Darley Abbey Bridge

Heritage Statement
Baseline Understanding
&
Geoarchaeological Assessment

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Darley Abbey Bridge - Heritage Statement, Baseline Understanding & Geoarchaeological Assessment

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Glossary

To avoid confusion, we have referred to the river and its riverbanks by the conventions used by the Environment Agency for riverine environments, by using right and left bank, as experienced on descending the river following the water direction.

Banks: in river engineering, "left bank" and "right bank" are used to denote the position of a feature as seen when looking downstream. For this part of the River Derwent, at the bridge, the east bank is the left bank and the west bank is the right bank.

Tailwater: downstream water levels on a weir.

Headwater: upstream water levels on a weir.

Weir crest: the uppermost section of the weir. The level of the crest, its length and its cross-sectional shape determine the discharge (flow) characteristics of the weir.

Straight drop weir: A weir with a sharp drop immediately downstream of the crest, usually into a stilling basin.

Broad-crested weir: weir with a crest section of significant length measured on the direction of flow. For accurate flow gauging, the crest length should normally not be less than about three times the upstream head of water above the weir crest.

Apron: a layer of scour-resistant material placed on the channel bed near to a weir or at the toe of river bank protection.

Abutment: wall that flanks the edge of a weir (and bridge) and supports the river banks on each aside of the weir.

Stilling basin: Energy dissipator comprising a basin in which a hydraulic jump occurs.

Glaçis: The downstream sloping face of a weir, between the weir crest and the stilling basin.

Channel: The bed or course of a river / the route of the main flow through a body of water.

1. Introduction

1.1 Mel Morris Conservation and York Archaeology were appointed by Derby City Council in July 2025 to provide a robust understanding of heritage and archaeological impacts, to undertake a geoarchaeological assessment, and to inform the development of options for a replacement bridge at Darley Abbey, Derbyshire (NGR SK 35321 38568, Figure 1) and undertake a Heritage Impact Assessment in accordance with the UNESCO 2022 Toolkit[1]. The appointment also provides continuity in enabling the consultancies to contribute to the planning application process and inform the discharge of any planning-related conditions for a replacement bridge. The investigation has involved site investigation from the water, archival research in Derbyshire Record Office, Derby Local Studies Library, Derby Museums and Galleries, online sources such as the British Newspaper Archive and National Archives, and a search of Historic Environment Record data, as well as the authors' own professional experience and site-specific knowledge.

1.2 The site has the potential to address several points detailed in the Derwent Valley Mills World Heritage Site Research Framework (http://www.derwentvalleymills.org/derwent-valley-mills-history/derwent-valley-mills-research-framework Knight 2016).

AGENDA THEME 10. LANDSCAPE AND ENVIRONMENT
10.1 What evidence has survived for landscape change from prehistoric to recent times (for example, relict river channels, organic deposits in palaeochannel fills and mineral contaminants in floodplain alluvium)?
10.7 What has been the impact of industrial activity, particularly that associated with mining, quarrying and other extractive industries, upon the landscape, valley ecosystems and geomorphic processes?
Strategic objectives
10B Explore the hydrological history of the landscape by identifying, mapping and investigating relict riverine landforms.
10C Investigate the impact of human modifications to the landscape of the Derwent Valley and identify strategies for improved water management

Authors

1.3 Mel Morris runs an independent, conservation-accredited, heritage consultancy – Mel Morris Conservation – and was part of the team at Derbyshire County Council in the 1990s who worked on the nomination of the Derwent Valley as a World Heritage Site, as well as having project-managed grant schemes for several conservation areas within the valley prior to inscription. Mel has worked on multiple projects in the Derwent Valley, recently preparing heritage impact studies and assessments of the significance of the weir sites at Milford, Belper and Masson on behalf of the Environment Agency and the Wild Trout Trust. Mel Morris currently provides advice to Amber Valley Borough Council as a heritage consultant, advising on Milford Mills and Belper Mills, and has historically represented the Council as an expert witness at a

[1] Guidance and Toolkit for Impact Assessments in a World Heritage Context, UNESCO, ICCROM, ICOMOS and IUCN, 2022

number of Public Inquiries which dealt with development that threatened the setting of the World Heritage Site.

1.4 Kristina Krawiec is Head of Geoarchaeology at York Archaeology and has worked on a wide range of research and commercial projects mainly focused on the use and exploitation of wetlands in prehistory. Past projects have included: Historic England funded research excavations at the triple post alignment at Beccles, Suffolk; Environment Agency Funded investigations at Medmerry as part of a coastal realignment project; Environment Agency funded project evaluating the River Thames Flood Alleviation Scheme and the Historic England Funded Geoarchaeology Audit of the Trent Valley.

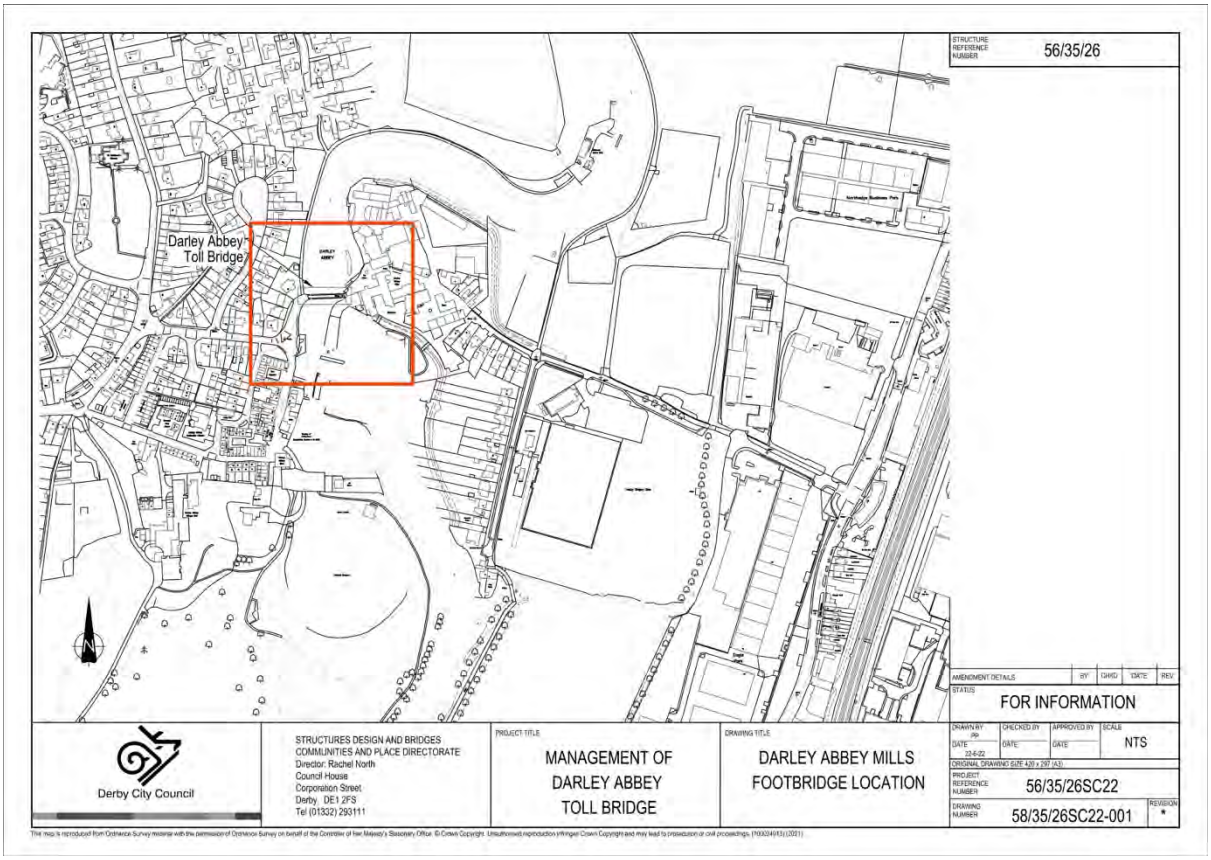

Fig. 1 Location Map at NGR SK 35321 38568 - Darley Abbey Mills (Derby City Council)

Physical Constraints of the Bridge

1.5 A 7.5 tonne weight limit was applied to the present road and footbridge in recent times, although a 5 tonne limit was recorded in 1970. A structural assessment undertaken in 2013[2] concluded that the bridge deck fails for 7.5 tones. However, it also confirmed that if comprehensive repairs and strengthening were carried out (including partial reconstruction) it is highly likely that the capacity could be enhanced to 7.5 tonnes. Examination in both 2013 and 2025 has found significant structural defects to the superstructure. Furthermore, in 2025 there is additional scouring to the right abutment, loss of sub-structure of the earlier bridge right bank abutment, exposure of earlier piles and undercutting of the masonry walls, and substantial or total loss of a free-standing masonry pier, all of which is suspected to be due to several major flooding events on 8th-9th November 2019 and in late 2023 and early 2024, when extensive debris had to be cleared from the bridge (16th January 2024 – BBC News).

1.6 In 2022 a superstructure and temporary bridge was erected which spanned the 1934 bridge and was erected with a scaffold system for access ramps. The site itself has undergone no previous archaeological monitoring and the replacement structure was constructed without archaeological supervision.

Designations

1.7 The Derwent Valley was inscribed as a **World Heritage Site** in December 2001 and the statutory listings at Darley Abbey were subsequently revised.

1.8 The main South Complex, comprising LONG MILL, MIDDLE MILL, EAST MILL, WEST MILL, ENGINE HOUSE AND CHIMNEY, TOLLHOUSE, BOBBIN SHOP AND DRYING SHED, is now listed Grade I.

1.9 The North Complex comprising NORTH MILL AND ENGINE HOUSE AND BOILER HOUSE and a separate block comprising the PREPARATION BUILDING AND COTTAGE AND WORKSHOP AND CART SHEDS TO NORTH OF SITE, are listed as two groups at Grade II*.

1.10 The Fire Station, to the north, and the Sawmill and Workshop Range and Drying Shed within the south complex are listed grade II, as are a range of cottages and houses.

1.11 The whole of the Boar's Head Mills site lies within the **Darley Abbey Conservation Area**, as does the historic core of the settlement and the bridge crossing the river.

1.12 In addition, the Weir is separately listed and was added to the list in 2014 after a fish pass was developed. The list description for the weir is very detailed and is repeated in full on pages 35-36. This is followed by an analysis of the weir.

[2] MLM Consulting Engineers Ltd, 'Structural and Archaeological Survey Report, Darley Abbey Mills Bridge, 23rd July 2013

Fig. 2 World Heritage Site boundary and designated heritage assets referred to in the text (13 August 2022 Bluesky ©)
Green wash - WHS
Orange wash – Buffer Zone
White line – Conservation Area boundary

1.13 The bridge is not listed as a separate entity and is not mentioned in any of the list descriptions for the other buildings. The body responsible for defining the extent of listing, including curtilage, is the Local Planning Authority. The LPA assesses the evidence, the history and planning status of the site in question. This assessment is undertaken within the context of planning legislation and relevant case law. Following the undertaking of this Heritage Statement of Significance, and gathering the information currently available, the bridge does not seem to meet the curtilage tests.

1.14 For this report we have considered the bridge on its own merits and have assumed that it is not curtilage listed, but that it does contribute to a degree to Outstanding Universal Value as part of the network of structures specifically connected to the cotton mill complex. This assessment will set out specifically what it contributes to OUV and the relevant attributes. This assessment also explores the riverbanks and abutments and water management because they are closely physically connected to the bridge and archaeological potential.

1.15 Likewise, as set out in the list description for the weir, the larger water management system, which also includes mill races from the River Derwent to the mill complex, sluice gates and tail races from the mill complex to the river (whether buried or truncated) is not included in any listing. Even where non-designated, these elements may, nevertheless, contribute to Attribute 1 of OUV. That assumption has been made by local planning authorities and the various partners when dealing with any development works affecting water management within the various mill sites within the Derwent Valley.

Historic Background Reports

2006 – Boar's Head Mills

1.16 The principal report documenting the history of the site of Darley Abbey Mills is that written by English Heritage and authored by Adam Menuge and others dated 2006 – Boar's Head Mills – A Survey and Investigation of The Cotton Mills and Ancillary Buildings[3]. This was post WHS inscription and is a valuable resource for assessing the history of the complex and archive sources.

1.17 Large extracts have been quoted here where they are relevant to understanding the phasing of the site and the development of the various leats and water management, which consequentially effects our understanding of the embankments, roadways and infrastructure around the bridge. There is one instance where we disagree with the interpretation of the first (unrecorded) leat, and this is identified in the text.

2013 – the fish pass

1.18 A separate report was undertaken by Trent and Peak Archaeology (now York Archaeology) as part of an archaeological watching brief during the construction of a fish pass[4] on the west bank of the river, downstream from the bridge and located within the complex weir structure. This work recorded that 'an artificial island was formed by the deliberate alteration of a land promontory which extended into the River Derwent from the village' [Darley Abbey].

1.19 Prior to the extensive modification of the promontory, a 15th-16th century mill, which was constructed from timber and stone, was in operation on the site and appears to have been in use for several decades. The discovery of a late medieval structure towards the lower reaches of the island resulted in the scaling up of the project from a Watching Brief to a formal excavation. This work was conducted between March and July 2013.

[3] BOAR'S HEAD MILLS, Old Lane, Darley Abbey, City Of Derby - A Survey and Investigation of the Cotton Mills and Ancillary Buildings, Adam Menuge, Research Department Report Series 35/2006, English Heritage 2006

[4] Environment Agency construction of fish pass in conjunction with the Wild Trout Trust – ref. TPA - DARLEY ABBEY FISH PASS, DERBY, DERBYSHIRE - Final Report on an Archaeological Watching Brief, Prepared by P. Flintoft, 2014, Project Code – DAF4. TPA Report No. 049/2014

Fig. 3 Brushwood overlying stone wall of the mill (fish-pass island - York Archaeology)

2013 Report – the bridge

1.20 In 2013 a report was commissioned to assess the condition of the bridge and undertaken by MLM Consulting Engineers Ltd. It was accompanied by an archaeological assessment and a diver survey. The report identified extensive failure of the reinforced concrete and corrosion of the steel reinforcement bars. This was most evident on the soffit of the bridge and the underside of the edge beams. The dive survey concluded that underwater bridge elements, including cast-iron piers and masonry foundations and abutments were in fair condition although the pier apron was affected by scour. The underwater survey extended for 12 metres upstream and downstream of the bridge and included the riverbanks.

1.21 The purpose of the archaeological survey[5] was to identify different phases of construction and attempt to date them and to identify and record earlier phases of the structure surviving below the water line. The report suggests that the earliest bridge may have been a single-span stone bridge[6]. It also suggests that there may have been an earlier medieval crossing point to Darley Abbey. We address these suggestions / hypotheses in this detailed Heritage Statement.

[5] LP Archaeology - 2013

[6] There are no single-span stone bridges across the Derwent with the exception of the Wigwell Aqueduct of 1792 along the Cromford Canal, which straddles a narrow section of the river at high level. This was described by Farey (vol. III- 1817) "the River arch is 80 feet span, with a smaller one on the meadows on each side, for private Roads". For it to be a single arched span, the bridge would have had to be exceptionally tall as the river is at its widest above the weir. This hypothesis is highly unlikely.

2024 - Report on the joint World Heritage Centre / ICOMOS / ICCROM Advisory Mission to the Derwent Valley Mills World Heritage property 31 January to 2 February 2024

1.22 The Mission Statement said with regard to Darley Abbey Bridge that this is one of the major developments.

It stated,

> *"On 23 February 2023, the State Party informed the World Heritage Centre that the structural integrity of the Darley Abbey Bridge within the boundaries of the World Heritage property had already led to its closure in May 2022. The bridge is not a listed building but lies within the curtilage of the Grade I listed West Mills and Grade II* listed North Mills. It has undergone a number of alterations since then, most notably the addition of a cast iron structure to the ashlar abutments and pier, the latter possibly dating from the 1783 or 1795 construction phases. A more recent modification to the bridge was the installation of an in-situ reinforced concrete deck in the 1930s. Today it is an important element in this historic industrial landscape and, for the Darley Mills complex, is vital in maintaining the relationship of the industrial buildings and their dependent urban settlements to the river. Darley Abbey Bridge is a historic structure that forms part of the Darley Abbey Mills complex and should be considered as a built feature that contributes to the OUV of the property. The 2022 Inspection for Assessment Report, Darley Abbey Toll Bridge, 58/3526, highlights that the structural weakness of the bridge, which has now become critical, is due to damage that has occurred over time to the concrete deck. The bridge was subsequently closed to all traffic. A temporary proposal for its rehabilitation and replacement was developed and ICOMOS concluded in its 2023 Technical Review that the current proposal could proceed with certain changes to the design. The temporary bridge structure is now in place and operational. The Council continues to work on a design and delivery partnership for a permanent replacement and Historic England remains involved. The State Party will share details of the potential options identified for a permanent solution with the World Heritage Centre following the recent Advisory Mission visit to the property and discussion of the bridge. The Mission understands that no request for a permanent solution has been made to date, as funding has not yet been secured.*
>
> *Recommendations*
> *The Mission considers that the bridge is an indispensable part of the property, that its replacement would seriously damage its authenticity, and therefore urges the State Party to make every effort to avoid its replacement. In this sense, the Mission team reiterates the recommendation already made by ICOMOS to the State Party in favour of a mixed option, acknowledging that even if 'a restorative approach would be preferable, given the complexity, cost and risk of such an operation, this approach may not be feasible'. ICOMOS therefore concludes that replacement of the concrete deck may be the only viable solution. If this course of action is taken, it would be important that a replacement deck replicates as closely as possible the visual appearance of the current deck in terms of shape, colour and, equally importantly, texture. Documentation of the current road surface is also a prerequisite for such a replica. Once options are available, they should be sent to the World Heritage Centre for review."*
>
> *15.*
> *With regard to the Darley Abbey Bridge, the issue of ownership should be resolved to ensure clarity for the conservation and longer-term management of the bridge. Any conservation project for the bridge will need to consider its potential impact on the Outstanding Universal Value of the property.*

2024

1.23 A stakeholder workshop was held online on the 12th September 2024, which was attended by approximately 26 participants.

1.24 It is understood that UNESCO asked that the refurbishment of the 'old bridge' be considered as an option in any appraisal. They asked that the current bridge either be repaired or that an option be provided that replicates the current old bridge. They identified that a Heritage Impact Assessment needs to be undertaken in parallel with the design process.

Geology and Topography

1.25 The site is located on the edge of Darley Abbey, a former industrial village, and is positioned approximately 2.7km north of Derby City Centre. It sits alongside the River Derwent, which separates the site from the village. The Derwent rises 9km east of Glossop in the Peak District and is confluent with the Trent at Shardlow.

1.26 The site forms part of the Derwent Valley Mills World Heritage Site (DVMWHS) which reaches from Derby to Matlock along the River Derwent and includes a buffer zone which forms the immediate setting and relates primarily to the visual envelope of the valley. This designated area includes the contemporary valley floor, river terraces and adjacent slopes of the Derwent Valley.

1.27 The underlying geology of the site is composed of Chester Formation, a sandstone bedrock formed approximately 247 to 250 million years ago in the Triassic Period in a local environment previously dominated by rivers. To the south, the underlying geology is characterised as Tarporley Siltstone Formation, a sedimentary bedrock formed approximately 242 to 250 million years ago in the Triassic Period in a local environment previously dominated by lakes (British Geological Survey GeoIndex 2024).

1.28 The bedrock is overlain by superficial sediments of Allenton Terrace Deposits and Head which in turn is sealed by Holocene Alluvium. These terrace deposits are likely to have been reworked in their upper portions and intact terraces have yet to be confirmed by observed exposures. The alluvial sequence contains both floodplain and palaeochannel deposits.

2. Geoarchaeological Assessment and Pre Evans History

(Kristina Krawiec)

Introduction

2.1 The Derwent Valley Mills World Heritage Site has been the subject of several overarching studies relating to its industrial heritage and the effects on the river. What is less well investigated are the deposits related to relict channels preserved within the floodplain. The evolution of the Middle and Lower Derwent is poorly understood and little work has been carried out on the deposits.

