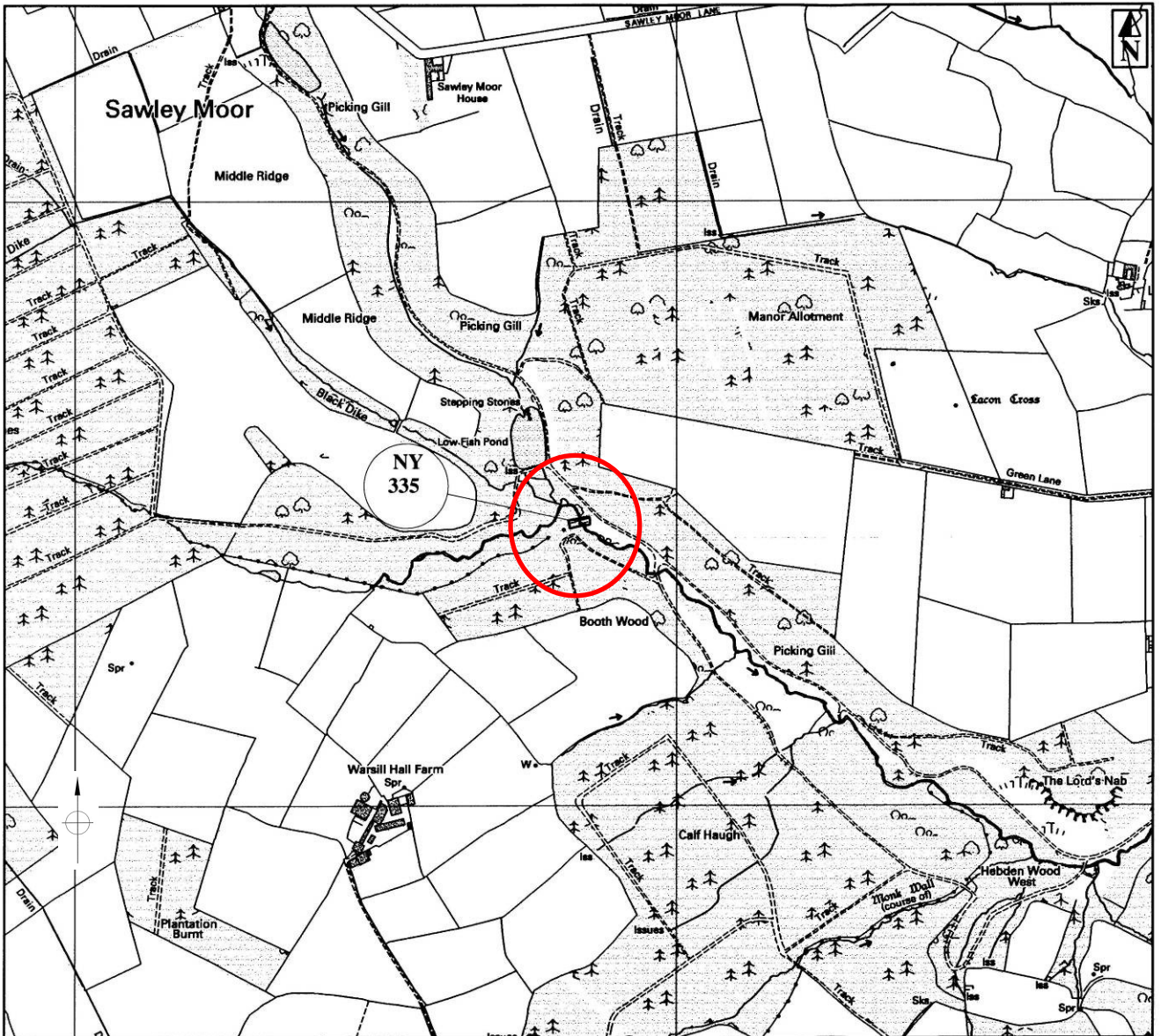
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Ed Dennison, EDAS
20th January 2020



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PROJECT		BUTTERTON BRIDGE, SAWLEY	
TITLE		GENERAL LOCATION	
SCALE	NTS	DATE	JAN 2020
EDAS		FIGURE	1



Map extract taken from Historic England's Scheduled Monument description (NHLE 1004202).

PROJECT		BUTTERTON BRIDGE, SAWLEY	
TITLE		DETAILED LOCATION	
SCALE	NTS	DATE	JAN 2020
EDAS		FIGURE	2