The Derwent Valley

The Valley that changed the World

DERWENT VALLEY MILLS WORLD HERITAGE SITE RESEARCH FRAMEWORK

Edited by David Knight

United Nations Educational, Scientific and Cultural Organisation

Derwent Valley Mills inscribed on the World Heritage List in 2001

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Watercolour of Cromford, looking upstream from the bridge across the River Derwent, painted by William Day in 1789. Lead workings, which were demolished during the construction of Arkwright's St Mary's Chapel in 1797, emphasise the depth of industrial tradition that preceded construction between 1771 and 1790 of Arkwright's Cromford mill complex (© Buxton Museum and Art Gallery)

http://www.derwentvalleymills.org/derwent-valley-mills-history/derwent-valley-mills-research-framework

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'So now, where Derwent guides his dusky floods
Through vaulted mountains, and a night of woods,
The Nymph, Gossypia, treads the velvet sod,
And warms with rosy smiles the wat'ry God;
His ponderous oars to slender spindles turns,
And pours o'er massy wheels his foamy urns;
With playful charms her hoary lover wins,
And wields his trident - while the Monarch spins.
First with nice eye emerging Naiads cull
From leathery pods the vegetable wool;
With wiry teeth revolving cards release
The tangled knots, and smooth the ravell'd fleece;
Next moves the iron-hand with fingers fine,
Combs the wide card, and forms the eternal line;
Slow with soft lips, the whirling Can acquires
The tender skeins and wraps in rising spires;
With quicken'd pace successive rollers move,
And these retain, and those extend, the rove;
Then fly the spoles, the rapid axles glow;
And slowly circumvolves the labouring wheel below.'

Erasmus Darwin 1791 The Botanic Garden. Part II. The Loves of the Plants

Top: Portrait of Erasmus Darwin (1731–1802) by Joseph Wright (oil on canvas; 1792–3; © Derby Museums Trust)

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FOREWORD

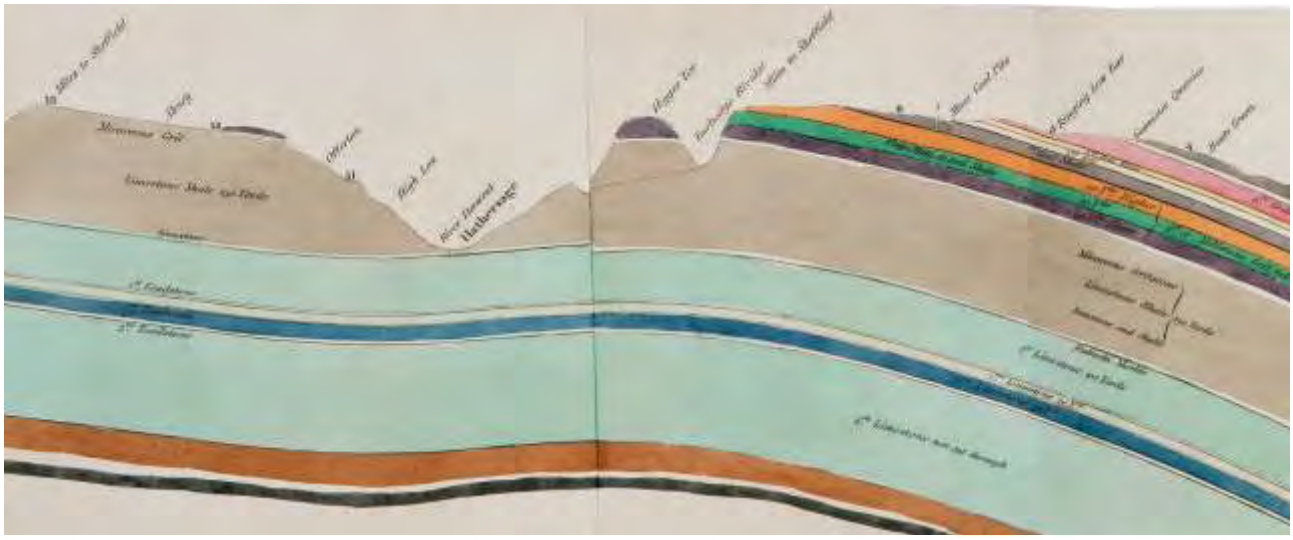
The United Kingdom is fortunate in having 29 World Heritage Sites. They reflect the complexity and diversity of our history and national identity and also illustrate, through their outstanding universal value, the impact that our small islands have had on the world stage. The Derwent Valley Mills World Heritage Site (DVMWHS) is significant for its pivotal contribution to the development of the modern factory system and the workers' communities that grew alongside the mills in the late 18th century. What took place here changed the way people lived and worked across the world and the effects of these elements of the Industrial Revolution remain with us today.

The UNESCO Operational Guidelines for the implementation of the World Heritage Convention encourage States Parties to make resources available to undertake and encourage research into the Sites. The Convention recognises that knowledge and understanding are fundamental to the identification, management and monitoring of World Heritage properties.

I am therefore delighted to welcome the publication of this Research Framework, which will help to fulfil this ambition. Building on the success of the *East Midlands Historic Environment Research Framework*, it is the result of real partnership working. As a funding body, we wished to see the full spectrum of the Derwent Valley Mills World Heritage Site Partnership engaged in its production and the partners have risen to the challenge. This document is, therefore, a true collaboration, incorporating the work of individual researchers, university academics, local authority staff, museum curators, local societies and other organisations within the World Heritage Site. The result is a document which has been made with the partners, rather than being done for them.

This document will be disseminated to the Derwent Valley stakeholder community and also to a range of universities and research organisations. I am sure that they will find much here that will inspire and direct future research into this remarkable area.

Duncan Wilson
Chief Executive, Historic England



Vertical Section of the Strata looking North across the High Peak Hundred in Derbyshire, *published by William Phillips in 1824: detail showing a section across the Derwent Valley at Hathersage, upstream of the World Heritage Site. The Derbyshire element of this section, which stretched from Liverpool to Doncaster, was produced by Elias Hall: a mineral surveyor, collector and geologist living in Castleton who was a pioneer in the geological mapping that transformed understanding of the physical landscape of the Derwent Valley and its environs (© Buxton Museum and Art Gallery; Westwood, R and Rhodes, A [eds] 2013* Enlightenment! Derbyshire Setting the Pace in the 18th Century. *Buxton: Buxton Museum and Art Gallery, 103)*

PREFACE

The Derwent Valley Mills is the only World Heritage Site in the East Midlands. It contains globally important industrial sites within a well-preserved rural landscape, much of which has changed little since the late 18th century, and local people and visitors are drawn to this rich mixture of history and landscape.

Tourism is an important part of Derbyshire's economy and, since the Site's inscription on the World Heritage List in 2001, the Derwent Valley Mills Partnership has worked to deliver many successes in this area. It protects the Site by working with stakeholders to enhance the facilities for visitors and promotes the area via a range of initiatives and through its website. Recent developments at sites such as Cromford Mills, the Cromford Canal and Derby Silk Mill provide clear evidence of a significant body of organisations with a drive to develop and collaborate.