Pleistocene

2.2 The Derwent valley is one of the oldest parts of the Trent system and is infilled with sands and gravels dating to the Middle Pleistocene with these older terraces recorded at the margins of the valley. The upstream portions of the valley are constrained by hard rock geologies preventing lateral migration of the river, and the development of palaeochannels. Downstream of Milford, however, the valley widens out and palaeochannels and ridge and swale features are recorded.

2.3 The Pleistocene Allenton terrace, mapped as underlying the floodplain Alluvium at the site, is known to be fossil bearing with mammalian remains excavated at the Crown Inn Allenton and Boulton Moor (Howard et al 2016). The majority of the material was identified as hippopotamus, bear, rhinoceros, bison and elephant and likely dates to the Ipswichian interglacial (MIS5e). The upper parts of the terrace are likely to date to the early Devensian (MIS 5d-4) although the closer to the current course of the river these deposits are the more prone to Holocene reworking. The survival of such remains is due to the isolation of this deposit at these locations from the Holocene course of the Derwent, some 2km to the north, and the widespread nature of the deposit. Such fossil bearing deposits have yet to identified in closer proximity to the modern course of the river.

Holocene

2.4 With climatic amelioration in the Holocene the accumulation of fine grained deposits within the valley floor and the down-cutting of channels into older Pleistocene deposits occurred. The Derwent valley floor is relatively narrow in its upper reaches around Milford but this widens out as the river passes through Duffield, Darley Abbey and Derby. Lidar data to the north and south of the site shows palaeochannels within the floodplain. The area immediately to the west of the site is however heavily developed and therefore any remnant terraces or palaeochannels are likely to be deeply buried beneath existing structures and made ground deposits.

2.5 Archaeological evidence from the Palaeolithic, Mesolithic and Neolithic within the East Midlands is largely confined to river valleys, including the Trent Valley. This activity evidence usually consists of flint scatters and singular flint finds. It is acknowledged that this greater number of archaeological finds within the Trent Valley may be due to a bias in the location of the archaeological works carried out and that similar remains may survive in the Derwent valley (Howard and Knight 2004; Myers 2006, 71-84).

2.6 The Derbyshire HER records two Neolithic heritage assets within the vicinity of the site which consist of two separate finds of Neolithic axe heads. A Neolithic polished greenstone axe was found by a diver near the site of the presumed Roman Bridge just north of the fort at Little Chester in 1986, approximately 675m to the south, and a Neolithic flaked flint axe was recovered approximately 943m west, from clay deposits at a depth of 0.30m at the side of a house on Hartsharf Hill in 1976. These artefacts imply Neolithic activity adjacent to the valley, although precise locations are unknown as the artefacts could have been carried by the river. Small numbers of residual lithics have been recovered from excavations at Little Chester as well as a small number of Iron Age pot sherds.

2.7 Parts of Darley Abbey are within the Little Chester Roman Fort although this activity is confined to the eastern banks of the river. Remains of river crossings have been recorded over half a kilometre to the south of the site but none have been confirmed within the stretch of river spanned by the more recent bridge. The lack of excavation within the Darley Abbey area may be partly the reason for such little information regarding the Roman period. All river crossings are suggested to be located much further south at the site of the Fort (Brassington 1981).

2.8 Recent excavations carried out as part of the Our City Our River project recorded alluvial deposits on the eastern floodplain at the site of the playing fields. This demonstrated Late Mesolithic to Neolithic sandy alluvial deposits which had been subsequently reworked and truncated by later Roman activity. Residual flint and Iron Age pottery was recorded but no prehistoric features were encountered (Malone and Puzey Broomhead forthcoming). These investigations demonstrated activity some distance from the fort, at City Road, which is characterised by pits, ditches and the remains of Ryknield Street with its roadside ditches surviving. This demonstrates that there is further potential for the areas adjacent to the river and away from the fort, for Roman remains to survive. In addition, the excavations here demonstrated phases of ground raising presumably as a response to flood episodes.

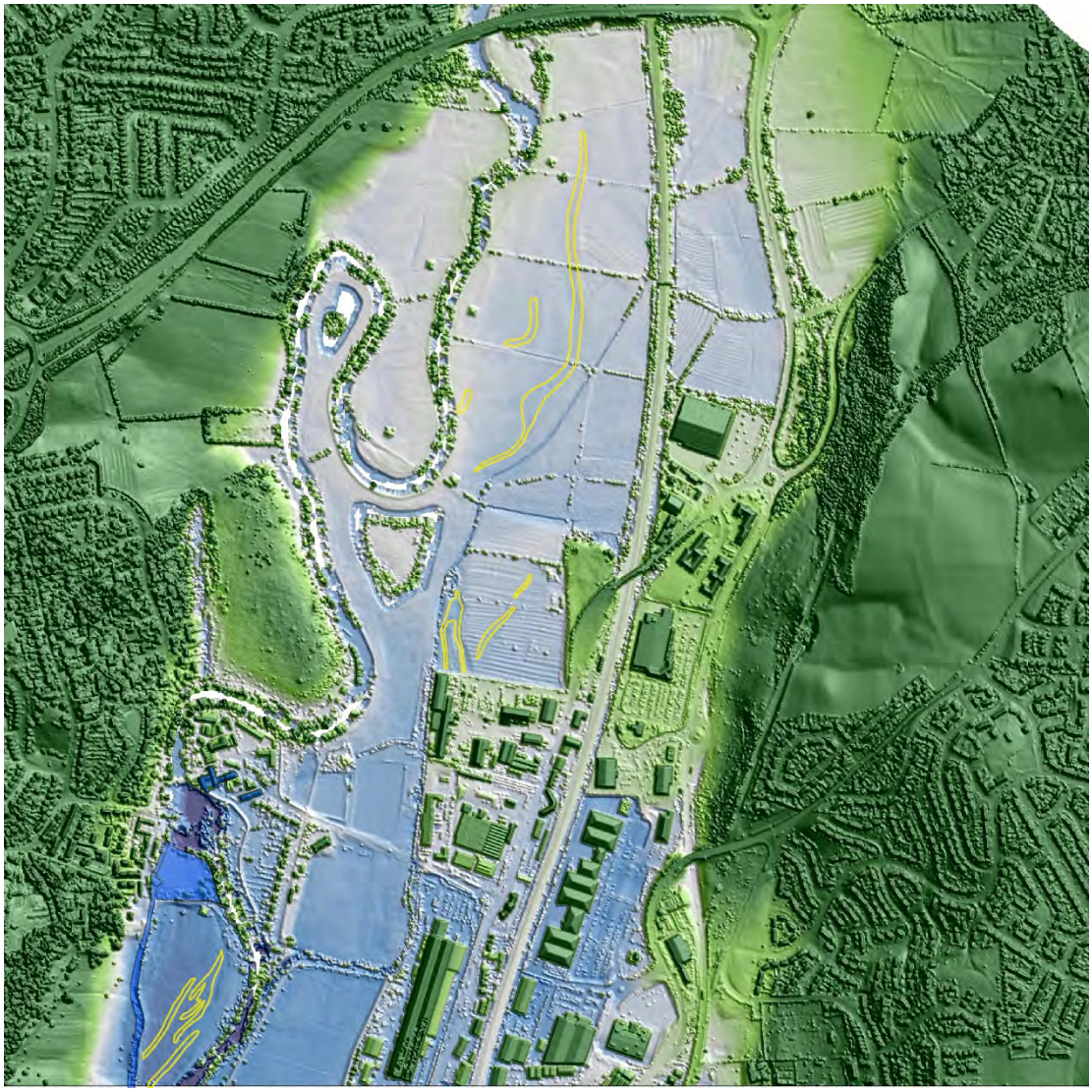

Fig. 4 Lidar imagery from the site with palaeochannels marked in yellow (York Archaeology)

2.9 In addition to evidence for flood episodes, represented by layers of silt clays, there is evidence in the form of palaeochannels for river movement. This lateral migration of the river is undated but likely predates the post medieval period as is reflected in the cartographic sources for the valley. Prior to the regulation of the river it is likely that the effects of climatic events such as the Little Ice Age and Medieval Warm Period would have seen significant changes to the fluvial system. It is tentatively suggested that there was an expansion in the agricultural exploitation of floodplain locales in the Medieval Warm period with extensive ridge and furrow recorded in the valley, and that these features may have been eroded in the climatic downturn represented by the Little Ice Age (Howard et al 2016, 4).

2.10 Widescale floods are documented in the medieval period and into the post medieval period, with 5 major floods recorded in the 20th century between 1901-1940. These are linked to periods of high rainfall, storms and snowfall. The energy pushed through the fluvial system by these events was powerful enough to destroy 'the old bridge' at Belper in 1795. Despite this the main channel been stable for at last 180 years and has remained in its current course.

2.11 Borehole data for the site itself is lacking although the BGS does hold some records in the general area of the wider floodplain proximal to the site. A borehole, (BGS borehole 210885, SK33NE561) located to the immediate west of the PureGym building at the Meteor Centre, records the terrace gravels overlain by 1.40m of gravelly sandy clay alluvium. This is located at the very edge of the former floodplain where the alluvial sequence would be expected to be fairly thin. Further records to the south west at Darley Abbey pumping station indicates between 1.80-4.30m of clay which overlies sands and gravels and is interpreted as alluvium (BGS borehole 210540, SK33NE216), suggesting thick alluvial deposits do survive in the areas surrounding the site.

2.12 The only potential in-channel boreholes are located in Derby at the inner ring road St Alkmunds Way bridge crossing, BGS borehole 210402 (SK33NE78). This recorded the compact sands and gravels of the river bed overlain grey coarse sand 1.54m thick which is overlain by presumably recent river silts 1.54m thick.

2.13 The Darley Abbey bridge itself is located wholly within the current river bed and in-channel deposits are considered to be highly reworked and mainly gravel dominated. There are likely to be recent accumulations of river silts and after flooding episodes, redeposition of timber remains from further upstream has been noted (Keyworth pers comm). The planform of the river has changed little in the post-medieval period but little is known from earlier periods given that the majority of the floodplain deposits are now buried beneath the mill complex.

2.14 The associated Boar's Head Mills complex sits inside the meander core of the Derwent and the former parish boundary of St Alkmund follows the current course of the river to the north and south of the mill complex. However it does deviate along Haslam's Lane to the east. This may suggest a former course of the Derwent that predates the available historic mapping as parish boundaries often followed the course of major rivers. There is a lack of borehole and Lidar data for this area that would help to establish this.

2.15 Recent work carried out on calculating the effects of lead mining pollution on the deposits of the Derwent concluded that the alluvial deposits of the world heritage site is contaminated with lead, zinc and cadmium and that this contamination is prone to remobilisation through fluvial erosion further upstream (Howard et al 2016).

Darley Abbey – The Abbey

2.16 A house of the Augustinian Canons was founded in c 1137 as the Abbey of St Helen at a site near St. Alkmund's on the outskirts of medieval Derby. It was later, c 1154, granted funds by Robert Ferrers, second earl of Derby, to establish a new and larger house. A suitable site for the new house was not found until c 1160 when Hugh, rural dean of Derby, granted all his lands at Little Darley for the purpose and the Canons moved from St Helen's to the current environs of the Scheduled Monument of Darley Abbey and established the Abbey of St Mary under its first abbot Albinus. Darley Abbey grew over the centuries to become the richest and most important monastic house in Derbyshire.

2.17 Two mills are also recorded within the abbey. The only surviving buildings belonging to the abbey are Grade II listed 7-9 Abbey Lane and the Grade II* listed Abbey Public House which is

believed to belong to the former abbot's house or guest house and was built c 1450 and extensively restored in 1979-80.

Pre- Evans Mills

2.18 The remains of a mill, at Darley Fish Weir, were recorded during a watching brief showing the presence of a timber structure on the artificial island within the Derwent. Dating of the structures and timbers present[7] suggests that the mill may have been managed by the abbey and dismantled following the dissolution of that institution (TPA 2014). A mill, mill race and island were the predecessors for the later development of the weir and post-medieval mills. The medieval development was therefore an important precursor to the current designated complex.

2.19 Cartographic sources demonstrate the scale of development within this area prior to the construction of the mills and expansion of the worker's accommodation. Prior to the Evans expansion, a mill race, which may have been in use from the medieval period, fed several mills on the western bank of the River Derwent. In the mid-17th century two corn mills and two (later three) fulling mills, and possibly a forge were at work in Darley[8]. A corn mill, paper mill, fulling mill, hemp mill, and a leather mill are attested from a 1713 sale document[9]. William Woolley's 1708 map demonstrates some of these buildings within the vicinity of the river and gives a simple pictorial representation of 'houses and Milnes'[10]. A bridge, included within the non-designated assets, is also shown on this map and mentioned in the 1790s ledgers as the 'Corn Mill Bridge'. Burdett's 1767 Map of Derbyshire shows the mill race, in the area of Dean's field, as well as the possible mill structures within this bend of the river.

2.20 An estate map of 1757 (not seen but referenced by English Heritage) notes the presence of 'Darley Mills'.[11] By this date the mills also included the flint mill of William Duesbury (1725-86), which supplied his Derby Porcelain Factory. Twenty years later another flint mill and a leather mill were in operation.[12] The regular operation of these mills would have required the penning of the Derwent.

[7] with timbers dated to 1403-1428 AD and stone-built elements also represented. Possible later repair phases were also recorded which suggest the structure only fell out of use in the early to mid 16th century.
[8] World Heritage Nomination (2000), 83
[9] Frank Nixon, Industrial Archaeology of Derbyshire (Newton Abbot, 1969), 205. Also 'Post Boy', September 1713.
[10] 'A mapp of Darly Abby belonging to Wm Woolley Esq … 1708', reproduced in Robinson (2001), Fig. 4.
[11] 'A Plan of the Demesne Lands Belonging to Darley Hall from a Survey taken August 14th: 1757', Derby Local Studies Library. This map was not available when we requested it in 2025.
[12] World Heritage Nomination (2000), 83.

3. The Evans Cotton Mill – Evolution and Documentary Evidence for the Bridge

(Mel Morris)

3.1 The Evans enterprise included mills on both sides of the river, including a Corn Mill and the earlier Paper Mill on the west bank, which was first recorded in 1713 when it was for sale[13].

3.2 As acknowledged in the English Heritage report, the Evans' Darley Abbey Mills complex is recognised as one of the three most significant textile enterprises of the Derwent Valley alongside the mills of Arkwright at Cromford and elsewhere and the Strutt Mills at Belper, Milford and Derby (Menuge, 2006, 1). Its completeness of survival is exceptional. The main difference between the Darley Abbey Mills site and those of Belper and Cromford is that most of the water management features at Darley Abbey have been stopped up and partially truncated, culverted, or buried (see figure 24). This lack of open water through the site hampers our understanding and onsite interpretation of the relationship between the buildings and the source of power. The archaeological potential to address this and better reveal and interpret the water management is therefore an important consideration when assessing all new development.

3.3 The family links and social connections between the Evans family and the Strutt family is documented in the 2006 English Heritage report[14]; for example, William Evans who had married Jedediah Strutt's daughter Elizabeth (1758-1836) in 1785, died in 1796 and was succeeded in the business by his half-brother Walter, who then married Elizabeth in 1798. In 1793 Barbara, sister of Walter Evans, married Jedediah Strutt's talented son, William (1756-1830).

3.4 Importantly, there is considerable evidence in the company ledgers which survive in the Derbyshire Record Office that some of the Strutt engineering and shared knowledge was adopted in the Boars Head Mills at Darley Abbey. The company letterbooks refer to the Strutts giving permission for their models for castings for different parts of machinery to be used by W Evans & Co. when they place orders from various iron and brass founders. The ledgers record between 1796 and 1798 the extensive provision for fitting out the mills with 'cast-iron wheels, brass bushes, cast-iron racks and pinions, saw plates, posts, pulleys, fly and jack wheels, a water wheel shaft, ironwork for two spinning machines', all acquired from J Strutt & Sons of Belper.

3.5 The first mill on the east side of the river is now known as Long Mill and this was served by a leat to the north, serving a waterwheel and flood wheel on the east side of the building, although the original course of the leat is not documented. An early paper written by Stuart Smith and Arnold Pacey of RCHME in 1968 decided that the original mill leat was located to the west of the Long Mill and dated it to the reconstruction of the Long Mill in 1789. This was confirmed in 1988. However, re-evaluation in 2006 changed this interpretation, based on a more detailed analysis by Menuge of the phasing of Long Mill.

[13] TPA – 2014, Ibid. page 9

[14] 2006 – page 7-8.

3.6 The Long Mill was first erected in 1782-83, the date which the firm of Walter Evans & Co. later adopted for the firm's foundation on the eastern bank of the Derwent, which was penned by a large weir. The earliest unequivocal references to its operation date from 1787. It was largely destroyed by fire on 29 November 1788 with operations ceasing on the site until 1790. The mill was rebuilt in 1789-90 on the same site and incorporated some of the earlier mill.

3.7 By the late 1780's workshops and warehouses had been constructed in addition to the mill. The mill continued to expand with most of the existing buildings present by 1862[15].

3.8 In 1798-1800 a 'new cut' was constructed and recorded in the ledgers and this appears to be the alignment shown on the 1811 Liberty map (figure 17). The alignment of the original cut is not known but the hypothesis in the English Heritage report is that it is represented by the curved alignment of later buildings to the north of the watchhouse (this hypothesis is discussed later – para. 3.18).

3.9 The ledgers also record the construction of a 'reservoir' at the Cotton Mill in 1804 at a cost of £139, 13s, 11d. This is not mentioned in the English Heritage report. The reservoir is likely to be an intermediate pond which is fed by the mill leat. Identifying the location of the reservoir is more problematic as the maps are small in scale.

3.10 As part of the development of the site of the Evans cotton mill complex on the east bank of the river, two distinct campaigns of work can be identified, the first concentrated in the period 1796-1801, and a second between 1804 and 1806, as described in the English Heritage report:

> *"In the earlier of the two periods the works include a new flood wheel and wheel-house on the east side of Long Mill, promptly followed by a realignment of the original leat..... and two bridges, one in timber and one in stone.*
>
> *The first indication of work connected directly with the cotton mill is a series of accounts for a 'Flood Water Wheel & House at East side of the Mill'. A flood wheel is one set at a higher level than normal, allowing it to be used when the river is in spate. The evidence of Long Mill .....indicates that the original wheel was located on the east side, so it would appear that the flood water-wheel was added alongside. The wheel-house referred to may therefore have been an extension of an existing one in order to accommodate a second wheel, though it is possible that the original wheel was not housed. A reference to the 'East wheel' in October 1798 (Ledger 1795-1804, 188R, entry dated 12 October 1798) might suggest that there was already a wheel on the west side of Long Mill, where a second leat and wheelhouse are known to have been in existence by 1811, but since there were two wheels on the east side by late 1798 it may simply be another way of distinguishing the flood wheel.*
>
> *Before the flood wheel and wheel-house were complete work had begun on the 'New Stone Bridge for Cotton mill meadow', minor payments for which are dated May to September 1798 (Ledger 1795-1804, 77L & 186L). This work appears to have been a prelude to the*

[15] Middle Mill - 6- bay mill building added to the Middle Mill in 1818. West Mill - 1821 four storey brick building with stone coped gable and parapets. The building was constructed in two or three phases. North Mill - Also known as the Dye House, three-storey brick fireproof mill of c1835.

eastwards realignment of the mill leat upstream of the mill. The costs are assigned to the 'New Cut acc[oun]t.', which can be identified with the 'New Cut in Shrogs', for which wages were paid between August 1798 and October 1800 (Ledger 1795-1804, 185R-186L and 228R-229L)."

The First Record of a Bridge

3.11 The 2006 report mentions accounts of the bridge across the River Derwent. We have also consulted the ledgers which are referenced in detail. The detail in the ledgers suggests that this started out initially as a repair of the earlier timber bridge but then the repair was abandoned in favour of the replacement of the bridge with a new timber bridge. It was a substantial undertaking, taking between 1797 and 1800 to complete, with the final item being the installation of two metal gates in early 1800:

English Heritage (2006) - "The 'New Wood Bridge at Cotton Mill', for which accounts extend from September 1797 to May 1800, was probably the much longer bridge across the Derwent. The accounts were originally headed 'Repairs of Bridge', but were later amended to read 'New wood Bridge', and include an allowance for 'Old bridge materials'. Two iron gates secured the bridge." (Ledger 1795-1804, 132R, 133L, 163R, 186R-188L, 243L.)

The Boat House, first mentioned in 1803 (Ledger 1795-1804, 115L & R, 118L, 132L, 141R and 249R), may have housed Evans & Co.'s own barge, to which scattered references occur, but is more likely to have been for a lighter used to dredge the leats and their approaches."

3.12 The slower-moving water along the northern leat would have required regular maintenance to prevent a build-up of silt. A sketch drawing of the mills dating from 1844 (L Jewitt - DRBY005309) shows what appears to be either a boat house downstream of the weir or an outflow from the water management within the mill site. The dredging of the river is usually required upstream of the weir. The drawing also shows the rack-and-pinion sluices along the crest of the weir.

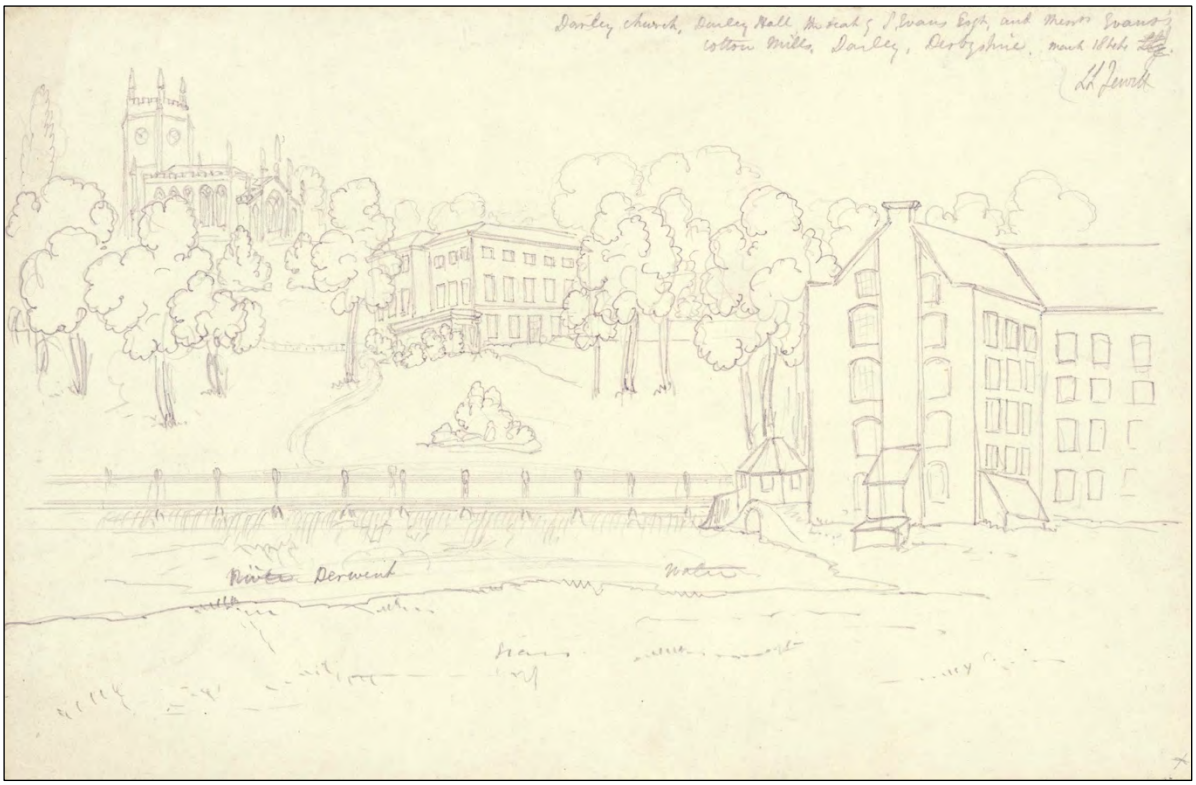

Fig. 5 Pencil sketch of the West Mill, Darley House and Weir, dated March 1844, L Jewitt (DRBY005309 – Derby Local Studies and Family History – Picture the Past). It is notable that the small watch house appears in this image adjacent to an outlet immediately alongside the West Mill. The present arrangement with tall retaining walls supporting a platform for the 'dinner house', therefore postdates this 1844 image.

3.13 The entry in the ledger from 1797 is amended twice, first to say 'New' bridge and then later to insert the word 'wood'. It is a very detailed description of the works undertaken amounting to several pages of accounts, with lists of materials and labour. The detailed descriptions refer to Deal being the main timber used in the early phases of the bridge repair and reconstruction, whilst later accounts refer to Oak and Deal.

Partial Transcription

'1797	New~~Repairs of~~ wood **Bridge at Cotton Mill**				[Carried over to next column] 1798				
Sept. 8	To 3 Piles & Shoes & C	7	5	7½	Jan 31	By Deal Timber	9	1	9
9	To 1 ditto and 2 ditto	3	14	12	Mar 27	By Deal Timber		14	10
14	To wages	4	3	8½	" 28	By Deal Timber		12	8
"	To 1 Pile & Shoe	3	13	11½	Jany 28	By Deal Timber	3	14	3
21	To allowance for driv.g piles		6	3	Febr. 1	By Deal Timber	2		6
"	To Wages	3	19	2½	Mar 6	By Deal Timber	1	11	9½
22	To Soft Soap		3	4	" 12	By Deal Timber	3	8	10
19	To 1 Pile & H[K?]oop	3	15	4			£21. 4s. 7½ d.		
25	To 2 Pieces of Deal	3	8	1					
26	To 2 Ditto	1	13	11					
"	To 2 Ditto	1	11	8					
28	To Wages	1	13	1½					
27	To 12 Pieces Deal Timber	11	2						
28	To Deal Timber	4	1	7½					
Oct. 5	To Wages	1	2	4½					
4	to 16 screw Pins and plates	1	5	3					
6	to Deal timbers	11	19	3					
6	to 3 Pieces Ditto	7	17	8					
7	To Screw Pins & C	3	2	4½					
10	to 7 Pieces Deal Timber	11	5	3½					
12	to Cook's Bill for Ale	1	8	6					
"	to wages	3	3	9½					
"	to Deal timber	6	5	7					
"	to Ditto	9	18	6					
14	to 1 Pile & shoes & Pins	6	19	4½					
19	to Wages		2						
"	to Ditto	5	9	½					
18	To 8 iron pins		18						
19	To Deal timber & c.	12	14	6					
21	to 12 Pins and Plates	1	6	3					
23	to Ditto Ditto		10	6					
28	to 40 Ditto Ditto	3	15	6					
26	To wages	2	12	2					
Nov 2	to Ditto	1	13	6½					
1	to Pins and Plates		13						
"	To Allowance bill		3	11½					
9	To wages		3	8					
16	To Ditto		2	5					
11	to Welch's Bill		9	9					
1798 Jan 28	To Wages	2	1	4					
8	to 3 Pieces Deal								
Ditto	to Allowance								
May 24	To the whole of the Old Bridge materials	£47, 2 shillings and 11½ d							
	Total cost	£195, 18s, 4 ¼d							

3.14 Another page with entries under New Wood Bridge At Cotton Mill – dated June – August 1798 starts to list Oak Plank. This is a protracted period of rebuilding over two years, as with the

weir. The early phases comprise driving piles and pile shoes which appear to be constructed from 'Deal'.

3.15 Later entries for August and September 1798 list 27 tons of rough stone but there are also references to sources which may be local quarries in the names of individuals as Watson is named multiple times and Swinerton is the source for stone towards the end of 1798. It is most likely that this is the name of a stone supplier – Mark Swinnerton was a Derby stone mason and 'Swinertons' probably refer to him, as he leased part of the Moor Lane quarry at Little Eaton in 1798[16]. There is also metalwork in the construction, including 32 iron Hoops and on Oct. 25, 1798, there is an entry 'To Smith & Co for castings' with a very large sum of £77,13s 4d. The costs go into the end of 1799.

3.16 There is considerable sharpening of chisels towards the end of the period of construction, and it seems likely that the timber (or stone) may have had a decorative finish as well as the timber having a painted and oiled finish. The entries for sharpening picks are likely to relate to finishing stone faces rather than timber. There is also one entry for 1000 bricks and multiple entries for 'Old Lead'. (Page 187L&R, 188L). The final entry dated May 22nd 1800 (page 243L) which also lists 2 iron gates is for £840 – 16 – 8 ¼.

Dr – New Wood Bridge... At Cotton Mill									
'1798	Amount brought forward	195	18	4½	Amount brought forward		21	4	7½
	174.13.8¾								
June 9	To Screw Pins		13	6½					
13	To Oak Plank		13						
20	To 4 Ps Oak Timber	3	15						
23	To 4 ditto ditto	3	13	6					
"	To 12p Ft Oak Plank		6	3					
"	To Nails		?	11½					
7	To Wages		7	6					
14	To ditto	2	11	6½					
21	To ditto	2	13	12					
28	To ditto 3/6 12j		15	6					
"	To Allowance bill		6	8					
"	To wages	7	18	8					
"	To ?	2	7	3					
29	To 2 Pd Deal timber	1	16						
"	To Oak & Deal ditto	13	13	3½					
July 5	To Watsons bill	2	3	10					
11	To allowance		4	2					
12	To Watson's bill		6						
"	To Johnson's ditto		4	4½					
"	To wages	2	10	½					
5	To ditto	14	9	1½					
12	To ditto	12	9	7					
"	To Nails & c		14	9					
3	To Pile shoes & c.	2	16	10					
4	To 4 screw straps	2	5	5					
9	To Oak timber & c.	20	13	8					
11	To Pins & nuts	1	11	11					
13	To screw straps & c.	4	16	4					

[16] https://www.lelhs.org.uk/topics/quarries

16	To Oak timber & c.	5	18	6½			
19	To Allowance		3	11			
"	To Overtime		7	8			
17	To 1 P^{s} Oak	2	6	10½			
20	To screw pins	1		3			
21	To ditto		14	11			
24	To 2 P^{s} Oak	12	9	6			
"	To 98 Galls Beer	1	12	8			
26	To Wages		1				
19	To Ditto	8	14	7			
26	To Ditto	6	12	6½			
27	To a Mop		1				
26	To Timber & Nails	5	18	7			
28	To ditto & ditto	3	4	10			
Augt 2	To wages	7	2	1½			
"	To Allowance		6	3			
"	To ditto		3	4			
		£360	5	8			

D^{r} – New Wood Bridge... At Cotton mill									
1798	Amount from 133 folio	360	5	8¾	1798 Amount bro't forward		502	13	3¼
Augt 2	To 1 Pieces of Oak		5	5	Oct 11	To wages	11	6	5
6	To deal planks & c.	45	5	5	18	To Ditto £2.11.10, 3/-	2	14	10
?	To Trusler? For lime		18	8	11	To Oil		2	7
1	To 27 Tons rough stone	2		6	15	To Paint & Oil		3	7½
"	To Carriage of ditto	1	2	6	10	To Piles & c.	2	7	8
9	To Allowance		7	11	19	To Leyland's bill	4	10	9
"	To wages	4	12	11	25	To Cookes Ditto for Ale		3	1½
11	To 4 P^{s} Oak & screw pins	?	17	4½	"	To wages 5/6, 1.14.0	1	19	6
3	To Pimms bill	4	11		"	To Smith & Co for Castings	77	13	4
16	To Allowance		12	11	"	To 56 Galls Beer		18	8
23	To Wildes bill		14	8	Sept. 13	To wages	5	13	4½
"	To Watson's ditto		14		20	To Ditto	6	9	1
14	To 3 Pieces of Oak	1	16	1	27	To Ditto	4	10	8
16	To wages		2	3	Oct. 4	To Ditto		13	2
23	To ditto	1	12	7½	"	To wages	1	6	7½
25	T Smith & Co. for Car^{e} of Bricks	3	14	2	Sept. 8	To Welch's bill	4		4½
29	To Nails		6	8	Oct. 27	To ditto ditto	8	9	4½
"	To ditto		12	3	Nov. 15	To wages	1	4	10½
Sept 3	To ditto		4	9½	10	To Sharpening picks		3	
Augt 28	To Deal boards	10	10	3	14	To ditto ditto		5	8
30	To ditto	4	1	1½	"	To Oil & Paint		6	1
Sept. 1	To ditto	2	8	4½	22	To Wilde's		6	8
Augt 30	To wages	4	15	7½	20	To Oil & Paint		1	4½
25	To Pipes from Basses	4	4	4	15	To wages		10	8
Sept 6	To wages	5	15	11	22	To ditto		11	
4	To 2 Oak Timbers		13	2	Oct. 24	To Swinnerton for stone	2	15	11
5	To 68 Pins & c		14	10	July 12	To 8 load gravel		12	
6	To a piece of Deal		13	6	Nov. 21	To the uses of 20 deal planks		15	

7	To screw pins	1	14	10	Dec. 6	To Smiths bill for Gravel	4	10	
10	To Deal scantlings	1	8	9	"	To Wildes Ditto		2	10
11	To ditto ditto	1	6		13	To ditto		1	
7	To Oil & Paint		14	6½	Nov. 27	To Sharpening chisels			10
5	To ditto & Ditto		6	4	Dec. 7	To ditto		1	
11	To ditto & Ditto		10	8½	20	To Daves' bill		2	2
12	To Deal		11		"	To Bulls ditto		2	6
17	To Ditto boards		14	7	21	To Sharpening chisels		1	6
18	To Oak scantlings	3	2	5		To Snapes bill		3	9
14	To Paint, Oil & Nails	1	16	1½		To wages		7	3
17	To ditto ditto		9	11		To ditto		10	6
18	To ditto ditto		4	11		To ditto	2	8	4
20	To ditto ditto		4	11			£660	-	5¼
19	To 4 P^{s} Oak	1	14	3					
21	To 2 Ditto & 32 Iron Hoops	4	17						
28	To Whiting & c	5	7	4½					
Oct 1	To Ditto	2	4	4					
4	To Wildes bill		3						
"	To wages	7		3					
4	To Oak planks 5/- 1/4		6	4					
		502	13	3¼					

188 D^{r} New Wood Bridge				
1799	Amount brought forward	721		
98/ Dec. 29	To Carriage			
99/ Jan. 19	To Mr Welch's bill			
April 4	To Paint & Oil			
"	To Sharpening picks			
9	To Old Lead			
25	To Wilde's bill			
March 9	To Welch's bill			
April 27	To iron r(n?)ails & c.			
May 1	To Sharpening picks			
April 20	To Paint			
26	To Swinerton's bill			
4	To wages			
11	To D^{o}			
18	To D^{o}			
25	To D^{o}			
May 2	To D^{o}			
9	To D^{o}			
15	To Oak Posts and Rails			
1799	Amount brought forward from 188	817	6	3¾
June 17	To Swinerton's for stone		6	11
31	To paint		4	1½
Augt. 1	To wages		8	4
8	To ditto		13	9
26	To Barnes for paving	2	19	1
29	To wages		3	11½

Sept. 7	To Mr Stanley's bill		11	6
Augt. 31	To Jn Welch's bill	5	15	9
Nov. 1	To wages		6	
Dec. 20	To an iron bar		12	
May 23	To Wages		2	
1800 May 22	To 2 iron gates	6	14	8½
	To 87 loads Lav? L?gravel	3	19	9
	To Quarterly wages		12	6
		840	16	8¼

Railings

The Evans company correspondence books contain copy letters transcribed from 1787 to 1809[17]. The majority of the letters relate to orders of raw cotton from the Americas and many contain orders related to models of machinery and orders of castings and bobbins. There will have been much replacement machinery as parts were quickly worn out or when the factories expanded. The early orders are sent to foundries based in Chesterfield, for cast-iron, whilst later orders range further afield including a brass founder in Ashbourne and then from 1805 to T.C Hewes Millwright Manchester.

The letters contain references to all of the Evans operational businesses, so machinery for the slitting mills appear as do orders for the paper mill.

Amongst these orders appears on 15th July 1798 to Messrs Smith Chesterfield a letter regarding a pattern for railings. These are the only place where the design of the new bridge has any descriptive detail. The description tallies with entries in the ledger with payments for castings from Smith & Co. in October 1798 for the new bridge.

> "15th July 1798 to Messrs Smith Chesterfield
> 'Sir, We have sent you the pattern for the railing and provided these are cast to our satisfaction we shall have occasion for further quantity
>
> 34 to Pattern No. 1 for top rail
> 32 to ditto No. 2 for bottom ditto
> 32 to ditto No. 3 for ditto
> 520 to ditto No. 4 bars
> 36 to ditto No.5 bars and stays
>
> We wish to have them cast as soon as you can, and to be delivered at the Cotton Mill at Darley. You must take care the waggoner does not deliver them to Derby. We remain your most Obt. Sts. Wm Evans"

The fact that the railings have 5 separate patterns and that they are cast iron suggests a degree of ornamentation. There is further illumination on the appearance of the railings with further orders, as follows:

> "6th September 1798 – ordered the remainder of the Order for Railing for New Bridge to be forwarded as soon as possible from Messrs Smith & Co. Chesterfield."
>
> "15th September 1798 – Ordered from Smith & Co. Chesterfield

[17] Derbyshire Record Office 'W Evans Letterbook' ref. D5231/7/1

16 to pattern No. 1 – The Top Rail
3 to ditto No. 2 – The Bottom Rail
7 to ditto No. 3 – The return ditto
160 to ditto No. 4 – the Bars
10 to ditto No. 5 – bars and stays"

"27th September 1798 - Mr Swinerton
You must supply us tomorrow or the next day with some ashler for a job to be done on Sunday next
18 ft of 15 ins
44 ft of 14 ins
8 ft of 18 or 20 ins
We also want immediately a quantity of scapeled wall, a part of the two foot coping –
70 stones 3 feet long, 15 ins deep and to work to 10 ins
35 ditto – 22 ins long, 15 ins deep and 15 ins wide"

It appears that the railings were being fitted into a stone coping and that back stays provided the stability – these back stays would have extended out over the water. Further entries in October 1798 suggest a more decorative flourish was being added to the railings with a new pattern for some of the top rail. The cast-iron railings were ordered in batches, as the need arose, and may have extended along Old Lane and the western riverbanks as part of an approach to Darley House.

"6th October 1798 – Derby to Messrs. Smith & co. Griffin Foundry, Chesterfield
Gents
Herewith have sent you 2 modals, one for rail and another for spinning weights, to which you will please to cast as follows,
16 to Pattern… No. 1 for Top rail
600 to ditto.. No. 4 Bars
40 to ditto No. 5 Bars and Stays
32 to ditto .. No. 6, the Pattern sent for top rails
Also 24 spinning weights
…….. We wish to have the whole of the Railing & c. by the first waggon and for it to be delivered at the Cotton Mill at Darley……."

"28th May 1799 – Ordered from Smith & Co. Chesterfield
186 Banisters for Bridge – No. 4
6 Back Stays – 5
To be forwarded soon as possible and to return these or any other modals they may have on hand"

"18th June 1799 – Recd. From Smith & Co. the Banisters and Stays for New Bridge that were ordered on 23rd May and wrote to have the Pillars for Cotton Mill forwarded soon as possible."

The entries for the bridge end at this point and no further entries for gates are identifiable although they are unlikely to be cast-iron as the founders (Smith & Co.) are not mentioned.