Research has been central to the work of the Derwent Valley Mills World Heritage Site since the partners began the application for inscription on the World Heritage List. This process required a review of past research and new work to build a convincing case for presentation to UNESCO. Since achieving inscription, the commitment to research has continued. The DVMWHS has an active Learning and Research Panel, which liaises with the partners and reviews publications and interpretative texts to ensure accuracy. Its work is greatly aided by the DVMWHS Educational Trust, which has supported the publication of existing and new research. Over the past five years, the Trust has funded the reprinting of the seminal works on the Strutts and the Arkwrights by Fitton and Wadsworth, a second printing of *The Derwent Valley Mills and their Communities* and publication of *Cromford Revisited* by Doreen Buxton and Christopher Charlton.

One of the aims of the current Management Plan is to promote public understanding of the Site by facilitating research. A key objective within this is to produce a research framework that, by defining strategies for research, will encourage further work by independent researchers and members of universities, community groups and other organisations. We are grateful to Historic England for supporting this work.

The Partnership has been fortunate to work with David Knight of Trent & Peak Archaeology (York Archaeological Trust), who has led the process over the last three years in a calm and collaborative manner. David compiled with colleagues the *East Midlands Historic Environment Research Framework*, and this document complements and builds upon that work. Production of the framework has been a truly collaborative process involving engagement with many members of the Partnership. A Steering Group was formed from the members and from universities and other organisations with interests in the Derwent Valley. The workshops gained enormously from a mixture of local historians, archaeologists, leading academics, museum professionals and archivists. I would like to take this opportunity to thank all of those people who have contributed to this document and shared their expertise so generously. Special thanks are also due to Dave Barrett, Derbyshire County Council Archaeologist, Mark Suggitt, Gwen Wilson, Adrian Farmer and Sukie Khaira of the DVMWHS Team, and Tim Allen, Dan Miles and Paddy O'Hara of Historic England for providing invaluable support.

The result is a volume that outlines agreed priorities for research and measures by which we may advance understanding. It is not intended to be prescriptive, recognising that additional topics of interest may be identified and that further research may open unexpected but rewarding avenues for enquiry. We intend, therefore, for this to be a living document which will be added to the DVMWHS website and updated periodically. With this aim in mind, it is planned to review its impact and influence over the next five years. I hope that it will be a valuable tool for shaping future research into a unique and fascinating location that has had a huge impact on the way we continue to live and work.

Councillor Ellie Wilcox
Chair of Derwent Valley Mills World Heritage Site Steering Group
Derbyshire County Council

Fig. 1.1 Detail of an oil painting by Ramsay Richard Reinagle (c.1830) showing a turbulent River Derwent as it cuts through the Lower Carboniferous (Dinantian) limestones that outcrop between Matlock and Cromford. Much admired by 18th century and later travellers, the Matlock Gorge provides the northern gateway to the World Heritage Site (© Buxton Museum and Art Gallery)

1. INTRODUCTION

1.1 Preface

This document provides a research framework for the Derwent Valley Mills World Heritage Site and its wider Buffer Zone. The Site extends for some 24 km along the Derwent Valley, from Masson Mills to the Derby Silk Mill, and encompasses the mill complexes at Cromford, Lea Bridge, Belper, Milford and Darley Abbey (Fig.1.2).

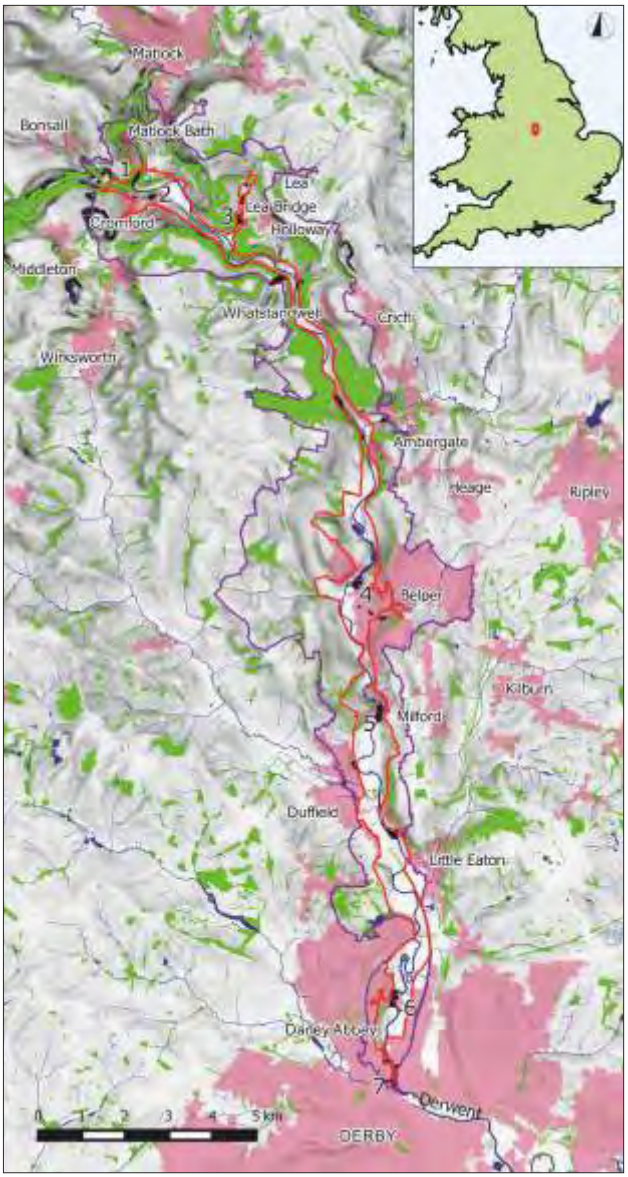


Fig.1.2 Location of the Core (dark red) and Buffer (purple) Zones of the World Heritage Site, showing relief, drainage, woodland (green), main built-up areas (light red) and historic mill sites (black). Key sites: 1. Masson Mills; 2. Cromford Mills; 3. John Smedley; 4. Belper Mills; 5. Milford Mills; 6. Boar's Head Mill; 7. Silk Mill (contains Ordnance Survey data © Crown copyright and database rights 2016; compiled by Steve Malone)

The project has been guided by a Core Management Team comprising David Knight (Trent & Peak Archaeology, York Archaeological Trust), Mark Suggitt (DVMWHS), Dave Barrett (Derbyshire County Council) and Paddy O'Hara (Historic England), with administrative support from Gwen Wilson (DVMWHS). It was conducted between April 2013 and August 2016 on behalf of the World Heritage Site, with the aid of funding from Historic England. The research framework has been developed in close liaison with the Derwent Valley stakeholder community, and is modelled upon the Updated Research Agenda and Strategy that was developed for the historic environment of the East Midlands.[1] In common with that work, it comprises in essence a synthesis of current views on the priorities for research (the **Agenda**) and procedures for advancing our understanding of these (the **Strategy**). It focuses upon research themes and topics identified by the region's stakeholder community, and seeks to integrate the rich variety of archaeological, built environment and historical data that may be drawn upon for study of the cultural and landscape history of the Derwent Valley. From the chronological perspective, it follows the period classification employed in the *East Midlands Historic Environment Research Framework*,[2] and aims to set the industrial developments that underpin the Valley's World Heritage status in their wider chronological context (Chapter 1.4).