The Leats and Embankments

3.17 The English Heritage report discusses the possible location of the original leat, before the construction of the 'new cut' in 1798:

> *"The original mill leat appears to have left the river a mere 60m to the north-west of the present north gable. This is suggested by the alignment of a series of buildings which stood until the 1880s, but of which the concave-fronted house is now the only substantial survival. Though in fact they are contemporary with the realignment of the leat at the end of the 18th century, these appear to have respected a gently curving watercourse reaching the mill next to its north-eastern corner and passing along its eastern flank (the reluctance to build on a recently backfilled channel is understandable). It is possible to see corroboration for this alignment in the small-scale, and clearly schematic, depiction of the mill and its watercourse on a plan made by Benjamin Outram in 1792 for a proposed extension of the Derby Canal (re-drawn in World Heritage Nomination (2000), 85). This agrees in showing the leat in the form of an arc (though with no pretence of accuracy) and passing along the east side of Long Mill. Burdett's small-scale map of Derbyshire, a revision of which was issued in 1791, appears to show much the same.*
>
> *The earliest large-scale map is the 'Liberty Map' of 1811, which shows the leat as modified between 1796 and 1798, possibly in connection with the addition of Middle Mill.*
>
> *On the Liberty Map the leat departs from the river almost due north of the mill; it follows a straighter course for much of its length, but at the northern end incorporates a slight curve in the opposite direction to that suggested by Outram. The differences between the two maps are signal enough to suggest that Outram's plan, despite the inevitable deficiencies resulting from its small scale, does indeed show a different arrangement."*

3.18 We do not agree that the schematic Benjamin Outram plan in the Inscription document shows a clear, different alignment for the leat. This is also discussed later under map regression. Burdett's 1791 revision of his earlier 1767 map does not show a secondary water course to the east – see figure 11 and the argument presented by Menuge about the location of the earlier leat, not evident on any maps but suggested by the curved alignment of the buildings, is not convincing as this is located on the inside of the bend where it is shallower; the outside of the bend having deeper and faster flowing water. In order for a leat to function well in this position it would have likely required a substantial engineered structure running into the water or fixed to bedrock, which is not apparent. The curved alignment of the buildings could be explained if it is related to either an architectural device, because it directly faced Darley House, or it could be related to a larger body of impounded water at the top of the weir and above the bridge; it was common for the impounded area to be enlarged and banks to be sacrificed to create sufficient head of water in the early part of the development of mills along the Derwent, as found at Belper; as the weir was later modified and the headwater raised with the addition of the rack-and-pinion sluices, the land may have been reclaimed with the construction of the new sluices.

Watch House

3.19 The watch house with its canted roof appears in the 1844 Jewitt pencil sketch, just below the bridge and on the site of the dinner house. This then appears in its present location on the 1846 Chapelry map. In the more exposed location adjacent to the bridge, its octagonal form would be an eye-catching feature. It may have inspired the canted form of the later Dinner House. Menuge refers to the Dinner House being erected in the early part of the 19th century, although its location is not pin-pointed and perhaps assumed to be the same.

Phasing of Mills

3.20 English Heritage elaborates on the phasing of the mills, as follows:

> *"The fifty years that elapsed between the making of the Liberty Map and the publication of the Illustrated Times article were characterised by continuing expansion. A very considerable programme of works is apparent in the years between 1818 and c1835, during which East, West and North Mills were added, and this impetus continued through to the middle of the century with the construction of a large number of ancillary buildings.*
>
> *Documentary information for this period is scanty, but some of the most significant additions are summarised in a series of entries in a contemporary Stock Book maintained by the firm (Stock Book 1815–1826, DRO D5231/5/1. This is foliated in the same manner as the two Ledgers, and is referenced in the same manner.)*
>
> *The first was East Mill, commenced in 1818, followed, from 1821, by West Mill... The latest entry in the Stock Book is dated 1826 and North Mill is nowhere mentioned, nor was it referred to in 1833, when the Evanses were consulted by the Factories Inquiry Commissioners; instead they described West Mill as their 'third and last' addition to the original mill.*
>
> *It is also absent, together with the accompanying further diversion of the leat, from George Sanderson's Map of the country twenty miles round Mansfield, surveyed 1830-34. Although the new channel passed close alongside North Mill it did not supply power to it directly. Instead power seems to have been derived initially from the existing wheels.*
>
> *Page 62 - North Mill lies to the north-east of Long Mill on land made available for building when the original leat, realigned between 1798 and 1800, was again diverted. The new watercourse approached from the east and passed close to the south elevation before turning sharply southwards a little short of its western end. The date of North Mill is not known precisely. The absence of any mention in the Stock Book, where the costs of East Mill, West Mill and some lesser additions are detailed, implies that it is later – probably after 1823, the latest dated entry. George Sanderson's map, surveyed 1830-34, which is an imperfect source for smaller buildings owing to its small scale, clearly shows the leat before it was re-diverted to make way for North Mill.*

The first Evans residence at Darley was Darley House, which was built for Walter Evans in 1785. It occupied generous grounds set back from what is now known as Church Lane and overlooked the Boar's Head Mills to the east.

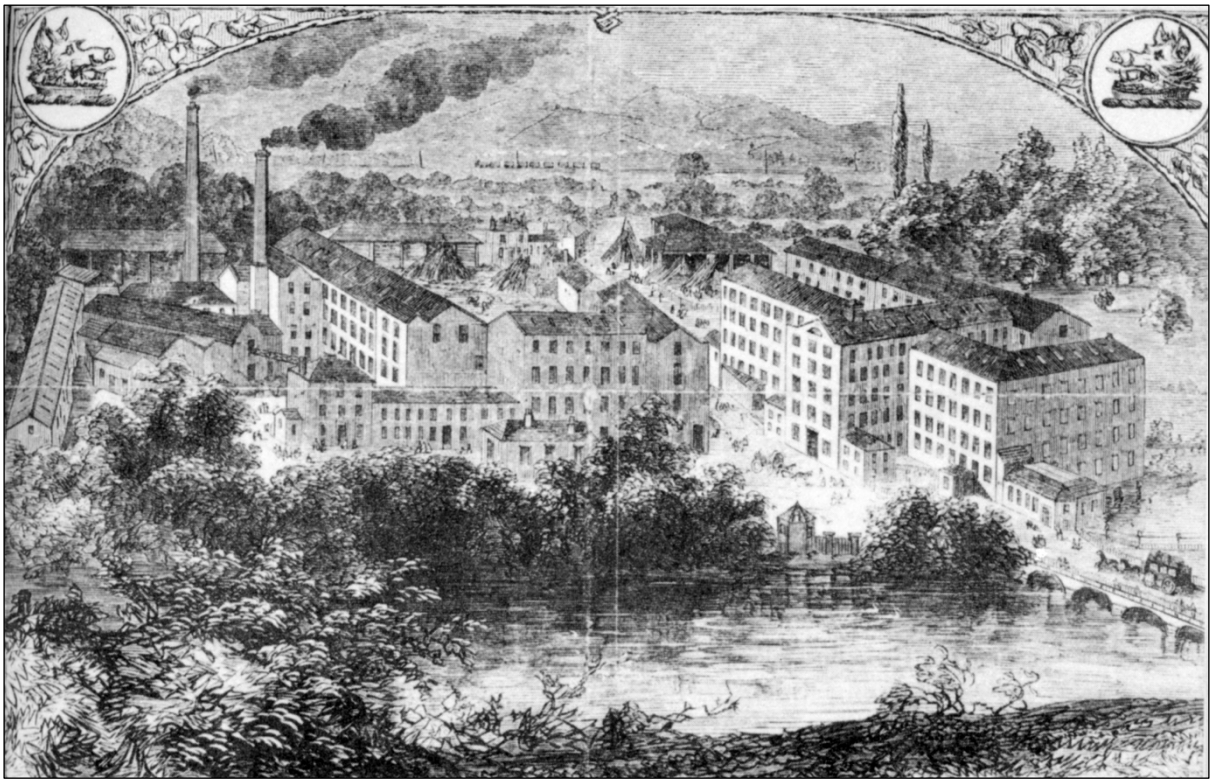

Fig. 6 1862 image of the Boar's Head Mills publicised in the Illustrated Times – July 26th 1862. This is the only known image of the bridge prior to the 20th century concrete bridge, but at this date it would be based on the 1853 bridge, and this depiction with what appear to be masonry cutwaters, not the cast-iron posts, is therefore somewhat unreliable.

Historic Relationship of Darley House to the Bridge

3.21 It is important to understand the relationship between the house and the mills. The bridge provided the physical connection between the two and a designed route, made arguably of higher status because of this association. Illustrations and photographs show this relationship clearly, with the 1818 church perched behind the house on the high ground. Images are all taken from the mills looking across the weir. The presence of cast-iron railings and likely a decorative pattern to these suggests some effort went into the design of the bridge, even though it was a mainly timber structure, probably influenced by its location as the main route to the mills by the Evans family from Darley House.

Fig. 7 View of Darley House, the Church and the Canteen (courtesy Adrian Farmer), ca. 1920s. The view shows the weir with its sluice gates lowered and the rack-and-pinion mechanisms and narrow boardwalks in-situ. In the background, the bridge has flat soffits, with broad flat spandrels over the posts, narrow railings, without concrete pillars, and appears to be a concrete precursor to the concrete and rebar bridge of 1934. The cast-iron end-caps can also be clearly seen.

3.22 In 1844, Darley House became home to two of Samuel Evans sisters and by the beginning of the 20th century it was leased to a banker, Colonel James Cavendish. After the First World War it was used as a school and in 1934 it was demolished, the site and extensive grounds now being occupied by houses. These houses line Weirfield Road and extend north to South Avenue and Waterside Close.

Fig. 8 Autumnal view of the weir and bridge in the background dated 1932 from the left bank looking towards Darley House in its small parkland setting. Railings continue along Old Lane on the left side of the photograph and appear to be wrought-iron by this date (image courtesy of Adrian Farmer).

The Weir

3.23 In February 1795 there was a major flood which flooded large areas of the River Derwent, particularly at Belper Bridge. The repair of the Weirs at Darley was recorded in the ledgers during the summers of 1797 and 1798, at the same time that Belper Bridge and the Horseshoe Weir were being rebuilt in Belper.

3.24 The weir has a close relationship with the bridge and is part built into the bed of the river. The relationship is not fully understood but given the proximity on the left bank they cannot be considered totally independent structures. The list description for the weir has been reproduced in full. This is followed by comments on some possible errors in the description, including comments related to the bridge, and a discussion of the weir evolution, based on map regression and evidence.

Summary

Weir structure spanning the River Derwent, constructed in c1782 for Boars Heads Mills at Darley Abbey, incorporating a fish weir.

Reasons for Designation

Darley Abbey Weir, constructed c1782, is listed at Grade II for the following principal reasons:

** Architectural interest: as a key component in the water management of the Grade I listed Darley Abbey Mills complex, comparable to other listed weirs in its date, size, construction and concave form;*
** Intactness: as an essential component of the water management system that controlled the Grade I listed mills at Darley Abbey and the contribution it played in the production processes performed at the mills;*
** Historic interest: for its association with the developments in processes pioneered by Richard Arkwright and his partners at Cromford and around the Derwent Valley at the peak of the Industrial Revolution and for its contribution to the international heritage significance of the Derwent Valley Mills World Heritage Site;*
** Group value: for the strong group value it holds with the Darley Abbey Mills South Complex (Grade I), Darley Abbey Mills North Complex (listed at Grade II & II*), associated mill workers' housing to the west (Grade II), and the Derwent Valley World Heritage Site.*

History

The industrial roots of Darley Abbey date back to the monastic period, when it was an industrial hamlet, with fulling mills, corn mills, and a forge. By the early 1770s, Darley Abbey held five water-powered mills, including a paper mill, a corn mill, two flint mills (for porcelain production) and a leather mill, all on the west bank of the River Derwent.

The Evans family were established industrialists and bankers, and Alderman Evans held industrial interests in Darley Abbey since at least 1746 when he acquired a fulling mill and dye house. It was not until the 1770s that his son-in-law Thomas Evans and his brother the Reverend Edmund Evans began the purchase of land holding at Darley Abbey, developing the Evans industrial estate. Thomas Evans was an associate of Richard Arkwright, who had successfully developed a machine for spinning cotton in the 1760s, and had built a large industrial milling complex north of Darley Abbey in the Derwent Valley at Cromford in the 1770s. The Evans family was also related by marriage to the Strutt family who had textile mills nearby in Belper, Milford and Derby.

The land east of the River Derwent at Darley Abbey was acquired by Thomas Evans in 1778, and Richard Arkwright persuaded Evans to build and operate a cotton mill using Arkwright's patented machinery. Evans developed the Darley Abbey site as 'Boar's Head Mills' between 1782 and 1830, the name is derived from the Evans family crest. By 1789, the Derwent Valley had the largest concentration of mills working on the Arkwright principle in Britain.

The weir was constructed in c1782, as well as a masonry bridge linking the village on the west bank with the new mills on the east bank of the river. The masonry bridge was replaced in the mid C19 by a bridge built on cast-iron columns, and this superstructure was replaced by concrete in the 1930s. The weir was constructed diagonally across the river Derwent to regulate the flow of water to the Boars Head Mills, and control the direction of its flow downstream. In order to obtain the adequate volume of water, the river was dredged from Allestree Ford, providing the Evans with a high quality sediment by-product to sell as a building material and to Derby Corporation for sanding tram lines in bad weather.

Two sluice gates helped provide a consistent flow of water, being opened and closed according to the abundance or scarcity of the water supply. Photos reproduced in Don Peters' Darley Abbey (1974) show two C19 metal gates on a winding mechanism, and these have since been replaced. From the pool created by the weir, water was channelled through the wheelhouse, turning the waterwheel and thereby driving the machinery.

The water-powered cotton mills at Darley Abbey specialised in the production of quality thread for sewing, embroidery and haberdashery. The Evans' involvement in the cotton mills ceased with the

death of Walter Evans II in 1903, and textile production at the mill complex concluded in 1970. Darley Abbey Mills South Complex was first listed in 1967, amended in 2002 (Grade I), and includes the Long Mill, the Middle Mill, the East Mill, the West Mill, the Engine House and Chimney, the Tollhouse, the Bobbin Shop and the Drying Shed. Darley Abbey Mills North Complex includes the North Mill, Engine House and Boiler House (Grade II), fire station (Grade II), and Preparation Building (Grade II).*

This mill complex is part of the Derwent Valley Mills World Heritage Site, a 15 mile stretch of industrial settlements from Matlock Bath in the north to Derby in the south. The four principal industrial settlements of Cromford, Belper, Milford and Darley Abbey are articulated by the River Derwent, the waters of which provided the power to drive the cotton mills. The Derwent Valley is recognised as being the cradle of the industrial revolution, where new types of buildings were erected to house the new technology for spinning cotton developed by Richard Arkwright in the late C18.

The north weir, footbridge, fish weir and south weir are identified on the 1882 and 1900 Ordnance Survey maps. In 2014 a modern fish weir was constructed east to west across the natural island which lies between the northern and southern sections of the weir. An archaeological watching brief identified timber posts set into the river bed with layers of brushwood and stone. The dating of the timbers suggests a substantial man-made structure was constructed in the River Derwent in the late C15. A footbridge following the line of the weir south of the island is a C21 replacement, as is a timber post and rail fence which sits above the weir.

Details

A weir, constructed in c1782, situated in the River Derwent, to the immediate west of the former Boars Head Mills, listed at Grade I.

MATERIALS: coursed square gritstone blocks.

EXTERIOR: the weir, constructed in c1782, is situated in the River Derwent, to the immediate west of the former Boars Head Mills, listed at Grade I. The weir complex measures approximately 110m in length, and comprises a two-part weir structure constructed of coursed square gritstone blocks.

To the north is a concave sharp-crested weir curving upstream measuring approximately 20m in length, and a stepped spillway to the south measuring approximately 40m in length. To the south of the spillway is a coursed gritstone block wall running perpendicular to the spillway, containing two floodgates. The floodgates are joined to a natural island to the south (which is excluded from this assessment). The height of the weir is approximately 1.8m, and the floodgates have a depth of 1.2m.

To the south of the island is a sharp-crested weir and fish weir measuring approximately 25m in length. Above the weir is a C21 footbridge on metal supports. The north and south weirs are linked by a stone wall revetment running around the northern and western edges of the island topped by a C21 post and rail timber fence. On the north western edge of the island the modern fish weir* cuts through the wall but the stone was retained, and on completion of the weir the stone work was reconstructed to match the original form.*

The C21 footbridge following the line of the weir south of the island and the timber post and rail fence* which sits above the revetment wall around the island are not considered to be of historic or architectural interest.*

The weirs form part of a larger water management system associated with the late C18 Boars Head Mills at Darley Abbey, which also includes mill races from the River Derwent to the mill complex, sluice gates and tail races from the mill complex to the river. Only the weirs have been assessed for designation.

**Pursuant to s.1 (5A) of the Planning (Listed Buildings and Conservation Areas) Act 1990 ('the Act') it is declared that the C21 fish pass and footbridge, the metal supports of the footbridge and the post and rail fence on the island revetment wall are not of special architectural or historic interest.*

3.25 The list description refers to the original bridge being a masonry bridge (see section underscored above), but this is not documented anywhere, as far as we can find, the earliest reference being a timber bridge.

3.26 'Repairs of Weirs' are recorded in the ledgers (D5231/1/1 – microfilm), dated over the summer months during June to September 1797 and July to September 1798. This refers to pile shoes, and Oak pile shoes, as well as stone from Watsons and Swinertons.

3.27 The list description does not describe the flat squared stone 'baulks', which survive and were built into the upper face of the weir crest to both straight drop sections of the weir, and built into or added to the shallower section of weir. These stone baulks are referred to in the 2013 report as 'keystones' which implies that they are integral to the structure, but they are not found within the aprons of other weirs along the river, and they were intended solely to support the cast-iron stanchions, rack-and-pinion mechanism, and vertical sluice gates.

Weir Evolution and Water Management - Discussion

3.28 The usual arrangement with mills along the Derwent was for the engineering advances in the construction of waterwheels, their strength, size and consequential increase in power output, to drive the need to raise the head of water. Key dates and developments drive this evolution of water management within the sites. At Belper, for example, the creation of the Horseshoe weir was a later development of 1797. It was accompanied by increasing the amount of water that could be impounded by widening the river and encroaching onto the riverbanks, in that case both the left and right bank. That occurred in conjunction with creating a new series of sluice gates close to the top of the weir on the left bank. At Darley Abbey, there is some evidence that the present weir was built in several stages. Raising the weir would have impounded more water and enlarging it would have encroached onto the land and left (eastern) riverbank. Map regression and comparison with other cotton mill sites along the Derwent[18] suggests that the left bank above the weir, and alongside it, may have been modified in stages.

3.29 The weirs that are evident today are split into five sections now running from the left bank to the right bank:

1. a curved section of weir closest to the mills which is highly engineered, with large blocks, and integral stone baulks, close in character to a straight drop weir. This was either a second phase or a partial rebuilding of the central section of weir; the reasons are unknown – it may have been associated with increasing the area of impounded water as part of the development of a cut or the later paired sluices to the immediate north of the

[18] Belper Weirs Heritage Impact Assessment - Fish Passage on the RIVER DERWENT for The Wild Trout Trust (Mel Morris Conservation, 11.10.2021), Milford Weirs Heritage Impact Assessment - Fish Passage on the RIVER DERWENT for The Wild Trout Trust, (Mel Morris Conservation 16.10.2020, and Masson Weir Heritage Impact Assessment Fish Passage on the RIVER DERWENT for The Wild Trout Trust (Mel Morris Conservation 15.03.2024 v.3)

bridge, or alternatively it was built to reduce scour on the left bank adjacent to the mills and may have been carried out when the programme of new mills were built from ca. 1821 on this side of the river.

2. the traditional shallow glaçis section of weir, which runs from the western (fish pass) island towards the middle of the river and meets the curved section at an abutment,
3. a flood gate which was assessed as part of the Fish Pass archaeological assessment located between the shallow glaçis and the fish pass weir, which contains the flood gates and spillway.
4. the fish pass – weir of 2013.
5. a smaller straight-drop south weir between the island and the right bank head race, which retains its castings for the sluice gates (minus the metal gates and all rack-and-pinion gearing). There are similar rack-and-pinion castings and flood gates serving the right bank at Milford Foundry Weir, which are dated 1858 in their castings.

3.30 Separating the two main sections of weir, there is a large stone wall with a retaining wall running with the flow of the water. This has been lowered, probably as a result of flood damage, and once had a sloping upper face (possibly concrete). The masonry blocks and weir crest that form the construction of this weir are not as uniform as elsewhere. Map evidence suggests that this weir was not present in 1767 and that the weir was a rock weir, as shown on the Burdett map (similar to the Milford Hopping Mill Weir – figure 12).

Fig.9 View of the weir from the bridge, with a view of the weir crest and apron of stone setts and the squared stone plinths or 'stone baulks' (arrowed) which supported the cast-iron stanchions of the sluice gates (photo – 14.7.2025).

3.31 The stone baulks are contemporary with the straight drop weir construction and built into it (see figure 9); each contained a narrow cast-iron stanchion or fin with integral pairs of ridges in which were slotted the sluice gates, and a rack-and-pinion mechanism; the metal sluice gates are missing and were largely removed in 1972 (DVMWHS interpretation panel) but they contain narrow slots and were probably always metal plates rather than timber gates. These sluices are continuous between the 110-metre concave weir and the southern, smaller, sharp-crested weir, where the fins / base of the rack-and-pinion castings remain in-situ on the stone baulks. They are depicted in the 1844 sketch illustration, so we know that they date from before that date. Photographs from the early 20th century show the sluices fully closed, partially open and fully raised. It is likely that in times of flood they were fully opened and raised to their full height, in conjunction with the flood gates mentioned in the list description. The purpose of these continuous sluices was primarily to impound the water, not to act as flood gates. The presence of the stone baulks and the castings which are integral to the straight-drop sections of weir, indicates that the weir has probably been altered both in order to create both a slightly broader weir crest, and to enable the raising of water levels to create a taller dam. The reason for raising levels was to increase power output and reliability, to increase the draw off rate into the mill goit(s) and also to increase the 'head' for power generation, especially in summer or during periods of low flow. The arrangement with the castings and the rack-and-pinion mechanism in our experience is mainly a 19th century phenomenon and was adopted at several sites along the Derwent for flood gates; at both of the Milford Weirs, the use of (and development of) cast-iron fixed to the weir crest as a permanent fixture enabled the crest of the weirs to be raised. Both weirs have raised cast-iron crests which has only recently come to light[19]. The cast-iron used at Foundry Weir is dated to ca.1801-1805, based on the date of the Strutt drawings of the reconfiguration of the weir and close examination. Whilst the use of rack-and-pinion castings is mentioned in the 1796 ledgers, its use as part of the creation of the weirs ca. 1782 seems unlikely as technological advances in the use of cast-iron developed slightly later and we have deduced that this is most likely to be a later adaptation, to provide a greater head of water when more power was needed to serve more cotton mills and larger wheels.

3.32 The middle section of weir, which the list description refers to as a spillway, incorporates a shallow glaçis. It is not technically a spillway at this point, as it is not part of the flood control.

3.33 In practice what appears to have happened at Darley Abbey is that the weirs were not built as one complete structure in 1782, as the list description states, but rather adapted, in order to raise the water levels, at which time at least one of the straight-drop weirs may have been added along with the castings and additional sluices. Rather than being a lesser structure, because it is multi-phased, it is of greater historic interest as it exemplifies the way that water management was altered during the course of the technological developments of manufacturing in the cotton industry. It was only with the innovations of the improvements to water wheels to increase their diameter and the post 1810 creation of iron suspension wheels that this was made possible. For an explanation see 'The Development of the Iron Suspension Wheel' ca. 1810 see page 6 of Belper Weirs Heritage Impact Assessment - Fish Passage on the RIVER DERWENT for

[19] see Upper Duckbill Weir and Foundry weir - ref. Milford Weirs Heritage Impact Assessment - Fish Passage on the RIVER DERWENT for The Wild Trout Trust, Mel Morris Conservation 16.10.2020

The Wild Trout Trust (Mel Morris Conservation, 11.10.2021) and Rees Cyclopaedia of 1819, showing in 'Fig. 3' the breastshot waterwheel at Belper.

3.34 Sluice gates were added upstream of and close to the bridge in conjunction with the creation of a secondary channel / leat on the west side of the Long Mill and appear in a number of contemporary photographs where they can be seen close to the Watch House (see figure 10). The flow of water through these sluices can be seen on the 1835 Sanderson map, although they are not shown on the 1811 Liberty Map. These are tall timber structures which were raised to allow the water to flow through paired channels and were separated by a gate.

Fig. 10 View of the left bank upstream of the bridge ca. 1930, The water level is high, where it is impounded by the sluices of the weir and this shows the clear relationship between this level and the paired sluices which are visible in this image as two large timber 'walls' adjacent to the watch house, which are in their raised 'operational' position. High railings set between the watch house and the sluices can be seen. The left bank is vegetated, with some signs of a part-timber revetment by this date. We can date the view by the presence of two cars. This glimpse of the bridge suggests an almost completely flat bridge deck and shallow arches springing from the cast-iron 'end caps', one of which is visible, and a slim deck oversailing them and carrying the railings. (Photograph courtesy of Adrian Farmer).

3.35 The paired channels are illustrated on OS maps and may relate to the presence of the two separate wheelpits, either one for the principal waterwheel and the second for a flood wheel, or one for West Mill. An RAF aerial photograph shows the remains of the feeder (the West Mill headrace – ca. 1818-1821) very clearly as a wide channel.

3.36 The arrangement of these tall vertical sluice gates is very similar to the arrangement at Belper, where sluices, known as shuttles, were added close to the Horseshoe Weir circa 1797. The

current Belper sluices are later additions although the original masonry for the gates is in-situ. The Darley Abbey gates no longer survive and much of the area around the paired sluices has been altered, apparently by infilling.

3.37 The stability of this area is unknown. The addition of the horseshoe weir at Belper increased the head of water and meant that sluices close to the weir became much more efficient; prior to that the water was supplied by a long leat (as at Darley); water wheels were therefore increased in size from 12 to 18 foot and eventually after 1810 the development of the iron suspension wheel would have enabled a greater head of water and more power. The larger and more efficient waterwheels were able to power more spindles in the Mill, i.e. the increased power allowed the Mills to expand without having to relocate. At Belper, this was all carried out in conjunction with the development of West Mill. At Darley Abbey, it seems highly probable that the raising of the weir crest and the development of the paired sluices next to the Watch House were contemporary. This would be either contemporary with the development of the West Mill at Darley Abbey circa 1821 (midway between the 1811 Liberty map and the 1835 Sanderson map) or contemporary with the development of a secondary leat which fed an earlier wheelhouse, dating from before 1811. Were the 'Weirs Repairs', recorded in the ledgers dated July 1798 with entries for 'Watson for stone' supplies in 1797, an alteration of the weirs as well as local repair? The itemised materials includes extensive use of oak pile shoes. The stone originally came from 'Watsons' in 1797 and then in 1798 from Swinertons.

3.38 The northern oxbow bend in the river which lies upstream of the second recorded 'cut' of c.1798 is similar to the early weir arrangement at both the Hopping Mill Weir at Milford (15th century origin) and the first mill at Belper served by the Burton Weir, both of which form long cuts.

3.39 Downstream of the weir, silting up of the river and changes to water flow and flooding events have led to the creation of a debris island with trees which is relatively recent. An aerial photograph (fig. 2 – HE 2006) shows the river without this island. There have been further changes as the impounded water from the weir which served the mills on the right bank was stopped up by 1948. The head of the mill leat is still visible.

3.40 The water courses at Boar's Head Mills are mainly truncated (see figure 24). The loss of this evidence of the water management in and around the site has diluted the significance of the site to a certain extent.

4. Map Regression

4.1 There is an extract on historic mapping in "Darley Abbey, Derby Historical and Architectural Notes on surviving Evans buildings, 23 November 2001"[20] (HER ref. 3976). Some of these maps cannot be located. For example, copies of the Darley Hall estate map, 1757, and of the 1824 estate map (as amended in 1834) were held by Derby City Council but cannot be found.

4.2 Some maps are reproduced in 'Robinson, David, Darley Abbey: Notes on the Lost Buildings of an Augustinian Monastery in Derbyshire, English Heritage, 2001' (HER ref. 2416), including the 1708 William Woolley Esq estate map.

4.3 The 1846 Chapelry District Map – there is a copy which is referred to in the Fellowship Room of the Church of St Matthew, Darley Abbey, and there is a separate copy now in the Derbyshire Record Office.

4.4 Burdett's Map of Derbyshire, surveyed 1762-67, second edition published 1791, is now available online in hand-tinted colour on the National Library of Scotland website. An original version of 1767 can be seen in Derby Local Studies Library.

4.5 The World Heritage Site inscription document refers to a survey dated 1792 by Benjamin Outram. That plan cannot be found in any archives. It is not the plan at Derbyshire Record Office entitled "Plan of intended Derby canals and railways by Benjamin Outram scale 2 inches: 1 mile 84 × 64 cm" – ref. D4734/19/3. This is the same as an original plan of 1792 by Benjamin Outram in the Derby Local Studies Library, which is reproduced in this report.

4.6 A map of 1852 map is referred to in The Citizen, Historic Darley Abbey in Derbyshire: A Small Booklet to Commemorate the 1989 Darley Abbey Pageant and Festival, Derby, 1989. This is the same as the map in the frontispiece of Don Peter's 1974 publication. The whereabouts of the original is unknown but was formerly in Derby City Library.

4.7 The earliest map to show the cotton mills in any detail is the Liberty Map of 1811. This and the later copy of the map dated 1846 are both held by Derbyshire County Council in the Record Office and reproduced in this report.

Maps in Chronological Order

4.8 Map regression is based on overlaying the watercourses depicted on the 1882 Ordnance Survey map at a scale of 1:2500, as that is the most reliable map drawn to scale and this has then been laid over the earlier maps. Constants have been retained, such as the location of Folly House, the alignment of the long tail race on the west bank, the location of the Paper Mill, and the location of Long Mill.

4.9 The early **1708 William Woolley map** reveals that the main course of the river was wide at that date and that the secondary water course running to the west was the tail race for the corn

[20] Dennis Rodwell Conservation Officer/Urban Designer, Derby City Council 23 November 2001

mill, described on the map as 'Milne fleam'. The head race, where water was channelled via a leat to serve the west bank mills is only depicted vaguely as there is a concentration of buildings described as 'Mr Hodgkinson House and Milnes' on the edge of the map.

4.10 The earliest County map of Derbyshire to show the primary watercourses and road layouts is **Burdett's map of 1767**. The map appears to show a land promontory extending into the river from the village of 'Darley' and a building on that promontory. The map illustrates a leat running along the west side of the river, creating a large island, then forming a long tailrace which discharges much further downstream.

4.11 The bend in the river towards Folly House does not appear to be too dissimilar to the present route and likewise the oxbow in the river above the Boars Head Mill site is similar but appears straighter in the Burdett map, with a less pronounced oxbow than most later maps. The mill leat to the west of the main channel has since been closed off in a culvert (see plate 46 – Appendix 3). The land promontory is attached to the land and is not separated by an open water course. The 1767 Burdett map of Derbyshire illustrates a cluster of natural islands or large boulders just south of the location of the bridge, prior to the construction of Darley Abbey Mills. There is insufficient detail to determine what these represent but map regression suggests that they are probably shallows, a natural rock weir using the exposed bedrock, as found for example at Hopping Mill Weir, Milford and the early, pre-Arkwright weir at Masson.

4.12 The water channels found on the map which serve the mills on the west bank are shown below the 'rock weir', so in practice it is likely that there was a short head race which may have been culverted through the land mass illustrated at this point and opened fully later.

Fig.11 1767 PP Burdett map of Derbyshire (National Library of Scotland), as revised in 1791. The earlier map (1767 – copy in Derby Local Studies Library) does not show Darley Hall - Holden Esq. which is marked on the later map. Many of the names of landowners which appear on the later map are not illustrated on the 1767 map, such as Markeaton Hall.

Figs.12 & 13 Plan of the Milford Hopping Mill weir with its natural bedrock and shallows prior to the Strutt alterations (above) and right- Thomas Smith's dramatic depiction of the Milford weir in 1754 (DMAG).

4.13 There is no evidence that the map, which was updated in 1791, was altered at this point and no sign of the mills on the east bank, although they existed by the 1780s. Although schematic, there are a number of clear mapping notations. There is no sign of the present weir.

Instead, there are three large roundish obstructions in the bed of the river; these are likely to be shallows created by exposed bedrock, a naturally occurring form of weir, similar to that at Milford Hopping Mill Weir.

4.14 The Benjamin Outram map of the canal network around Derby[21] illustrates the river in a similar way to Burdett, with a slight oxbow above the mill site but not the more curved oxbow alignment found later. Although schematic, the Long Mill, running roughly north-south is illustrated and one other building to the north-west, which cannot be firmly related to any buildings illustrated in 1811. The alignment of the 'cut' shown on the Outram map is taken very close to the alignment illustrated in 1811, and there is little difference except for the obvious difference in the course of the river upstream of the cut. It is plausible that the 'cut' illustrated in 1792 is slightly further upstream. It appears much more northerly in the 1792 survey than suggested by Menuge. The depiction of this map on page 85 of the WHS Inscription document is not based on the original 1792 map which survives in Derbyshire Record Office / Local Studies Library and the source is unknown so we cannot rely on the map for this report.

Fig.14 A Plan of the Intended Derby Canals and Railways with a Sketch of the adjacent Canals, Rivers and Roads showing their relative situations & connexions by B. Outram, 1792 – ACC. 46409, 46410 (Derby Local Studies and Family History Library). This is the first known map to depict the mills. There is a building set on an angle to the north-west of the mill, which does not appear on later maps.

[21] A Plan of the Intended Derby Canals and Railways with a Sketch of the adjacent Canals, Rivers and Roads showing their relative situations & connexions by B. Outram, 1792 – ACC. 46409, 46410 (Derby City – Local Studies Library)

Figs.15 & 16 Comparison of the 1792 Outram plan and the Liberty plan of 1811. When orientated north (as above), the line of the leat on the Outram plan appears to be northerly and not located following the alignment of the curved building.
Right - the dotted line overlaid on the Liberty map is suggested as a possible original alignment of the leat, as it corresponds with a north-south boundary marked on the 1811 plan and is the natural place for a long head race, as found at other early sites along the valley, such as Belper (Burton Weir) and Milford (Hopping Mill Weir and the original Foundry Weir).

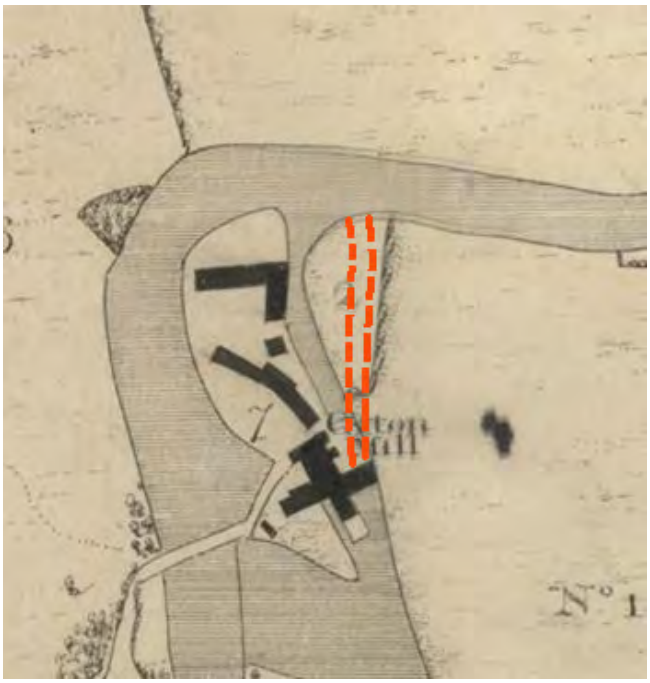

Fig.17 1811 Derby Liberty Map (DRO – D769/B/11/3)
The 1798 'new cut' is illustrated on this map, which appears to be a highly accurate survey, based on an overlay of the first edition OS map. Could the earlier 'cut' have followed the boundary alignment shown close to plot number 2? This appears closer to that illustrated in 1792.

Fig.18 1835 Sanderson map – extract (DRO – D6572/1). The water is clearly marked and illustrated with contour lines flowing through sluices on the left bank above the bridge and the bank above the bridge is clearly built-out where it adjoins the sluices. The weir is not illustrated with its distinct curved shape for the northern straight-drop section.

4.15 On the Liberty map, the bridge does seem to span the weir, which suggests that the curved portion of the weir was a later modification. A map overlay of the Sanderson map of 1835 with that of the 1882 map suggests that the river appears to be wider in 1882 between the later

cut and the cut illustrated in 1835; the river is also wider downstream of the weir in 1882 than in 1835.

Fig.19 1846 copy of the Derby Liberty Map (DRO – D769/B/11/4)

4.16 A comparison of the Liberty map of 1811 with the later 1882 OS maps reveals a high degree of accuracy for the Liberty map. Anomalies or differences, therefore, deserve close examination and explanation. The differences are as follows:

- the river appears to be much wider in 1882 between the later cut and the cut illustrated in 1811. Banks have been widened, including the left bank where it passes through the northern part of the site.
- The bridge appears to continue on the 1811 map as a revetted structure forming the left bank, and the left bank upstream of the bridge does not illustrate separate sluices. Whilst there is a channel shown as an outflow to the west of Long Mill, it cannot be assumed that this is related to a western cut (for example, at the West Mill site in Belper water was simply diverted around both sides of the building from the original cut). Therefore, it is not clear that the paired sluices were here in 1811, asserted by Menuge.
- The northern leat has been displaced by the eastern leat, which was constructed by 1846 (ref. Chapelry District map).
- The left and right banks of the river, where the bridge meets them, appears to be narrower in 1882, which suggests that they have been remodelled and have encroached into the bed of the river. The presence of a more generous curved abutment to the left bank above the bridge can be seen on the 1835 Sanderson map and also appears on the 1846 Chapelry map (see area marked in orange on the 1882 map below). Does this mean that the paired sluices on the west side of the Long Mill were added between 1811 and 1835?
- The alignment of the weir by 1882 has a distinct curve where it meets the left bank but is straight in 1811. Is this remodelling associated with an encroachment of the mill site into the bed of the river at this point, as they searched for more space to accommodate more structures / and / or changed water management?

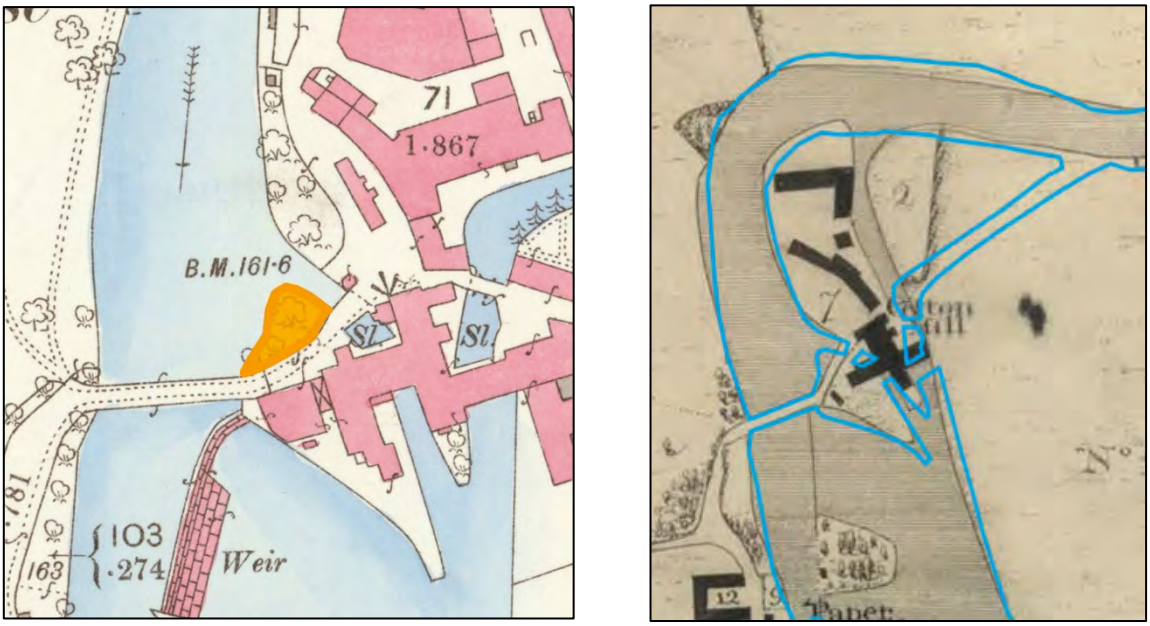

Fig.20 Comparison of the 1882 OS map (left) with the Liberty map of 1811 (right). The area in orange marked on the 1882 map appears to be built out in order to create the paired sluices to feed the west side of the Long Mill / Middle Mill after 1811.