Fig.1.3 Derby Silk Mill, opened in 1721. The introduction by John Lombe of technology developed in Italy enabled silk to be thrown on water-powered machines, and provided an important first step in the growth of factory production in the Derwent Valley. The first mill, which was destroyed by fire in 1910, is illustrated in this 1776 watercolour by Moses Griffiths. All Saints Church (now Derby Cathedral) is shown in the background (© Derby Museums Trust)

This document builds upon a draft Research Framework for the Site that was circulated internally in 2012[3] and an assessment of the history and development of the Site that was published in 2011 by the Derwent Valley Mills Partnership (Fig.1.6).[4] The latter represents an update of the Nomination document that was prepared by the Derwent Valley Mills Nomination Steering Panel for inscription of the Site on the World Heritage List.[5] The 2011 publication includes a synthesis of the development of the World Heritage Site, a gazetteer of its built heritage (including photographs and descriptions of important built assets), biographical notes on the Valley's mill owners and a comprehensive bibliography, thus providing a firm and readily accessible foundation for this Agenda and Strategy.

1.2 Managing the World Heritage Site

The Derwent Valley Mills and the surrounding landscape were inscribed as a World Heritage Site by UNESCO in 2001 in recognition of the importance of the area for the development of the factory system. This is manifested by the development of innovative building types to house machinery for manufacturing textile products (Figs 1.3–4). In addition, the need to provide workers' housing and other facilities resulted in the creation of early factory colonies that, at Cromford, Belper and elsewhere, have survived in a remarkably intact state (Fig.1.5). The Property's Statement of Outstanding Universal Value, as expressed through its Values and Attributes, is the golden thread that runs through its Management Plan and the work of the Partnership.

Fig.1.4 Detail of a watercolour by William Day (c.1789), looking from Cromford village towards Sir Richard Arkwright's first cotton-spinning mill, built in 1771 (© Derby Museums Trust)

Fig.1.5 The northern terrace of Long Row, Belper, built by the Strutts between 1792 and 1797, provides an excellent example of the industrial housing constructed by the mill owners for their workforce. The houses in this row are of Derbyshire gritstone, with a continuous sloping eaves line, and have floor plans that interlock around the staircase (photograph: David Knight; © Trent & Peak Archaeology)

A Global Heritage

Recognition of the Site's global significance brings the responsibility, specified in the World Heritage Convention, to ensure that the Property is 'protected, conserved, presented and transmitted to future generations'. The UK signed this international treaty in 1984. It informs governments how World Heritage Sites are to be managed. UNESCO sees this duty of care resting with the UK government, which has devolved management of the Site to the Derwent Valley Mills Partnership. In recognition of this responsibility, the Partnership seeks to ensure engagement with international initiatives such as the European Landscape Convention[6] and UNESCO policies on climate change impacts.[7] Such concerns underpin several of the Strategic Objectives that form the heart of this document (Chapter 4).

Management Structure

Management of the World Heritage Site is a complex matter. The site stretches 15 miles (24 km) along the river valley from Matlock Bath southwards to Derby. The sites within it are owned by many different land and property owners and are protected through a variety of UK planning and conservation laws. It is also a popular destination for local people and tourists. The aims of the Property are not solely about conservation and protection. It has always had socio-economic aims within its vision and mission.

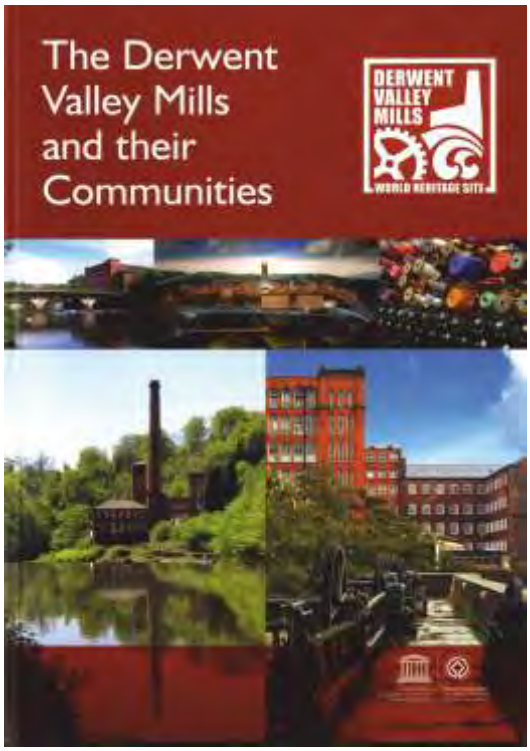


Fig. 1.6 The 2011 update of the Nomination document includes discussion of the Site's industrial development and an audit of its key built environment assets (© Derwent Valley Mills Partnership)

The Property is managed through the Economy, Transport and Communities Department of Derbyshire County Council and has a Steering Group that has grown from a locally based partnership. The Partnership is funded by the local authorities, particularly Derbyshire County Council. It also receives advice from specialists and regional, national and international agencies. The Steering Group and the DVMWHS team manage the relationship between the diverse partners to coordinate activity and provide advice, facilitating partners to achieve mutually supportive aims. The structure of panels and working groups, along with the engagement of volunteers, ensures that communities have a role and a voice within the management of the Property.

The Management Plan

The World Heritage Site works to a Management Plan, which has been developed through extensive consultation with stakeholders and the public. It includes an analysis of the current issues and opportunities facing the Property and provides an action plan which aims to address them. The Vision, Mission and Aims that underpin this plan are defined below.

Vision:

- To celebrate the Outstanding Universal Value of the World Heritage Site, enabling the global community to enjoy, engage with and be inspired by it.
- To be renowned for best practice in World Heritage Site management and for its contribution to the local and regional economy.
- To become a popular, quality tourist destination, shaping a creative future and becoming a symbol of regional and national pride.

Mission:

- To maintain the Outstanding Universal Value of the World Heritage Site by protecting, conserving, presenting, enhancing and transmitting its unique culture, heritage, economy and landscape in a sustainable manner.

Aims:

- **To protect, conserve and enhance the Outstanding Universal Value of the DVMWHS.** Policies focus on the statutory and policy framework that will protect the Property against developments impacting on its Outstanding Universal Value and on the monitoring and conservation activities that need to be undertaken to ensure that it is effective.
- **To promote public awareness of and access to the DVMWHS** through a range of social media, publications and activities, including the successful *Discovery Days* festival. It also examines transport issues within the Property and ways to encourage the use of public transport.
- **To promote the development of sustainable tourism within the DVMWHS.** The development of the Property as a sustainable tourist destination is an important aim encompassing marketing activities, arts projects and the actions required by Partnership members to improve the infrastructure and the attractions offered within the Property.

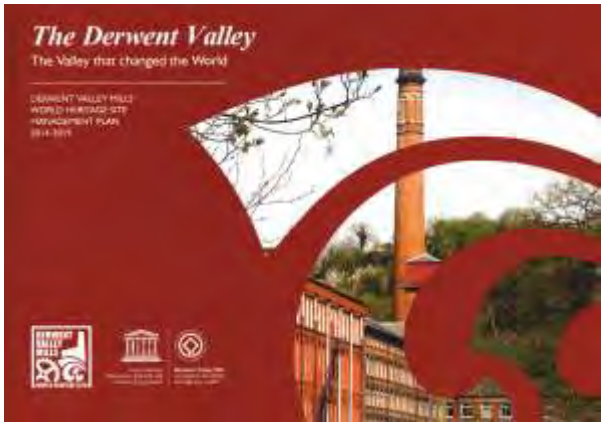


Fig. 1.7 The current World Heritage Site Management Plan provides a strategic vision for the period from 2014 to 2019 (© Derwent Valley Mills Partnership)

- **To enhance the economic and social well-being of the DVMWHS** and its communities so that local people and businesses feel engaged with the Property and can gain benefits from it. Data collected on its economic and social impacts will assist future funding applications.

- **To promote public understanding of the DVMWHS by facilitating research.** This builds upon an existing body of research and publication on the history of the Property and aims to strengthen partnerships with universities. A key objective is the production of a research framework for the Property.

- **To promote educational use of the DVMWHS for formal and informal learning.** The Property is a destination for local and regional schools. It is planned to develop additional partnerships and projects within the Property and with schools, colleges and universities. This will enable the Site to become both a subject for study and an inspiration in areas of creativity and informal learning.

- **To build strong partnerships with volunteers and local, regional, national and international stakeholders.** Strong partnerships are essential to the future of the Property in terms of credibility, visibility, the delivery of projects and future funding. The role of working with and supporting the many volunteer organisations which aid the Property will continue to be essential.

- **To work with partners to access funding and deliver projects.** Partners within the Property benefit from advice on funding bids and need to coordinate bids to maximise success.

- **To manage the Partnership in an efficient and sustainable manner** through robust internal systems, the securement of adequate long-term revenue resources to support the Partnership and the development of long-term capital projects which will have considerable positive impacts on the Property.

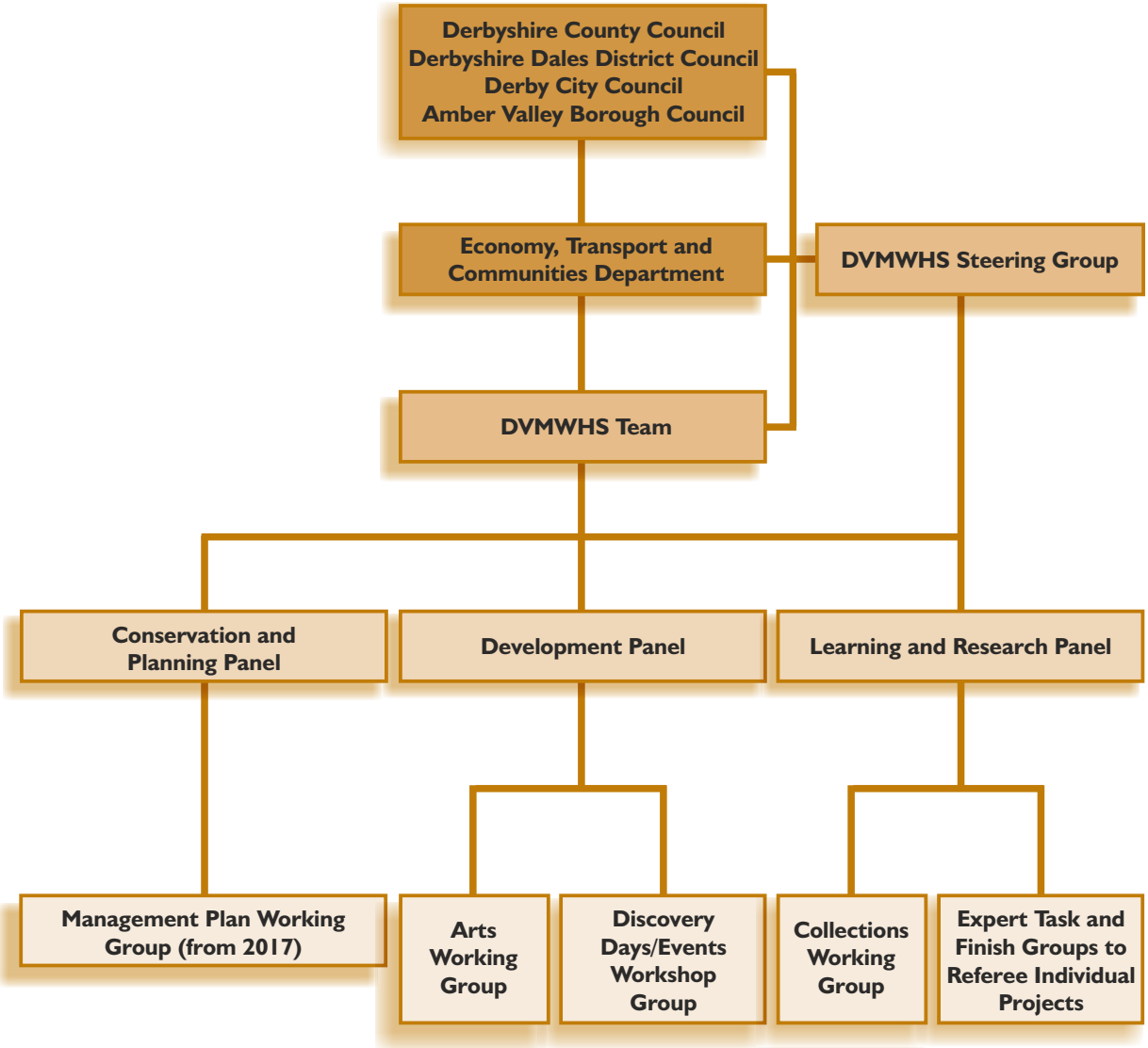


Fig. 1.8 Delivery structure for the Derwent Valley Mills World Heritage Site

1.3 Why do we need a Research Framework?

The DVMWHS Steering Group has guided the development of a Management Plan for 2014 to 2019, in line with its mission 'to maintain the Outstanding Universal Value of the World Heritage Site by protecting, conserving, presenting, enhancing and transmitting its unique culture, heritage, economy and landscape in a sustainable manner'. The need for a robust research framework, which is a key requirement for maintaining the Site's status with UNESCO, is a principal aim within the document (Aim 5, Policy 9.1); this is supported also by the Derwent Valley Mills Partnership and DVMWHS Educational Trust (Registered Charity No: 1099279).

From the national perspective, research frameworks for the historic environment are now in place for most regions of England, including the East Midlands, and are viewed as crucial elements of the planning process as well as important tools in the allocation of research funds. To ensure that this document integrates effectively with the framework developed for the wider East Midlands region, we have adopted here the innovative template developed for presentation of the Agenda and Strategy for that area.[8]

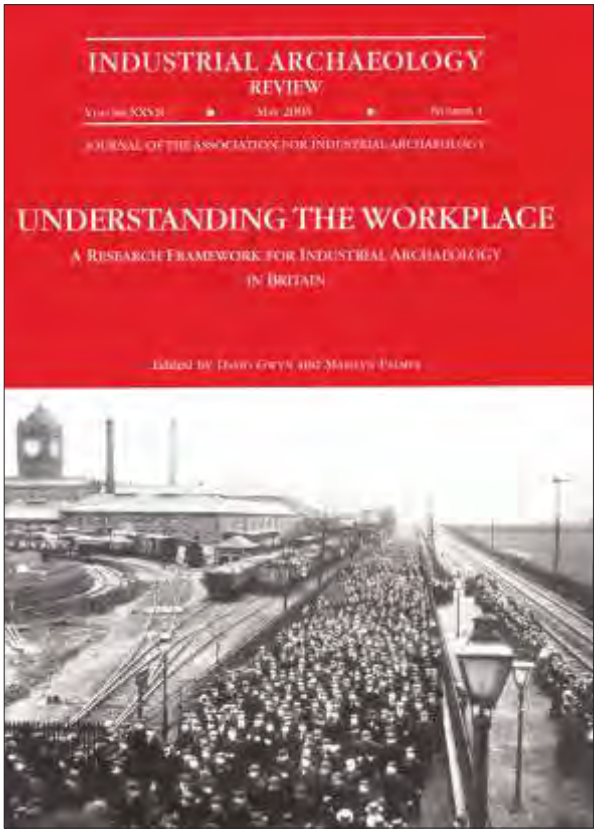


Fig.1.9 Close links may be drawn between the research priorities identified for the DVMWHS and those highlighted in Understanding the Workforce, *published in 2005 in the* Industrial Archaeology Review *(reproduced by courtesy of the Association for Industrial Archaeology and the Science Museum/Science and Society Picture Library)*