Fig. 21 (and detail - right) The Liberty map is extremely accurate, and the fact that this area of land is missing from the map tends to suggest that the impounded area was slightly wider prior to the construction of the sluices.

Fig.22 By overlaying the Liberty map with the 1882 OS map, we can see that the 1811 map has a high degree of accuracy.

Fig.23 1846 - Chapelry District Map of Darley Abbey - Edward Smith 5th October 1846 (Derbyshire Record Office D769/P23). The upstream left bank of the bridge extends into the site and the river is slightly wider at this point.

Fig.24 1882 OS map @ 1:2500 scale (National Library of Scotland)

Fig.25 Aerial Photograph of 2022 (Bluesky) with an overlay of the 1882 watercourses and in turquoise the 1811 watercourse from the Liberty map. All of the leats have been removed from the site.

Interpretation of Left Bank

4.17 There is currently no clear understanding of the phasing of the water management features along the west bank, upstream of the present bridge. There is clear evidence by 1835 of the paired sluices and a short leat serving the west side of the Long Mill or the West Mill of 1821; this is located above the dam and is recorded both in photos dating from the late 19th century and from detailed OS mapping. The sluice gates have been removed but the revetment walls for the paired sluices are likely to survive buried. The equivalent sluices at Belper were '20-feet' wide and retain the original arched masonry construction. Before 1835, the evidence is more elusive and there is a strong possibility that a larger penned area of water, which appears to be represented in 1811 and which may also date from the 1780s, was sacrificed in order to raise the overall level of the dam and create these sluices. Local engineering works would have reinforced and built out the riverbank at this point. If this is the case, we would expect to find a buried revetment wall located close to the line of Old Lane, where it passes between the Watch House and the present bridge. This area has been adopted over recent years by the restaurant with a compound for commercial waste and incremental alterations to the bank for a seating area, high fencing and gates.

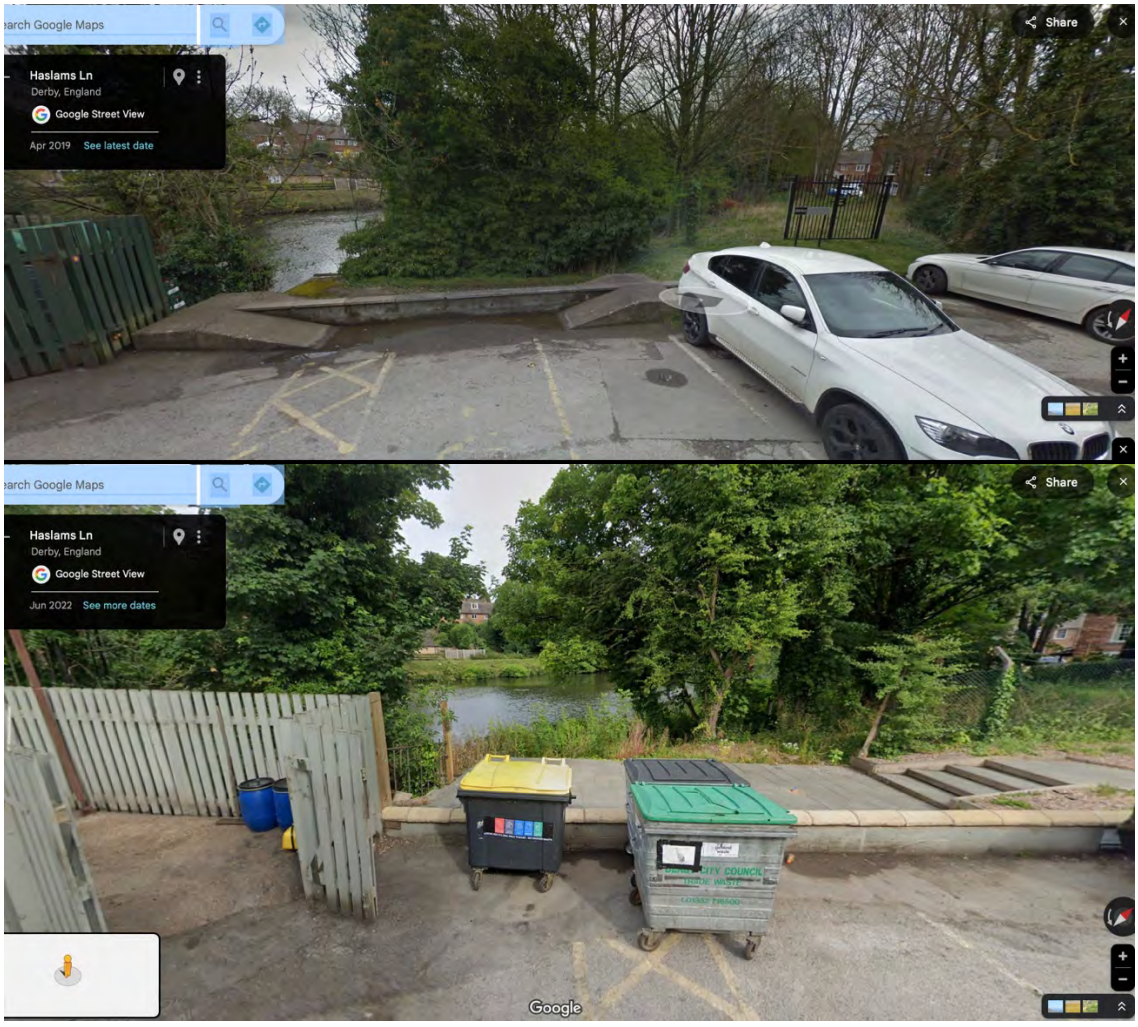

Fig.26 Google Streetview images from 2019 and 2022 show incremental changes to the left bank.

5. Darley Abbey Bridge - Description

5.1 The superstructure of the bridge is a reinforced concrete rebar construction comprising a series of transverse reinforced concrete beams with longitudinal reinforced concrete sections to the outer edges, a tarmac surface to the deck, with concrete kerbs separating the central roadway and pavements to either side. The parapet of the bridge is comprised of a series of concrete posts forming regular stanchions approximately 1.2 metres high, into which are fixed panels of steel railings, the base of which are also then fixed into a concrete upstand. This bridge was drawn in 1970 at which time there were also a number of services recorded slung underneath the bridge or attached to one side or another; these included two gas pipes, a mains sewer pipe (downstream), a spring water pipe, and an electrical cable.

Fig.27 View of Darley Abbey bridge from the weir (8.8.2025)

Fig.28 View of downstream face with corroded rebar and spalled concrete, sewer pipe to the side and gas pipe to the soffit (8.8.25)

5.2 There are five piers to the bridge. Pier 1 closest to the mills is solid masonry, supporting two short cast-iron piers with a stepped toe foundation. Piers 2 to 5 are pairs of cast-iron columns, approximately 312mm bedded into the riverbed, probably screw driven to unknown depth in the riverbed stratum. The piers support cast-iron transverse I beams which act as a diaphragm and support the bridge deck.

5.3 The underwater survey in 2013 established that the abutments and pier 1 are founded on masonry stepped foundations. The report also stated that a redundant, free-standing pier, part brick and part stone, is located between Pier 5 and the right abutment, with similar characteristics to Pier 1. The report stated that masonry to the bridge abutments is of limestone construction[22].

5.4 Photographs in the report illustrate the date 1853[23] on the end plate of the I-section beam, to both the upstream and downstream sides suggesting that the I-beams are probably coeval with the cast-iron posts, although the 2013 report stated that these are attached and, therefore, may be later additions. However, the castings are bolted together with the same shape flange, and each capping or end piece is 'dowelled' into the junction of the beams and post, so we found no evidence to suggest that the 1853 date is later than the beams or posts. The bell-shape of the dated castings and angled upper profile also reflects the profile for a brick, jack-arched construction.

[22] They are of solid gritstone, as found on all masonry bridges and abutments along the River Derwent.
[23] The 1853 casting date represents a mid-century period of development along the river, as many of the cast-iron sluices and flood gates found at Milford are dated to 1857/ 1858.

5.5 The 2013 report suggests that the masonry piers and abutments may indicate that the earlier bridge was also masonry and arched. We found no evidence of this.

5.6 The divers' assessment also identified the remains of timber structures protruding from the riverbed, including square section timber piles, and suggested that these might be the remains of an earlier bridge[24]. The survey suggests that foundations for pier 1 may be built around two of these earlier timber supports. The dive survey recorded no masonry on the right bank above or below the bridge abutment, and masonry on the left bank in the form of a section of wing wall. Otherwise, there are no masonry or revetments recorded.

5.7 The 2013 archaeological assessment recorded that there were iron straps to Pier 1 across the stone joints, which it suggested were repairs. This is more likely to be standard practice iron cramps which are also visible on the entire gritstone blockwork of the weir at Masson. The report also suggested that the presence of a stone pier (Pier 1) also may indicate the remnants of the earlier bridge.

5.8 Notably, the report stated that the bank running along the east side of the river was mainly clays and vegetated with no signs of masonry. This must be a later alteration as the mid 20th century and other photos show it to be engineered with a revetment and in order to create the flow and draw the water and manage scour, the banks must have been engineered with gritstone where they form the short feeder / cut. The left bank is now more-or-less straight. An RAF image of 1948 shows the arrangement very clearly. It reveals that the tollhouse sits on the very edge of the cut.

Date flown: 16 April 1948
Sortie: RAF/CPE/B/UK/17
Photographer: RAF
Aerial Photo - raf_cpe_b_uk_17_v_5461
and
Aerial Photo - raf_cpe_b_uk_17_v_5460

Missing Evidence

5.9 The 2013 description of the bridge refers to a brick pier close to the right bank – 'part brick and part stone, located between Pier 5 and the right abutment, with similar characteristics to pier 1'. This no longer survives and has disappeared since recent floods. The stone masonry base of this pier may also survive under the water level but was not obvious at our inspection. Most of the silt and debris forming the riverbed at this point has also been washed away since 2013, although it is noted that the 2013 description refers to 'a mixture of pitched stone and rock between pier 5 and the west abutment'. This was photographed by LP Archaeology in 2013 (see image below).

[24] Experience of investigating Belper Weir has identified the remains of piled coffer dams were installed upstream in order to provide access to repair and heighten the weir. Piles may also, therefore, represent interventions to change the water flow to repair the weir.

Fig.29 Brick pier photographed in 2013 by LP Archaeology, now missing.

5.10 The diagram in 2013 from the dive survey (sketch on page 13 of MLM Consulting Engineers Ltd. report) does not show the west abutment having any undercut and this scour may have occurred in part during or following the removal of the brick and stone pier. The 2013 photographs of this abutment shows just two large masonry block courses and a large amount of debris and silt against the base of the abutment wall. The loss of the freestanding brick pier and the removal of silt has exposed the bottom stone course of the abutment and below this the bank is undercut (see comparative photos below). Examination suggests that there is at least one timber pile underneath the stone structure of the right abutment.

Figs.30 & 31 Revetment wall to west abutment photographed in 2013 by LP Archaeology. Compare this with the same wall in 2025 (below).

Fig.32 Undercut to right abutment of 1.5 metres, with pile arrowed (8.8.2025).

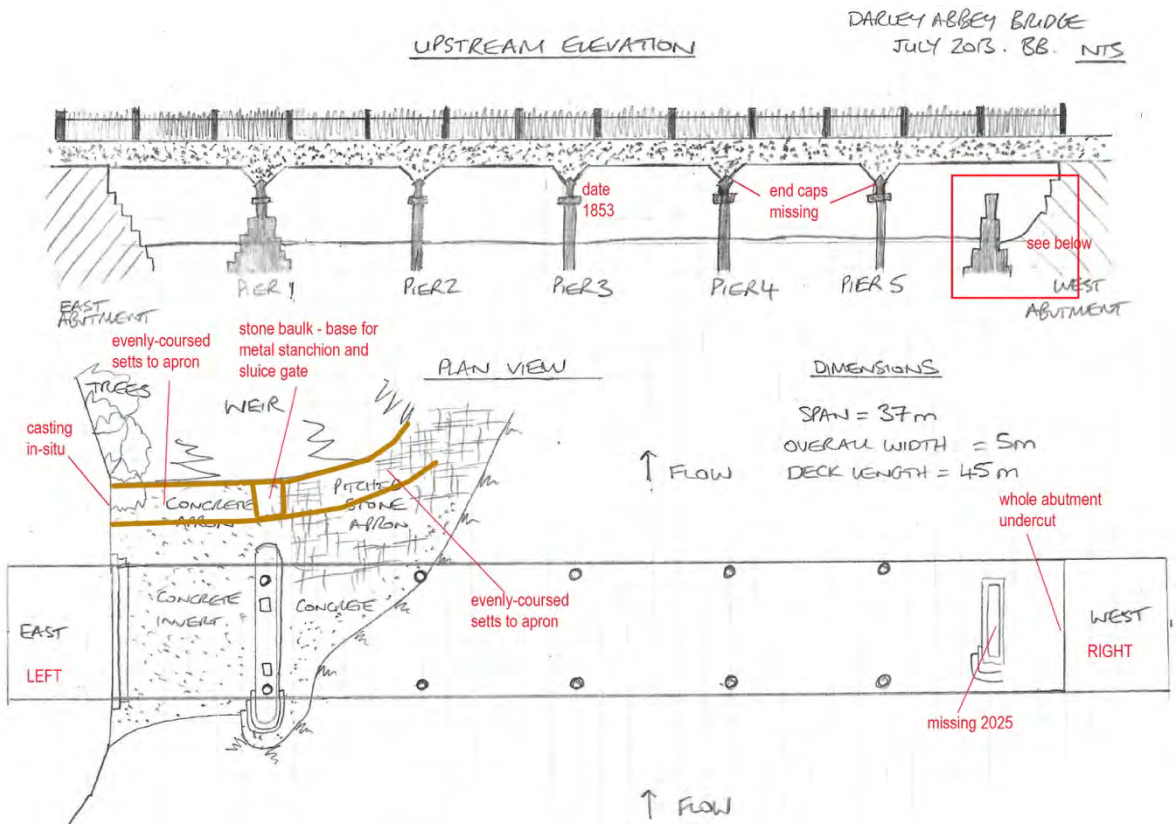

Fig.33 2013 Divers sketch annotated 2025.

5.11 The 2013 report also referred to the following, but it was not plotted onto a topographical survey:

> *'There are remains of what is likely to be an earlier timber structure protruding from the riverbed. There is a single timber section measuring 0.25 x 0.25m at bed level wasting to nothing 1m above which is located midway between upstream piles on piers 1 and 2. There is a single timber section measuring 0.5 x 0.5 x 3.5m partially cast into the concrete weir apron at downstream pile of pier 2 and inclined at a 45 degree angle towards the upstream pile of pier 3. There is a group of 4 timber sections measuring 0.25 x 20.25 x 1.0m tall protruding from the bed midway between the downstream piles of piers 2 and 3. There is a single timber section measuring 0.25 x 0.25 x 1.2m long inclined at a 45 degree angle towards the group of 4 piles from a position immediately downstream of pier 3. There are two vertical timber sections measuring 0.3m x 0.3m built into the masonry of pier 1, refer to photographs 9 and 10 in section 15. There may be additional items, but significant amounts of tree debris present on the riverbed made a full bed survey impossible.'*

5.12 This timber structure may be part of an earlier timber bridge or it may be part of a piled coffer dam used to facilitate the alteration or repair of the weir, as found at Belper Horseshoe Weir (see figure 33 below).

Fig.34 Remains of coffer dam with timbers embedded in the river bed above Belper Horseshoe Weir in 1976 (© Courtesy of Belper Historical Society – BHS02569)

The Existing Bridge

5.13 Apart from the detailed description of the materials used in the construction of the timber bridge recorded in the Evans ledgers between 1797 and 1800, there are no other descriptions of the construction of the bridge, including the later 1853 bridge. There are no ledgers, cash books or stock books from the period around the 1850s. All evidence about the 1853 bridge is therefore based on our examination of the surviving structure and limited historic photographs.

5.14 The bridge was examined at close quarters from an open boat on 8th August 2025, when the river was at a particularly low level. The height gauge was not visible as a result of the temporary bridge structure and access restrictions. However, the water level from the river bed under pier 1 was measured at 510mm (see figure). Following a prolonged hot spell and low water levels, increases in the concentration of algae and silts does not enhance the clarity of the water; visibility through the water was therefore still limited. Vegetation along the riverbanks was heavy and as a result it was not possible to examine the left bank above the bridge. This is where the greatest concentration of works associated with the water management of the mills site are likely to survive. Revetment walls could not be seen, although they are visible in early photos. A single area of revetment wall with some timbers which may be related to repairs could be seen (see image below).

Fig.35 Left bank upstream of the bridge 2025.

5.15 The bridge contains a series of five cast-iron transverse beams sitting on 10 x 312mm dia. cast-iron posts or hollow piles. These beams are not true I-beams and have unequal flanges and are clearly illustrated on drawing 615338/02 in the MLM 2013 report (see extract right). Each of

these beams contains four flat enlarged flanges at four intervals, the central ones have four fixing holes to the upper face and two holes to either side of the 'stiffener' and these no longer have a structural function (see section A-A -right); the two outer flanges now support concrete spandrels and integral hidden metal fixings bolted to the beams; the spandrels in turn support the later reinforced flat concrete bridge deck; the two inner flanges, which are part of the casting are redundant but contain the four holes for historic bolts; these would have originally supported cast-iron axial beams running longitudinally, meeting at each beam. In many cases these would be historically constructed in wrought iron. It is likely that the longitudinal beams were also paired to the centre two (inner) transverse beams, rather than single beams, providing added strength to the core. The beams are not true I-beams, as the upper face of the flange is narrow for the majority of the length, whilst the bottom flange or 'belly' has more depth and is about double the thickness, to resist tensile forces.

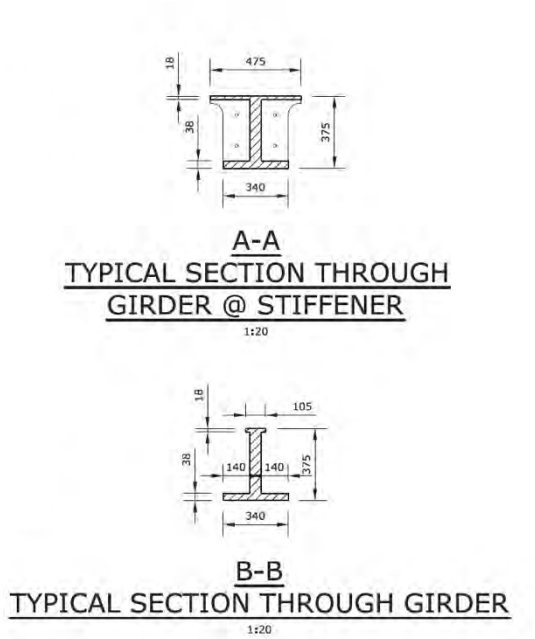

Fig.36 2013 MLM Consulting Engineers Ltd sectional drawings through the casting.

5.16 We have looked closely at the construction and the 1853 bridge appears to have been principally a cast-iron bridge, composed of a series of lateral (longitudinal) cast-iron beams which in turn supported the deck. The 'deck' probably partially oversailed the beams upstream and downstream and wrought iron railings were added to the outer edge which are visible in historic photos. The construction of the deck is unknown and may have been a series of timber rails or a combination of wrought/cast-iron, stone and timber. None of the lateral (longitudinal) beams (i.e. running across the river flow) survive.

Stone Abutments

5.17 The stone abutments are different, but all built from Derbyshire gritstone, of a buff colour. The right bank abutment is composed of three massive courses of very large blocks, measuring 1.5 metres x 600mm on average, which are slightly stepped and roughly tooled with a pitched face. The bottom course is narrower and undercut along the whole length and the river flows underneath the bottom course. There are no obvious signs of movement or failure. The undercut will vary but we measured 1.5 metres of undercut in places. On the downstream edge a large circular column or pile can be seen under the water line, possibly an old timber pile. This may represent one of a series of piles, but this needs further investigation (possibly by underwater drone). The 2013 survey does not show an undercut – see picture 25, page 24. This shows the bank intact and the brick pier in-situ, now missing. This whole area needs further urgent investigation.