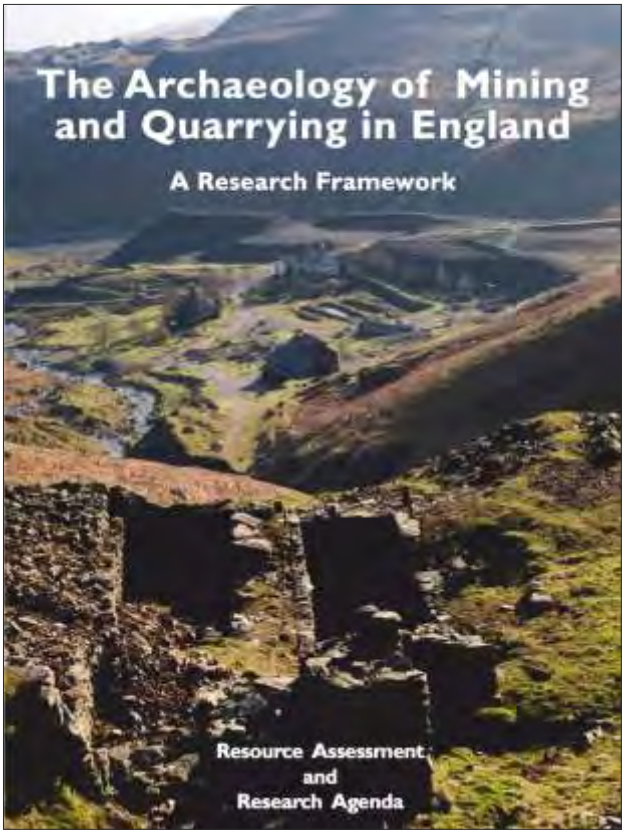


Fig.1.10 The National Association of Mining History Organisations published in 2016 a research agenda for the study of mining and quarrying. Members are currently working on a strategy to define measures for advancing understanding of the research priorities identified in that document (© NAMHO)

Thematic research frameworks with particular relevance to the DVMWHS have also been developed in recent years, including those published by the Association for Industrial Archaeology (Fig.1.9)[9] and the National Association of Mining History Organisations (Fig.1.10)[10] and the thematic frameworks developed by Historic England for the historic industrial[11] and urban[12] environments. These and other research documents are listed in the bibliography (Chapter 6.7).

On a broader scale, the ICOMOS-TICCIH[13] Dublin Principles of 2011[14] place considerable importance on the requirement for researching and documenting industrial structures, sites and landscapes from historical, technological and socio-economic perspectives. The World Heritage Site Steering Group is committed to exploring the potential of the Site as a focus for nationally and internationally important research, which in turn requires a clear statement of its research priorities.

1.4 Spatial and Chronological Scope

We are concerned principally with developments in the tightly defined riverine corridor that forms the focus of the World Heritage Site. However, discussion of many issues,

such as the origins of industrialisation and the impact of the technological innovations spearheaded by Sir Richard Arkwright, Jedediah Strutt and other mill owners, necessitates consideration of developments beyond the study area. In consequence, some of our Agenda Themes and Topics and some of the Strategic Objectives devised to elucidate these range beyond the strict geographical limits of this inquiry.

Fig.1.11 Lidar images of the Derwent floodplain from Cromford to Derby reveal intricate networks of palaeochannels, as shown here near Little Eaton. Some channels may truncate medieval ridge and furrow earthworks and may signify a phase of more dynamic riverine activity associated with the climatic changes of the Little Ice Age (source data © Environment Agency; see also Fig.1.16)

Moreover, although the Industrial Revolution remains the focus of study, we have sought to embrace research themes and topics covering a wider span of human activity in order that developments from the 18th century may be viewed in context. Thus, although particular consideration is given to themes such as the growth of textile mills, the development of canals, railways and other transport infrastructure, and the socio-economic, political, religious and artistic impacts of industrialisation, close reading of the text will reveal interests in themes that require significantly longer chronological perspectives if knowledge is to be advanced. Study of the origins of factory-based textile production, for example, requires consideration of the Valley's long history of industrial activity, while understanding of the potential impacts of climate change upon the historic environment resource is enhanced by study of the landscape impacts of the climatic conditions that characterised the Medieval Warm Period (*c.*900–1300) and Little Ice Age (*c.*1450–1850; Fig.1.11).[15]

1.5 Stakeholder Consultations

The project's management team has consulted widely during the compilation of this research framework, which is a distillation of views provided by a diverse body of stakeholders. The team has been guided by a Steering Group including representatives of the DVMWHS Steering Group and former Research and Publications Panel[16] and of other regional and national organisations with interests in the cultural heritage of the World Heritage Site. Representatives were selected with the aim of maintaining an appropriate balance between the community, academic, curatorial, museum, cultural heritage management and contracting sectors, thus ensuring wide stakeholder representation. The key roles of this group have been to assist determination of the form and scope of the research framework, advise on consultees, monitor the academic progress of the project, assist with the writing of Strategic Objectives, validate the final document and agree the strategy for monitoring research progress.

Further input has been provided by a Specialist Panel including all other members of the DVMWHS Steering Group and former Research and Publications Panel and a broad range of external specialists. This has ensured ready access to stakeholders with appropriate expertise and has assisted in the development of a pool of Strategic Objective authors. Members of the Specialist Panel were selected with the aim of obtaining advice on key specialist topics (eg mill architecture, industrial housing, transport networks and pictorial art) and the history of the several mill communities that are dispersed along the Valley. Efforts were also made to ensure that membership reflected the diversity of the historic environment sector, with representatives of local archaeological and historical societies, regional universities and museums, county historic environment services, archaeological contracting organisations and national bodies such as the Association of Local Government Archaeological Officers (ALGAO), Historic England, the Council for British Archaeology (CBA) and the Institute of Historic Building Conservation (IHBC), together with independent researchers.

Beyond these groups, we have consulted widely with individuals and organisations interested in the cultural heritage of the Derwent Valley, with the aim of building upon the expertise that resides in established organisations

along the Valley and upon the knowledge and enthusiasm of individuals interested in the area's heritage resource. Our list of consultees continues to grow as additional organisations and individuals with interests in the World Heritage Site are identified, and we anticipate further growth as the Agenda and Strategy evolve.

1.6 Developing the Agenda

We composed a draft Research Agenda following consultations with members of the World Heritage Site Research and Publications Panel and the project Steering Group. This draft document, which comprised a series of key Agenda Themes and within each of these a number of more specific Agenda Topics, was circulated widely to consultees prior to discussion at an Agenda Workshop convened at Cromford Mills in July 2013 (Fig.1.12). All consultees were invited to the event, and feedback provided during small group discussions and a concluding plenary session was incorporated into an updated Agenda that was circulated widely for further comment.

Fig.1.12 Debating the research priorities for the study of landscape and environment (Agenda Theme 10): small group discussion at the Agenda Workshop convened in July 2013 at Cromford Mills (photograph: Sukie Khaira; © Derwent Valley Mills Partnership)

We identified during this process eleven Agenda Themes and, within each of these, up to ten Agenda Topics. The breadth of coverage may be illustrated by the Enlightenment theme, where consultees highlighted the importance of research on a wide diversity of topics, including: the contribution of studies of the earth sciences and antiquities to perceptions of the past; the impacts of Nonconformism and other free-thinking philosophies upon Valley communities (Fig.1.13); changing interpretations of the Derwent Valley arising from depictions of the region by Enlightenment artists; and the social and economic impacts upon the region of 18th century tourism and consumer culture (Chapter 3: Agenda Theme 3). As another example, topics raised during discussion of the impacts of industrialisation upon the urban and rural labour force included: changing gender and age roles and consequent changes in family structure (Fig.1.14); developments in the servicing and support of Valley communities by investments in welfare, cultural, educational and spiritual services; the impacts of factory working upon community health; the social, economic and political consequences of increased labour migration; and the effects of spiralling food demands upon the region's agricultural economy, labour force and infrastructure (Chapter 3: Agenda Theme 7).

Fig.1.13 Belper Unitarian Chapel, built by Jedediah Strutt in 1788 soon after his conversion to the Unitarian faith: a potent reminder of current debates on the impact of Nonconformism upon the lives of the mill owners and their workforces (photograph: Adrian Farmer; © Derwent Valley Mills Partnership)

1.7 Defining the Strategy

Four Strategy Workshops were convened during 2014 at Derby Silk Mill, Masson Mills, the University of Derby and Strutt's Community Centre (Belper) and focused respectively upon Agenda Themes 1–3, 4–6, 7–9 and 10–11. The aim was to agree for each Theme a series of measures, defined here as Strategic Objectives, which would provide effective mechanisms for advancing understanding of the Agenda Topics. Each Theme was discussed in small group sessions chaired by an appropriate subject specialist and documented by an elected scribe. Chairs and scribes of all groups met at the end of the day to review the results of discussion, and determined for each Theme the Strategic Objectives that had been accorded the highest priorities during discussion. The results were reviewed by the Core Management Team, following which a draft document summarising the agreed Agenda Themes and Topics and proposed Strategic Objectives was circulated to the Steering Group for comments and approval prior to wider dissemination. The agreed list of Objectives was circulated to project consultees, with a request for volunteers with appropriate specialist knowledge to lead on the writing of individual Objectives. These Objectives have been peer-reviewed and edited in consultation with the authors and form the core of this document (Chapter 4).

Fig.1.14 Gender and age boundaries were tightly drawn in the mill communities, with women and children forming the backbone of the mills' working force and men labouring in activities such as framework-knitting or weaving, nail manufacture and farm work. This image shows women winding cotton onto bobbins at the Boar's Head Mills (source: Illustrated Times*, July 1862; courtesy of Derbyshire Local Studies Libraries and www,picturethepast.org.uk; DRBY00496)*

1.8 Reviewing the Agenda and Strategy

The DVMWHS has taken ownership of the research framework and has assumed responsibility for its long-term promotion and maintenance. It is proposed that progress be monitored by the Learning and Research Panel, with assessment of the need for updating as projects unfold. Monitoring mechanisms will be developed during this period, with particular emphasis upon the development of links with the interactive research framework that has been developed for the wider East Midlands region (Fig. 1.15).

References

[1] Knight, D *et al* 2012 *East Midlands Heritage: An Updated Research Agenda and Strategy for the Historic Environment of the East Midlands.* Nottingham: University of Nottingham & York Archaeological Trust

[2] http://archaeologydataservice.ac.uk/researchframeworks/eastmidlands/wiki/

[3] DVMWHS Board 2012 *Research Framework 2012–2017.* Matlock: DVMP

[4] Derwent Valley Mills Partnership 2011 *The Derwent Valley Mills and their Communities.* Matlock: DVMP

[5] DVMP 2000 *Nomination of the Derwent Valley Mills for Inscription on the World Heritage List.* Matlock: DVMP

[6] http://www.coe.int/en/web/landscape

[7] http://www.unesco.org/new/en/natural-sciences/special-themes/global-climate-change/

[8] Knight, D *et al* 2012; see note 1

[9] Gwyn, D and Palmer, M (eds) 2005 *Understanding the Workplace: A Research Framework for Industrial Archaeology in Britain. Industrial Archaeology Review* **27** (1)

[10] Newman, P (ed) 2016 *The Archaeology of Mining and Quarrying in England: A Research Framework for the Archaeology of Extractive Industries in England. Resource Assessment and Agenda.* Matlock Bath: NAMHO

[11] https://content.historicengland.org.uk/content/docs/research/industrial-research-strategy.pdf

[12] https://content.historicengland.org.uk/content/docs/research/draft-urban-strategy.pdf

[13] The **I**nternational **Co**uncil on **Mo**numents and **S**ites (ICOMOS) and **T**he **I**nternational **C**ommittee for the **C**onservation of **I**ndustrial **H**eritage (TICCIH)

[14] http://www.icomos.org/Paris2011/GA2011_ICOMOS_TICCIH_joint_principles_EN_FR_final_20120110.pdf

[15] Howard, A J *et al* 2016 'Assessing riverine threats to heritage assets posed by future climate change through a geomorphological approach and predictive modelling in the Derwent Valley Mills WHS, UK'. *Journal of Cultural Heritage* **19**, 387–94

[16] From 2016, the Learning and Research Panel: Fig.1.8

Fig.1.15 The East Midlands Historic Environment Research Framework *has been converted to an interactive digital resource with the aim of encouraging updating by stakeholders*