5.18 The right bank abutment contains a series of four large cut-out sections in the upper face of the topmost blocks, which correspond with the end blocks and bearing of four former

longitudinal beams. These have not been measured but they are not precisely related to the bearings for the 1853 four longitudinal cast-iron beams and so may represent the seating for an earlier arrangement of longitudinal beams. This may indicate that the stone blocks pre-date the castings and are earlier than the 1853 bridge. Above the masonry blocks and set back some 100-150mm is a shuttered concrete wall of circa 1934 about 500mm high which extends to the underside of the bridge. Above and below the masonry abutment the right riverbanks are vegetated and there are no signs of earlier masonry or revetments.

5.19 The left bank abutment has four blocks of masonry visible above the water line and probably another block below the waterline measured on 8th August 2025. These masonry blocks are also stepped but not undercut and the wall is continuous and meets the riverbed, which is smooth and may be either massive masonry blocks or mass weathered concrete at this point. The masonry blocks are smaller than those on the right bank and have a pitched face of rough herringbone tooling. The masonry blocks appear to have been reduced in height prior to the construction of a reinforced concrete wall in 1934.

Stone Pier

5.20 The masonry pier (Pier 1) is also stepped like the left abutment, with a stepped toe foundation which meets the river bed in a smooth surface, of stone or concrete. The pier is rounded to the upstream cutwater face; the downstream face has been repaired in blue brick possibly to remove the step effect and reduce erosion or improve flow and there is a metal bracket attached to the bottom leading edge of the exposed stone masonry.

5.21 The stonework is heavily tooled with draughted margins and a raised / rock-face pitched face. The detail is not particularly decorative and does not show great consistency. The top course of the pier is 'rougher' in execution and may be later and a replacement. There are some cementitious repairs to the more heavily weathered upstream cutwater.

5.22 The upper face of this structure has a series of wrought iron cramps at the masonry joints[25]. The visible corrosion makes it clear that these iron cramps, which are a common way of connecting ashlar masonry wall caps, are wrought iron[26].

[25] LP Archaeology refers to these as iron 'straps' and 'repairs'.
[26] Iron cramps are used along the whole of the weir head at Masson Mill to tie each block together.

Fig. 37 Stone pier with short cast-iron posts, transverse cast I-beam, and rounded cutwater - 2025

5.23 There are two square cast-iron collar housings, bolted to the upper face of the stone pier and cut into a deep slot in the face of the pier. Inside the hollow of each of these square castings is the remaining heartwood of a timber post which extends down through the upper face of the masonry pier.

5.24 The 2013 Dive Survey describes the interface of the masonry abutment and Pier 1 as follows:

> *"The construction of the downstream weir also interfaces with that of the bridge on the eastern side of the channel. The weir comprises of a masonry ledge with large keystones at a regular spacing, leading onto this is a wide pitched stone apron, the upstream edge of the apron appears to have been scoured and undermined over the years and there are areas of mass concrete repair. The concrete invert beneath span 1 of the bridge extends around pier 1 and the downstream cast iron pile of pier 2 then follow the plan of the weir across the river channel."*

Fig.38 Cast-iron square collar with inset casting surrounding a timber post (parts of which are visible) let into the upper face of the stone pier and bolted to the upper face with 4 corroded bolts. The outer edge of the collar measures approximately 500 x 500mm. Off-set is a wrought-iron cramp 350mm long inset into the stone at the joint between two large masonry blocks and another channel cut for a wrought iron cramp which is missing. The stone appear to have delaminated at the outer edge, where it is fractured and a weak spot – 8.8.2025.

Fig.39 Stone pier with second cast-iron square collar, slightly smaller, approximately 400mm x 400mm. Four corroded bolts to the upper face, one with a surviving threaded nut. Inset timber post with heartwood. Wrought-iron masonry cramps are visible (bottom left of image and top) – 8.8.2025.

Fig.40 Stone pier with masonry upper face. Some wrought-iron masonry cramps are missing but the channel remains (arrowed) – 8.8.2025.

Remaining Castings

5.25 The outer cast-iron flanges contain integral end pieces, which are tapered, narrow at the base, widening out towards the upper face, and each of these contains four holes in the face; these supported cast-iron end caps which were fixed by metal plugs or dowels, which are flush with the outer face of the casting. The lower dowels are not visible and are probably part of the end caps and pushed through the end pieces from the opposite, outer side. The upper dowels are visible and were finished smooth with the face of the end caps.

Fig.41 Tapered end of cast-iron beam, with four holes for dowels. The end cap is missing to this beam - 8.8.2025.

Fig.42 Castings for the beam and post meet with a flat joint which is part covered by the bell-shaped end cap. Here there is some local corrosion which has exposed one of the bolts - 8.8.2025.

Figs.43 & 44 End caps with visible dowels to upper face (left – plain, right – with 1853 date in the casting) – 8.8.25.

5.26 The cast-iron end caps are curved to the face and have a slight bell-shape and skirt. Only the two central caps have cast datestones of 1853. The end caps are missing on two of the beams. Each end cap sits above the end of each cast-iron beam shaped at the upper part in such a way to mask the junction with the beam and any longitudinal beam. The tapered shape reflects that of a jack-arch, and the concrete structure also hints at this, but there is no surviving evidence that there was any brickwork in the construction, although T Swailes[27] states that 'many short span road bridges with cast-iron girders to brickwork jack arches are still in use'.

[27] 19th century Cast-iron Beams – their Design, manufacture and reliability in *Proceedings of the Institution of Civil Engineers - Civil Engineering* (1996) 114 (1): 25–35.

5.27 Downstream of the left bank abutment, there is a casting for one of the historic rack-and-pinion mechanisms for the sluices which is fixed within the 'wing wall'. The metal slot is still visible where the sluice boards have been removed. Behind this, bedded in the wall and partially hidden by modern railings, is the remains of the casting for the rack-and-pinion mechanism.

Fig.45 Left bank at the weir crest. Marked in yellow dashes is the casting for sluice gate, rack-and-pinion and grooves for raising the gate within the 'wing wall' - 8.8.2025. The outer spur carried a narrow boardwalk.

5.28 The five sets of cast-iron columns are spaced equally, with two of the pairs being short and sitting on the masonry pier close to the left bank. The short columns have flanges to the base and top and are bolted to the top of the stone pier and are approximately 450mm square to the base of the casting. These do not have a collar. The remaining columns each have a collar, but they are not uniformly spaced, so do not appear to have a carefully designed decorative purpose, although equally they do not cover a joint. The central columns and those closest to the left bank have collars close to the water line (on 8.8.25), whereas the remaining two pairs closest to the right bank have raised collars. The collars comprise a central raised rounded rib and upper and lower stepped square profile. They roughly reflect the neck and astragal of a classical column.

Cast Iron Gateposts and Railings

5.29 Access restrictions with the construction of the temporary bridge have made it impossible to examine the gateposts at close quarters. They are said to be stamped with the manufacturer - HILL & SMITH LTD | BRIERLEY HILL[28]'. These are cast-iron posts, octagonal in section with moulded caps and necking rings. Smith and Company are recorded in the 1798 ledger for 'castings' related to the New Wood Bridge, but they were based in Chesterfield. However, the present cast-iron gateposts can only relate, at the earliest, to the construction of the 1853 bridge as the name Hill & Smith was first adopted in 1853. The railings attached to the gates are fixed by means of metal flanges which appear to be soldered to the cast-iron columns. These support modern railings. The gates themselves are relatively plain and difficult to date but are likely to be relatively modern. There are remnants of railings to either side of the bridge on both east and west banks but the earliest likely date for these is 1934. None of the earlier wrought-iron railings evident in early 20th century photos are visible now. These extended far beyond the bridge along the approach road (Old Road) as can be seen in figure 8.

[28] English Heritage, 2006 – "In 1934 the bridge across the Derwent was demolished and in the following year the present steel and concrete bridge was completed (dated photographs in Mr Nelson's album). At the eastern end of the bridge there are two cast-iron gate piers, octagonal in section with moulded caps and necking rings. The shafts are cast with the name of 'HILL & SMITH LTD | BRIERLEY HILL'.

Interpretation - Earlier bridge

5.30 The presence of two square cast-iron bearing blocks, bolted to the upper face of the stone pier (Pier 1), and the presence within these castings of the remaining heartwood of substantial timber posts indicates a bridge that predates the 1853 bridge. It is likely that this is the remains of the Timber Bridge recorded being erected between 1797-1800. The record describes a large quantity of stone and sharpening of picks for tooling, so we know that there was a large amount of masonry used in the construction of the timber bridge.

5.31 The location of these two castings is off-set from the later 1853 beams and the size of these and the posts indicates a bridge comprised of oak posts. It seems possible that this bridge would have been constructed on a series of stone masonry piers, as found in-situ with Pier 1. There is evidence in the list of materials in the Evans ledgers for a considerable amount of Watson's and 'Swinertons stone' being used in the construction of the bridge (probably sourced from Little Eaton quarries, a yellow Millstone Grit). However, there is no evidence for any further masonry piers in the river bed, apart from the missing pier described in 2013, and the riverbed is heavily silted now and difficult to examine evidence of other piers. None were recorded by the diver survey in 2013.

5.32 The cast-iron square sections fixed within the upper face of pier 1 would have been added in order to provide the stability needed for the posts, so that these could be bolted to the masonry base and so that the base could be encased, to provide rigidity. There are similarities between this form of construction and that of the gearing blocks in the Derwent Valley cotton mills (e.g. North Mill basement).

1862 Depiction - Assessment

5.33 The 1862 bird's eye view of the bridge illustrates a series of shallow arches spanning a series of arched masonry cutwaters and suggests that the bridge was a formal arched masonry bridge. Based on the physical evidence, it is most likely that this was either artistic licence or an interpretation of the 1853 or earlier structure. That image also depicts in the background the raised sluice boards and rack-and-pinion gearing for the higher dam along the top of the weir and those are also visible in the Jewitt image of 1844.

5.34 The photograph dated ca.1930 (see figure 10) Illustrates a section of the pre-1934 bridge. We can just see, in the shadows, the form of one of the bell-end cast caps. To either side of these caps the bridge appears to have shaped and very shallow arches and what may be panels of masonry. Another photograph of the bridge which predates the replacement bridge of 1934 bridge looking across the weir indicates clearly that the structure had a concrete face and a flat deck and that there were shaped spandrel panels in concrete which were wider than those of 1934 (see figure 8). This view does not illustrate any arched form, but the railings appear to be wrought iron and predate the 1934 refurbishment.

5.35 If the illustration in 1862 is of stone / masonry, then it must have been carried on the cast-iron longitudinal beams and they must have had a specifically designed arched casting to create the formwork for the masonry panels. There is no clear proof that it was a brick jack-arched construction. These shallow arches appear very close to the waterline in the photographs and

reflect the state when the level of the dam was raised. Another possibility is that the longitudinal beams comprised a series of cast-iron arched ribs. These would correspond with a common method of bridge construction using iron.

5.36 The location of each of the longitudinal cast-iron beams is so much lower than the present concrete bridge deck, that it is likely that it either sat much lower than the 1934 bridge or that there was a significant structure above the longitudinal beams, for which there is no longer any evidence. In repairing the bridge in 1934, therefore, they may have raised it slightly, but there is no conclusive proof either way. The pre-1934 bridge finished with the upper face of the deck flush with the door threshold into Darley's, the former canteen, as shown in the 1930 photo, as did the 1934 bridge deck.

5.37 The development of cast-iron in the form we find in the bridge followed the development of railway bridges. Whilst the use of structural cast iron originated in the development of mill buildings, around 1800, its later use for bridges had become commonplace by the 1850s. According to English Heritage, by 1855 there were more than 40,000 iron bridges in the country[29] and many of these used a combination of cast-iron and wrought iron, whilst cast iron was preferred for load bearing structures, especially for elements such as arches.

5.38 The single surviving masonry pier with its integral timber posts from the previous phase of bridge may well be remnants of the timber bridge described as the New Wood Bridge of ca. 1800. The 2013 Diver Survey stated 'The masonry foundations of pier 1 appears to be built around two of the timber supports for the earlier bridge". However, this is a misunderstanding of the evidence. The timber post were built onto the stone pier. The masonry is not particularly fine or distinctive. Each block has a pecked and raised 'rock-face' with a tooled margin.

[29] English Heritage – Practical Building Conservation – Metals – p.112

6. Significance

6.1 The National Planning Policy Framework defines the significance of a heritage asset as: *"The value of a heritage asset to this and future generations because of its heritage interest. That interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset's physical presence, but also from its setting."*

6.2 Historic England has published Good Practice Advice on 'Managing Significance in Decision-Taking in the Historic Environment' - Historic Environment Good Practice Advice in Planning: 2 (July 2015) to assist in assessing the significance of heritage assets. This guidance provides information to assist in implementing historic environment policy in the NPPF and the related guidance given in the Planning Practice Guidance ('NPPG'). It also provides a suggested staged approach to decision-making where there may be a potential impact on the historic environment, as follows:

"1. Understand the significance of the affected assets;
2. Understand the impact of the proposal on that significance;
3. Avoid, minimise and mitigate impact in a way that meets the objectives of the Framework;
4. Look for opportunities to better reveal or enhance significance;
5. Justify any harmful impacts in terms of the sustainable development objective of conserving significance and the need for change;
6. Offset negative impacts on aspects of significance by enhancing others through recording, disseminating and archiving archaeological and historic interest of the important elements of the heritage assets affected."

Historic Interest

6.3 The current bridge is the fifth bridge on this site since the establishment of the first Evans Cotton Mill on the site. There is no evidence for an earlier bridge on this site before 1782. It is a multi-phase structure incorporating a 1934 deck with concrete beam and rebar structural framework, sitting on cast-iron posts and transverse beams dating from 1853, with remnants of a left bank masonry abutment of indeterminate date, and an abutment to the right bank from an earlier phase, probably of the 1790s, and a stone pier from ca.1797-98, with contemporary castings. The design of the 1853 phase and the architectural intent is now obscured by loss of the longitudinal beams and all of the deck, masonry and railings. There is, however, evidential value to the bridge supported by archival references to a bridge on this from the late 18th century. The present bridge is the fifth in line of bridges on this site dating from the erection of the first cotton mill in 1782-83, although only the first bridge is likely to have had a complete design; each later bridge adapted remnants of its forerunners. Each bridge appears to have had a relatively flat deck and simple design, without strong design intent, and none worthy of contemporary observation or remark[30].

6.4 The revetment walls, weir and associated water management features which connect to the bridge are of particular interest and are associated with the Outstanding Universal Value of

[30] Contemporary journals and published diaries of visitors to the valley have been consulted from the late 18th century to the end of the 19th century. Darley Abbey Mills / Boards Head Mills attract little attention.

the mills site (see later analysis of OUV). There is high archaeological potential for earlier phases of water management and revetments to survive on the left bank, upstream of the bridge, now buried.

6.5 The bridge has moderate historic interest for the surviving remnants of previous bridges on this site but low intrinsic value. The bridge has moderate historic interest for its structural design of 1853, which is only partly understood.

6.6 The majority of historic images illustrate the weir rather than the bridge and the weir had a series of large sluices built into the apron of the weir, cast-iron, with paddles and a series of sluice controls at each pier. There would have been a narrow access platform across the weir to control the sluices. The majority had disappeared by the late 1970s. The most picturesque view was that from the left bank downstream of the mills, looking back towards the weir, with Darley House and the church in the background. There are unfortunately no known 19th century photographs of this view or the bridge.

Architectural Interest

6.7 The design of the bridge is multi-phase and without a single architectural composition. Whilst elements have a modest architectural character, the bridge has overall low architectural interest as there is no single composition or integral structure from a single phase and the elements are (with the small exception of the 'end caps' which has modest interest) each of low architectural interest, without particular care in their design or execution, other than for pragmatic, structural, and practical purposes. All of the evidence points to it being a working bridge designed to carry people and goods.

6.8 By comparison, early railway bridges at this date (1853) would commonly be the lattice girder type and constructed in rivetted iron[31]. Cast-iron bridges were eventually largely displaced by rivetted wrought iron / steel lattice bridges, following the spectacular failure of a number of cast-iron bridges (e.g. Dee Bridge Disaster 1847 and the Tay Bridge 1879).

6.9 The earlier pre-1934 bridge, whilst still a partial concrete structure, had a more elegant and refined design, with less visual impact, as it avoided concrete stanchion posts and had continuous railings set into the slim deck. The bridge now has a large number of services and anti-vandal fixtures attached, which detract from any residual architectural interest.

6.10 Like many of the early 19th century bridges crossing the river in and around Derby, the earliest bridges were mainly timber and were primarily designed for a practical purpose, such as to provide access to the canal network and local industries on the riverbanks. Unlike the contemporary bridges at Derby (St. Mary's – 1794), Milford (1791), and Belper (1795), there is no evidence that this privately-funded bridge was ever an arched masonry bridge with a classical

[31] Handyside Bridge - Erected for the Great Northern Railway crossing at the opening of the line in 1877. Bennerley Viaduct – 1877. Barmouth Bridge – 1867.
The Strutt bridge to the Bridgehill Estate and Chevin Corn Mill is riveted forged and cast-iron lattice construction, with integral horizontal iron rods providing pedestrian protection. It is purported to date from 1855.

composition. However, the records of cast-iron railings, which contain multiple cast components, enough to warrant bespoke patterns, does suggest that the 1798 bridge had a strong architectural element in the design of the railings, all of which has since been lost. The deck is too low and the span too great to create a single arched bridge and there is no documentary record of a multi-arched masonry bridge. Modern secondary sources claim this without corroboration. There is so little masonry left in the present structure that we shall probably never know the full extent of masonry used in the 1797-98 bridge, although the use of stone in the construction is recorded.

Archaeological Potential

6.11 The lack of borehole data from the site itself prevents detailed discussion of the likely depositional sequence, although records from the wider valley do provide useful indicators for the expected sediment sequences adjacent to the site. Boreholes recorded in the wider area demonstrate an alluvial sequence dominated by minerogenic sediment, mainly sandy clays. However, to the north and south of the site Lidar imagery of the undeveloped parts of the floodplain demonstrates the survival of palaeochannels which have a higher potential of preserving organic deposits. The likelihood of these deposits being present within the modern course of the river is considered low given the velocity of the current river, the management of the channel and the recent high energy flood episodes (figure 46).

Fig.46 River Derwent at Milford in spate October 2023 (© Kristina Krawiec)

6.12 The wider valley demonstrates varying degrees of alluvial deposit survival and this will be intimately linked with the location and degree of post-medieval development of the mill complex. Alluvial deposits will most likely survive adjacent to the current canalised course of the river. As the

development of the Derwent through lateral migration is poorly constrained in terms of chronology, the age of the bankside alluvial deposits in uncertain. In other systems such as the Trent, sequences adjacent to the modern course are often more recent in date. This may also be the case in the areas immediately to the east and west of the bridge.

6.13 In addition to the depositional sequence, the site has the potential to preserve both in channel and bankside earlier structural remains. The recent site visit demonstrated recent erosion beneath the current river wall, both in terms of the stone facing and later concrete repairs. This has exposed timbers which presumably relate to earlier phases of revetment and channel management. The visibility in the river was poor and no in channel remains could be identified.

6.14 Despite this it is possible for earlier structural remains to survive in such conditions. Recent excavation at Dovecliffe demonstrates that beneath the post medieval weir, and within the adjacent floodplain, timbers relating to earlier phases of channel management were preserved (YA/CFA 2023). The sediment contemporaneous with these remains had been removed by subsequent fluvial processes but the timbers were able to provide dendrochronological sequences spanning the late medieval into the early post medieval period (figure 47).

Fig.47 Dovecliffe weir removal. The timber and clay packing of the earlier weir beneath the stone and later concrete cap (YAT).

6.15 The area surrounding the Darley Abbey bridge site has already demonstrated this is a possibility with the excavation of possible medieval mill remains to the immediate south of the bridge (TPA 2012). Here the remains were sealed by later post medieval made ground layers which had been used to extend the existing island.