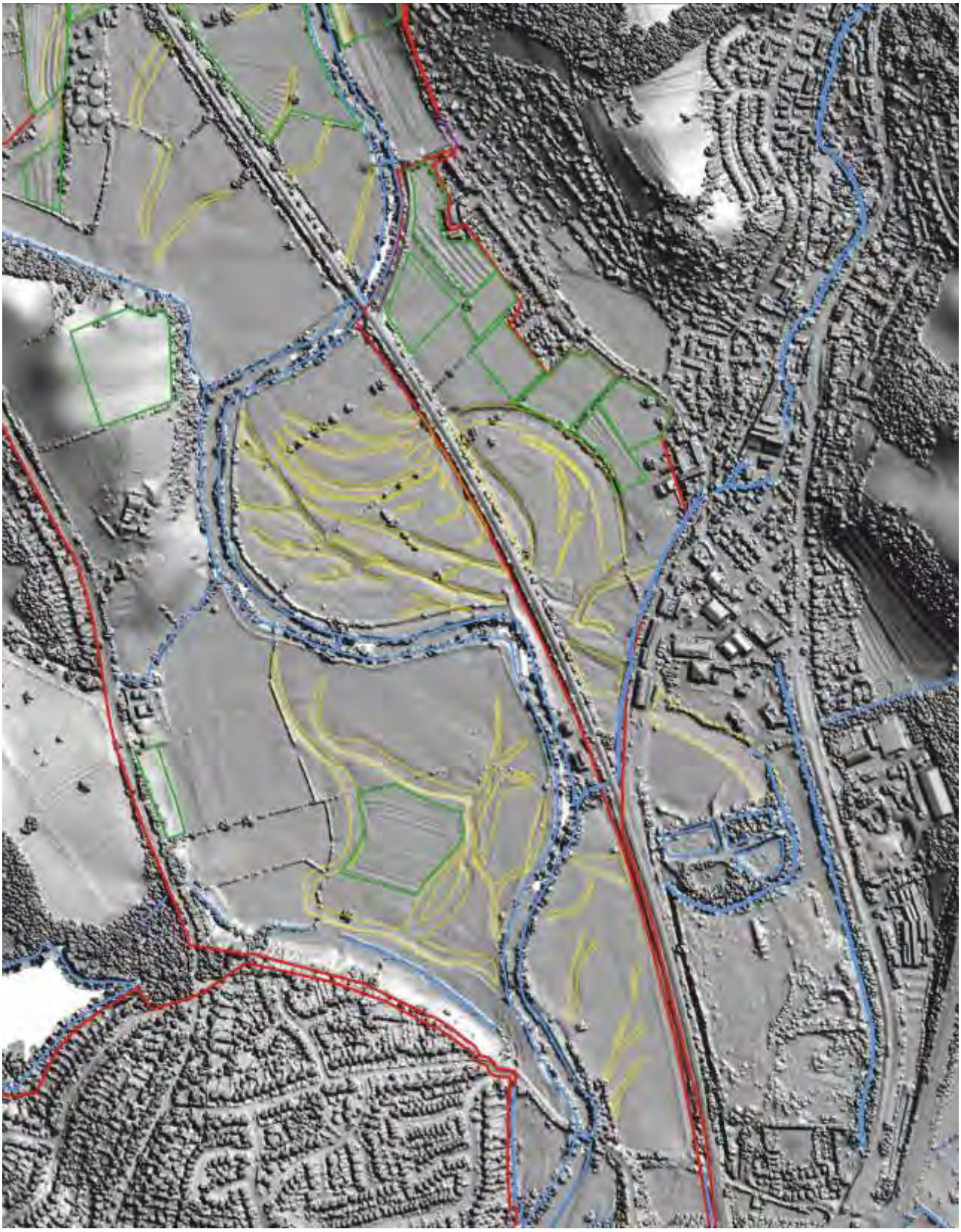


Fig.1.16 Interpretative plot of palaeochannels (yellow outline) visible in the lidar image of the Derwent Valley near Little Eaton (Fig.1.11). This shows clearly the intricate pattern of abandoned river channels across the floodplain and their relationship to historic landscape features such as ridge and furrow (source data © Environment Agency)

2. BUILDING THE RESEARCH FOUNDATIONS

Attention is focused in this chapter upon a range of general measures that it is recommended be implemented to provide a secure foundation for future research. These echo and expand many of the proposals developed for the *East Midlands Historic Environment Research Framework*,[1] but with an emphasis upon recommendations of particular relevance to the Derwent Valley.

2.1 Developing the Information Base

1 *Planning briefs in advance of development:* ensure that contracting organisations working within the World Heritage Site provide appropriate reference to the Agenda Topics and Strategic Objectives defined in this document in schemes of investigation relating to developments impacting upon the Valley. This will assist targeting of resources on questions of particular concern to the regional research community (eg Strategic Objective 2C) and will facilitate monitoring via the development process of progress on the Research Strategy.

2 *Standards and guidelines:* ensure that investigations of the built environment and archaeological resource take account of the best practice recommendations of appropriate subject and period groups.

3 *Site location and survey:* maximise the potential of the aerial photographic record by continued mapping of cropmarks, earthworks, etc and investigate further the effectiveness of remote sensing techniques in different landform zones. The use of innovative terrestrial geophysics, airborne lidar, multispectral and hyperspectral imaging and ground-based scanning techniques for the location of archaeological sites should be encouraged, with particular emphasis upon areas with few known archaeological sites (for example, floodplain zones where archaeological features may be buried beneath alluvium and in woodlands not yet systematically searched for earthwork remains: Strategic Objective 2A).

4 *Derbyshire Landscape Character Assessments*[2] *and Historic Landscape Characterisation (HLC)*[3]*:* update as research refines our understanding of landscape developments and historic landscape character and focus resources upon the creation of an online HLC resource.

5 *Built environment assessments:* undertake assessment and surveys of built environment resources that are currently poorly understood (eg Strategic Objective 9C) and ensure full integration in historic environment research of archaeological and built environment data.

6 *Building recording:* encourage more rigorous requirements for building recording through the planning process and the application where appropriate of laser technology and photogrammetry to the high-definition surveying of historic buildings (eg Fig. 2.1). It is recommended that an archive of digital survey records that may be used for research and management purposes be compiled and maintained as a long-term resource (see also Strategic Objective 9D).

7 *Building materials analysis:* encourage the use of scientific techniques of materials analysis (eg analyses of mortar, stone and architectural paint used in mill buildings) and appropriate scientific dating techniques.

8 *Industrial remains:* undertake an audit and condition assessment of industrial archaeological remains, including the physical remnants of early transport routes (eg packhorse tracks), as a foundation for further synthetic study of industry and trade and as an aid to resource management.

Fig.2.1 Laser-scan rendering by the Heritage Lottery-funded Young Roots *project*[4] *of Leawood Pumphouse on the Cromford Canal (source: Derbyshire County Council). Built in 1849, the pumphouse building accommodated a steam pumping engine that drew water from the Derwent to increase the supply of water to the Cromford Canal*

9 *Monument classifications:* ensure that field investigations focus upon the development and refinement of regional monument typologies (eg industrial archaeological remains in woodlands).

2.2 Enhancing the Archive Resource

1 *Create integrated digital platform:* compile an internet-based platform that would provide a searchable database of key written, photographic, pictorial, cartographic and oral sources relating to the Derwent Valley (see Strategic Objective 1A for details).

2 *Enhance accessibility of historic maps:* create online catalogues of Derwent Valley historic maps and provide access to digital copies where possible.

3 *Derwent Valley bibliography:* compile a comprehensive regional bibliography, building upon and enhancing that provided in Chapter 6, and maintain as an easily accessible and updatable online resource.

4 *Journals of Derwent Valley interest:* contents lists and publications in journals of regional interest should be made available online wherever possible (following the example of the *Derbyshire Archaeological Journal*, which in 2016 became freely available via the Archaeology Data Service).

5 *Digital reports:* provide online copies of reports focusing upon subjects of Derwent Valley interest (eg via the Historic England and DVMWHS websites, the Archaeological Data Service [ADS][5] and the Derbyshire Historic Environment Record). In the case of archaeological research, details of developer-funded and other projects should be submitted to the ADS in the form of OASIS[6] records, ensuring national dissemination of information about recent work.

6 *Backlog investigations of archaeological sites and buildings:* unlock this information through further analysis and conventional paper or digital publication, with reports and comprehensive archives made available online wherever possible.[7]

7 *Derbyshire Historic Environment Record (HER):*[8] ensure resources are maintained for long-term maintenance and enhancement of the HER, increase public access by further development of online resources, and ensure that the results of academic studies and research are added to maximise its value as a research source.

8 *Geographical Information Systems (GIS) mapping:* encourage the preparation and web publication of period and thematic maps derived from HER and other sources (as exemplified by the work of the Derwent Catchment Partnership).[9]

9 *Artefact studies:* building upon the Derbyshire County Council *Enlightenment!* programme,[10] encourage the focused collection of paintings, artefacts and other material relating to the history of the World Heritage Site.