6.16 The proposed impacts will be determined by the final choice of replacement structure for the site. There are unlikely to be significant deposits within the river bed that have palaeoenvironmental potential. However, there is a possibility that the removal of the bridge piers and bankside abutment/revetment material may expose earlier structural remains.

Setting

6.17 Historic England has published guidance in respect of the setting of heritage assets, providing detail on understanding setting and the associated assessment of the impact of any changes. The guidance confirms that:

> *"Setting is not a heritage asset, nor a heritage designation, rather its importance lies in what it contributes to the significance of the relevant heritage asset itself."*

6.18 The setting of the bridge is the river, its banks and the designed approaches to the bridge, including the cast-iron gateposts. The mills do not contribute to the setting of the bridge. Rather it is vice versa, that the bridge forms part of the setting of the mills. It forms part of how they are experienced and how they are approached and have been approached from ca. 1783 onwards. It contributes to the setting of the mills because of the functional historic relationship between the mills, the factory village and former Darley House (dem).

Darley Abbey Conservation Area

6.19 Darley Abbey Conservation Area incorporates the multiple heritage assets, listed and unlisted, within the settlement and within the historic parkland estate associated with the former Darley Hall. Its character relates to the relationship between the early history of the settlement which was primarily an isolated monastic site, with scattered survivals, and the later imposed factory village developed by the Evans family, with its purpose-built experimental designs, built in planned campaigns, such as courts, back-to-back clusters, terraces and squares. The mills are at the heart of the Conservation Area designation but located to the east of the River Derwent and detached from the majority of the factory community. The Conservation Area incorporates the route of Old Lane where it tracks through the settlement, as far as Folly Road to the east and connecting to Abbey Lane to the west. The sites of earlier mills which were part of the Evans 'empire' are located on the west bank of the river, but none survive above ground level. The Conservation Area includes a large sweep of the river and right riverbank, encompassing the historic water management elements along the left bank. Modern elements, such as the historic site of Darley House and its landscaped grounds, are excluded.

Context - Other Bridges along the Derwent

6.20 There was a great programme of road building in the Derwent Valley during the latter part of the 18th century and early 19th century. Between 1791 and 1817 (less than 30 years), most of the existing road network within the valley floor had been created. Within the Derwent Valley there is no doubt that the River formed a major barrier and most of the movement was along the ridges on either side of the valley, only coming down into the valley to cross the River. It is now difficult to appreciate how dramatically the River fluctuated through the seasons, as its flow is so heavily controlled by releases from the Howden, Derwent and Ladybower Reservoirs, but a flood

in 1774 destroyed Masson Weir and Whatstandwell Bridge, so its potential force was greater than experienced since the reservoirs were constructed. This also meant that there would be periods when the River was quite low enabling ford crossings. The earliest routes across the river were in the shallows, either by stepping stones, or by ford. Only a handful are known and it is likely that there were many more. A summary of the different bridges along the Derwent from Belper southwards is included in Appendix 1. The earliest bridges serving the mill complexes and industrial establishments were timber bridges. There is evidence for this both pictorially and in documents. The grand masonry bridges were reserved for the public roadways.

Outstanding Universal Value

6.21 The OUV of the DWMWHS is described in the World Heritage List through a brief synthesis on the property, the criteria by which this WHS was first inscribed, its Integrity, its Authenticity, and also those protection and management requirements currently maintained by the UK government. It consists of a 24km length of the lower Derwent Valley stretching from Matlock Bath in the north to Derby City Centre in the south. Darley Abbey is located in the southern area, where the landscape setting is much broader and more open, dominated by the flood plain.

6.22 The WHS boundary at Darley Abbey includes the whole of the Conservation Area, Darley Abbey Park, and the former Dean's Field, as well as the agricultural land lining the route of the River at the former Holme Nook and Nut Wood, to the north of the bridge, outside the Conservation Area. It also incorporates the flood plain and recreation grounds to the south of the mills.

6.23 The land which was part of the site of Darley House falls within the Buffer Zone, as does housing development located on the east-facing slopes of the valley above the treeline, outside the Conservation Area. Little Chester lies within the Buffer Zone to the east of the River and to the south of the recreation grounds.

6.24 The DVMWHS was inscribed on the UNESCO World Heritage List in 2001 under criteria (ii) and (iv), which are as follows:

> (ii) to exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design.
> (iv) to be an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history.

6.25 A retrospective Statement of OUV endorsed by the UNESCO WHS Committee in 2010. The WHS Management Plan covers the period 2020 to 2025 and is currently being reviewed and updated. Furthermore, UNESCO published a strategy in 2007, requesting that World Heritage Sites integrate climate change issues within their Management Plans as they are updated.

Contribution of the Bridge to OUV

6.26 As set out in para. 6.18, the bridge forms part of the setting of the mills. It forms part of how they are experienced and how they are approached and have been approached from ca.

1783 onwards. The setting of the World Heritage Site incorporates a Buffer Zone and elements that support its significance which may lie within the Boundary. The bridge contributes to the setting of the mills because of its functional historic relationship between the mills and the factory village. It has low intrinsic architectural and only modest intrinsic historic interest, and exhibits no architectural or technological qualities, but the presence of a bridge on this site is nevertheless vital to understanding the development of the mill complex, the relationship to the main road network, markets and the factory village.

6.27 The presence of a bridge in this location is entirely related to the development of the cotton mills, and the construction of a weir, which by impounding and raising the water levels (and thereby dissipating the energy of the river at this point) enabled a long, level, access bridge to be constructed.

6.28 The bridge, however, unlike the mills which have high authenticity at Darley Abbey, lacks **authenticity** as its original forms, building materials, and structural techniques are not intact and not easy to discern.

6.29 For effective protection and management, it is necessary not only to have the overarching Statement of Outstanding Universal Value, but also to define the attributes of OUV which individually and collectively comprise OUV. The attributes of Outstanding Universal Value are divided into five principal attributes:

Attributes of OUV	Darley Abbey Bridge - relationship
1. The successful harnessing of relatively large amounts of natural energy to deliver the power to drive newly devised machines housed in mills to produce goods of superior quality at an unprecedented rate.	The access bridge is functionally independent of the water management infrastructure, although elements are physically embedded into it. Any intrusive work to the bridge, abutments and river banks has the potential to inform Attribute 1.
2. The creation and development of a new way of life resulting from the need for people to congregate together (in factories) producing goods of superior quality at an unprecedented rate, sometimes in formerly rural (non-urban) locations, with attendant intensification of agriculture for provisioning and the adoption, from the early 19th Century, of new modes of transportation.	The bridge is unrelated to the attributes which define the factory community / or new way of life, or a new form of transportation. However, the bridge can also be seen as part of the factory community as it was solely funded by the Evans family and has never been in public ownership. As set out under the SOUV, the integrity of the property, particularly the interdependence of the mills and other industrial elements, such as the workers' housing, is still plainly visible. This access bridge is part of that integrity.
3. The dissemination of the new technology and new mode of mass production, from the Derwent Valley to other parts of the UK, Europe and North America, prior to the introduction of steam power and the transference of mill development to the coalfields of Lancashire.	The bridge does not exhibit new technologies related to cotton manufacturing, although there are fragments which embody late industrial developments, such as the use of cast-iron.

4. The further development of industry including the introduction of new modes of transportation and utilities.	The bridge is unrelated to a new method of transportation.
5. A 'relict' industrial landscape, where late 18th and early 19th century industrial development may still be seen in an 18th/ 19th century agricultural landscape containing evidence of other early industrial activity.	The site of the bridge is not part of the scenic beauty of the Derwent Valley which was celebrated in the 18th and early 19th centuries, or part of a tourist destination, and the bridge was not recorded pictorially or by way of any photographs. The landscape setting has also changed, with the demolition of the mill owner's house, Darley House, and the loss of its grounds and designed small parkland character, which formed a backdrop to the bridge, all prior to inscription.

The Derwent Valley Mills WHS Management Plan

6.30 Bridges have been replaced several times and have suffered losses due to flooding events, the most recent damage occurring in 2024. It has to be recognised, as set out in the Management Plan (2020-2025) that climate change is affecting the frequency of these events and putting a strain on the infrastructure (section 8.3 – p.48). The National Planning Policy Guidance (NPPG) sets out specific principles, in paragraph 32, which local planning authorities should aim to meet when developing World Heritage-related policies. These include protecting the World Heritage Site from climate change but ensuring that mitigation and adaptation is not at the expense of integrity or authenticity. The site sits within an area which is affected by flooding and designs of buildings and structures need to recognise and balance this and make judgements when there are threats to those elements that underpin OUV.

6.31 Section 9 of the Management Plan deals with Risk Management and states that 'For mill sites and other structures on or close to the banks of the River Derwent, flooding is likely to prove an increasing threat, both in terms of frequency and scale, so it is vital such plans prepare for possible severe flooding incidents'. Objective 1.9 of the Management Plan is to: 'Ensure owners and partners have plans in place to accommodate unexpected change, such as natural disasters and climate change. The Historic England report Future Climate and Environmental Change Within the Derwent Valley Mills World Heritage Site (16th October 2017), set out risks. The assessment methodology included examining the empirical evidence of known episodes of past climate change or flooding and modelling the impacts of future change. The risk assessment found the following risks associated with riverine flooding:

Fig.48 Debris build-up against bridge following during 2024 floods (image – Derby City Council engineers).

	2017 RISK ASSESSMENT	Likelihood	Severity	Timescale
1.	Increased riverine flooding	3 (not very likely)	2 (limited impact	L (long range)
1.1	CAESAR modelling suggests that the overall channel capacity is sufficient to cope with additional precipitation levels, although local problems may occur and damage the built heritage.			
1.2	Historic Water Management Assets (HWMAs) and other hard structures within channels (e.g. bridges, revetments etc.) may fail under pressure, especially if blocked by vegetation etc.			
1.3.	Localised erosion of archaeological remains may occur on the floodplain			

6.32 During Storm Babet, heavy rainfall lasted from the 18th to the 21st of October 2023 across the Derwent sub-catchment with rainfall peaking early on the 20th of October from 4:15am to 10:00am[32]. St. Mary's Bridge on the River Derwent and gauging stations on the River Ecclesbourne, River Amber and Bottle Brook produced the highest ranked flows or levels on record in response to Storm Babet.

6.33 Following these recent episodes of flooding, a review of risks by the Environment Agency took place in October 2023 and 2024, and these 2017 findings should, therefore, be interpreted with some caution.

[32] Derbyshire County Council investigation report - Storm Babet 18/10/23-21/10/23 – 29 August 2024

Short Timeline

1782 – establishment of first cotton spinning mill and likely date for original bridge (Bridge 1)

1792 – plan by Benjamin Outram for the extension of the Derby Canal to Darley Abbey

1797-1800 – new wood bridge built across the Derwent (Bridge 2)

1798 – new cut and changes to water management and Weir repairs

1821 – West Mill. Likely date for modifications to the Weir to raise the head and likely time for creation of paired sluices to the left bank.

1853 – dated cast-iron elements of the bridge and significant reconstruction with likely removal of stone piers (Bridge 3)

1934-36 – replacement of majority of the bridge in reinforced concrete, replacing an earlier concrete bridge (Bridge 4 and Bridge 5)

1943 - the mills are sold to J. & P. Coats of the Coats Viyella Group.

1970 – Textile manufacturing, latterly confined to finishing processes, ceases in 1970

2001 – World Heritage Site inscription

2023-2024 – major flood damage and loss of brick pier and substructure.

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D5231/1/1 - Ledger 1795-1804
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Historic Maps

1721 – Stukeley Map of Derventio – (Little Chester) – Mss 6329 (Derby Local Studies Library)

1767 and 1791 copies of PP Burdett's map of Derbyshire (Derby Local Studies Library for the 1767 version and NLS for the 1791 version)

1792 - A Plan of the Intended Derby Canals and Railways with a Sketch of the adjacent Canals, Rivers and Roads showing their relative situations & connexions by B. Outram, 1792 – ACC. 46409, 46410 (Derby Local Studies)

1792 – Plan of intended Derby canals and railways by Benjamin Outram scale 2 inches: 1 mile 84 × 64 cm (Derbyshire Record Office - D4734/19/3). This is identical to the map in Derby Local Studies.

'Darley Liberty &c. 1811' (DRO, D769/11)

A hand-drawn copy, entitled 'Plan of Darley Abbey Liberty in the County of Derby 1846', has fewer and different parcel numbers, but does not appear to record any changes since 1811 (DRO, D769/B/11/4)

George Sanderson, Map of the Country Twenty Miles Round Mansfield, Comprising parts of the Counties of Nottingham, Derby, York, Lincoln & Leicester … From Actual Survey made in the Years 1830, 1831, 1832, 1833, & 1834, Mansfield, 1835 (ref. DRO, D6572/1).

There are several versions of Sanderson's map, with some minor differences. The facsimile version (DAS) has been consulted, as well as original map D6572/1.

[Edward Smith], 'Map of the Chapelry District of Darley Abbey. 1846' - D769/P/23 - 5th October 1846.

Plan of Darley Abbey in 1852 (Derby City Library). This map has been copied in Don Peter's book. However, the Derby Local Studies Library does not have a copy. It does not add much to our knowledge.

Images

Bird's-eye view of Boar's Head Mills, published in the Illustrated Times in 1862. It depicts many important details though some are misleading and the perspective cannot be trusted. (Derby Local Studies Library & BNA).
Pencil sketch of the West Mill, Darley House and Weir, dated March 1844, L Jewitt (DRBY005309 – Derby Local Studies and Family History – Picture the Past)

Photographs

Historic England archive (not reproduced here) – Fig. 13 in 2006 EH report (1975 - BB82/6265). Illustrates the bridge with a canopy and concrete posts with barbed wire lining Old Lane.
Darley House built about 1783 demolished 1932 (courtesy of Adrian Farmer)
The mill weir with St Matthew's Church beyond (courtesy of Adrian Farmer)
The sluice gates by the bridge c1930 (courtesy of Adrian Farmer)

Appendix 1
Historic Bridges across the River Derwent
From north to south (from Belper to Derby)

Belper Bridge

On 26th March 1795 there was an advertisement for a contractor to 'widen and repair' Belper Bridge (Derby Mercury). The earlier bridge had 6 arches and was rebuilt c. 1796-97 – in a classical style, by Benjamin Marshall under the direction of Thomas Sykes, the County Surveyor of bridges, with 3 arches in stone with dressed ashlar and broad segmental arches, stepped voussoirs and rounded, rusticated cutwaters, plain raised piers. Masonry bridge parapets were removed when it was widened for modern traffic and it has a cantilevered deck with modern railings.

Strutt Estate Bridge of ca. 1850

There is a riveted wrought iron lattice girder bridge across the River Derwent south of the Belper Mills complex, which provided private access for the Strutt family to the Bridgehill Estate via a gatelodge on Derby Road (the A6) and also estate access for Crossroads Farm and Blackbrook Corn Mill.

The bridge is largely complete and intact and exhibits characteristics, such as an opening gate mechanism contained within a plated box girder structure, which are typical of the engineered innovations of the Strutt family.

The Strutt Estate bridge over the River Derwent of c.1855, Belper

Milford Bridge

Built c.1790 by Messrs Strutt. An ashlar bridge with 2 segmental arches and rusticated cutwaters. The bridge parapets were removed when it was widened for modern traffic and it now has a cantilevered parapets built in coursed masonry in 1906.

Milford Suspension Bridge

A pedestrian bridge. The masonry retaining wall, steps and base plates of the original suspension bridge of 1826 survives but is now inaccessible.

Duffield Bridge

Duffield Bridge has 15th century origins and is illustrated on all early County maps. It was widened in c1803 by Thomas Sykes, County Surveyor of bridges. Built from sandstone ashlar with three

segmental pointed double chamfered arches. The cutwaters are triangular, and it retains a stone parapet with plain coping. The bridge is also scheduled as an Ancient Monument.

Ford Bridge – North of Darley Abbey

On the 1835 Sanderson map the crossing over Derwent is a ford, now served by a concrete bridge ca. 1950(?).

Darley Abbey Mills bridge (this report)

Site of Roman Bridge

Close to Little Chester and to the north of the main complex is the site of the Roman bridge crossing the River Derwent. At this point, the Roman road from the military forts at Strutts Park to Broxtowe near Nottingham bridged the Derwent. It is theorised that this may have pre-dated the establishment of the Roman settlement at Little Chester (Derventio) and that later in the Roman period it was replaced by another bridge further south of which no trace has been found. A plan by the antiquarian William Stukeley in 1721 identified two surviving stone piers in the river, which are thought to have supported a timber superstructure. The plan states 'Ruins of a Bridge Over the River". Although since toppled, in the 1960s investigations revealed the pier bases and a debris field in the river at the same spot as shown on Stukeley's plan.

'Handyside Bridge'

A bowstring girder structure carried the Great Northern Railway's Derbyshire extension across the river from 1878 until closure in 1968. Although now known as Handyside Bridge, officially it was simply Bridge No 100.

Bridges at Derby

St. Mary's Bridge, Derby

The cartulary of Darley Abbey refers to the bridge at Derby. It was in need of repair in the early 14th century, suggesting at least a 13th century origin. The earliest known bridge was referenced in a town charter of 1229 and was replaced by the mid C13 with a stone bridge thought to have had nine arches (7 of which can be seen in old images), of which fragments remain in the masonry at the Bridge Chapel. It was described in 1789 as of "steep ascent" and "so extremely narrow as to admit but one carriage". It is clearly marked on Speeds map of 1610 as "Mary Bridge". It was replaced in 1788-94 by Thomas Harrison, bridge engineer and architect and designer of the later Grosvenor Bridge at Chester, amongst others. This was his second bridge, a smaller version of his first, Skerton Bridge, in Lancaster, with a road deck which was much flatter than its predecessor. Three arches are separated by cutwaters buttressed with vermiculated bases and pedimented niches, one dated 1794.

There are a number of bridges erected south of the Silk Mill. These fall outside the Buffer Zone of the World Heritage Site, but are related to the weirs just downstream of the silk mill.

The first of these is Exeter Bridge. The early 18th century maps of Derby reveal that the only bridge crossing the river was St. Mary's Bridge. Exeter Bridge first appears on the 1819 W.M. Rogerson map of Derby. It was not apparent in 1806.

Exeter Bridge

Whilst the bridge is recorded as being new in 1851, this was the third bridge on the site (Derby and Chesterfield Reporter – 8th August 1851). Images from the Derby City Museum show the bridge in four different forms; the earliest form of circa 1820 is a timber bridge with three stilts / posts broad, spaced well apart, supporting a relatively flat bridge with timber balustrade or rails laid in a lattice pattern (1978-200-10); the next form is a bridge with stone piers supporting a bridge with lattice pattern and close-set vertical balusters (1936_619_37), followed by a narrow brick multi-arched bridge (depicted in a painting by Ernest Townsend, ca. 1920 – 1936_619_38), and the current bridge designed by C.A. Clews in 1926 and engineers L.G. Mouchel and partners. It was modified before opening in 1931 by C.H. Aslin (Borough Architect), of reinforced concrete with masonry dressing along the parapets and open framing to the single-span arch below, incorporating bronze relief medallions of local worthies. The deck of the bridge was lower than its predecessor as by 1926 there was no need for this section of the river to be navigable.

The River Derwent, All Saints Church, the Shot Tower, Strutt's Derby Cotton Mill, and the timber Exeter bridge above the weir, Derby porcelain plate (© Derby Museum and Art Gallery)

The timber Exeter bridge, as depicted on a Derby porcelain mug (DMAG)

Exeter Bridge, with timber stilts of c.1820 - Derby Museum & Art Gallery (DBY_DEMAG_1978_200_10)

Exeter Bridge, with stone piers and timber balustrade of the later 19th century - Derby Museum and Art Gallery (DBY_DEMAG_1936_619_37)

Exeter Bridge, painted in the 1920s by Ernest Townsend, when it was a multi-arched brick structure - Derby Museum and Art Gallery (DBY_DEMAG_1936_619_38)

The Long Bridge

Downstream of Exeter Bridge there was a bridge built above the lower weir as part of the construction of the 1796 Derby Canal. This was a timber structure creating a raised towpath which allowed canal boats to be hauled across the river.