10 *Portable Antiquities Scheme:* encourage the use of PAS data as a foundation for thematic studies of Derwent Valley artefact distribution patterns (from the prehistoric to Modern periods).[11]

Fig.2.2 View of the Milford mill complex, developed by Jedediah Strutt from the 1780s but demolished in the 1960s. The upstream weir was built between 1787 and 1792, while the weir in the foreground (with central fish ladder) was constructed before 1840. These and many other historic photographs of the Derwent Valley may be viewed on the Picture the Past website (RAP Co Ltd, c.1910; courtesy of Derbyshire Local Studies Libraries and www.picturethepast.org.uk; DCHQOO1437)

2.3 Improving Communications

1 *Voluntary bodies:* local societies and volunteers should be kept aware of research work and should be closely involved in research programmes (eg via the newly updated DVMWHS website).

2 *Exhibitions:* museum exhibitions of recent research in the Valley should be encouraged (following, for example, the model of the recent *Enlightenment!*[12] project).

3 *Closer liaison between stakeholder groups:* encourage more dialogue between curators, staff in universities, schools and other academic institutions, contractors, consultants and the voluntary sector, and forge closer links between different academic disciplines.

4 *Engage more widely with diverse cultural groups:* build upon the results of the *Global Connections in Cotton* project[13] and other initiatives aimed at extending awareness of the World Heritage Site amongst under-represented social groups.

5 *Enhance the research role of the Derbyshire Historic Environment Record:* ensure staff are involved fully in the development of research projects, encourage work that will enhance HER data and improve the transfer to the HER of digital data.

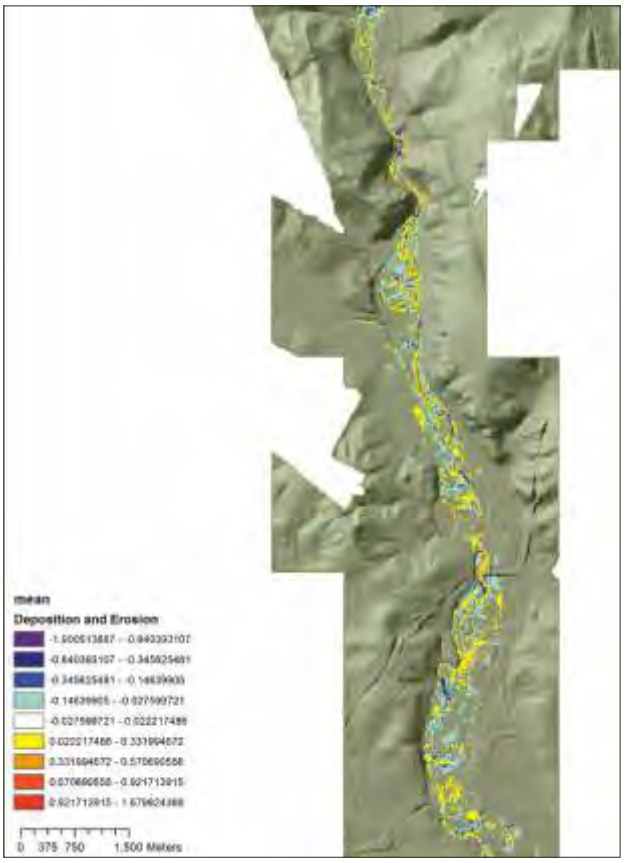


Fig.2.3 Lidar image of the Lower Derwent Valley immediately north of Derby, showing the potential impact of the precipitation increases (and thus surface runoff levels) predicted by current climate change models on fluvial erosion and deposition up to 2049. These were simulated using the UKCP09 Weather Generator, based upon the high emissions scenario for 2020–49 (yellow to red: increasing erosion; light blue to purple: increasing deposition; reproduced by courtesy of Tom Coulthard; source data © Environment Agency)[14]

2.4 Palaeoenvironmental Resource

1 Ensure best practice environmental sampling, processing, analysis and dating methodologies are adhered to during site investigations.[15]

2 To maximise its potential, ensure full integration of environmental research with other site work.

3 Develop a strategy to ensure the incorporation of palaeoenvironmental data in the Derbyshire HER.

4 Ensure that palaeoenvironmental data obtained during investigations in the Derwent Valley are incorporated in the web-based East Midlands environmental database.[16]

5 Encourage studies with potential for generating data that would contribute to studies of historic climatic change and the potential impact of climate change upon the historic environment resource (eg by flood modelling: Fig.2.3).[17]

6 Develop period-specific sampling strategies with particular relevance to the Derwent Valley, permitting targeted investigations of organically rich deposits (eg analyses of organically rich channel fills to examine correlations between fluvial processes and the Medieval Warm Period or Little Ice Age: Strategic Objective 10D; Figs 1.11, 1.16 and 2.4).[18]

7 Encourage the collection of environmental data that have potential for elucidating the environmental impacts of past industrial activities (eg to determine the accumulation in alluvial sediments of toxic contaminants derived from the mining of lead and other metals: Strategic Objective 10E).[19]

References

[1] http://archaeologydataservice.ac.uk/researchframeworks/eastmidlands/wiki/Main
[2] http://www.derbyshire.gov.uk/environment/conservation/landscapecharacter/
[3] https://historicengland.org.uk/research/approaches/research-methods/characterisation-2
[4] Strange-Walker D 2015 'Technology then and now'. *Archaeology and Conservation in Derbyshire* **12**, 8–9
[5] http://archaeologydataservice.ac.uk/archives/view/greylit
[6] **O**nline **A**ccess to the **I**ndex of **A**rchaeological **S**ites (http://oasis.ac.uk/pages/wiki/Main)
[7] Eg Church Wilne, Derbyshire: shrunken medieval village; http://archaeologydataservice.ac.uk/archives/view/churchwilne_eh_2010/
[8] Chapter 5.14
[9] http://www.derbyshirewildlifetrust.org.uk/what-we-do/projects/derbyshire-derwent-catchment-partnership
[10] Westwood, R and Rhodes, A 2013 *Enlightenment! Derbyshire Setting the Pace in the 18th Century.* Buxton: Derbyshire County Council
[11] https://finds.org.uk
[12] Westwood and Rhodes 2013
[13] http://globalcottonconnections.wordpress.com
[14] http://ukclimateprojections.metoffice.gov.uk; see Howard *et al* 2016, 2–3 (notes 17 and 18 below)
[15] Campbell, G *et al* 2011 *Environmental Archaeology: A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation*, 2 edn. Portsmouth: English Heritage
[16] http://archaeologydataservice.ac.uk/researchframeworks/eastmidlands/wiki/Enviro
[17,18] Howard, A J *et al* 2016 'Assessing riverine threats to heritage assets posed by future climate change through a

geomorphological approach and predictive modelling in the Derwent Valley Mills WHS, UK'. *Journal of Cultural Heritage* **19**, 387–94

[19] Kossoff, D *et al* 2016 'Industrial mining heritage and the legacy of environmental pollution in the Derbyshire Derwent catchment'. *Journal of Archaeological Science: Reports* **6**, 190–9

Fig.2.4 View of the Lower Derwent Valley in the vicinity of Darley Abbey, showing relict river channels (yellow outline) and ridge and furrow earthworks revealed in a lidar survey of the floodplain. The Boar's Head Mills complex at Darley Abbey is visible inside the meander core in the bottom left foreground (source data © Environment Agency)

3. THE RESEARCH AGENDA AND STRATEGY

This chapter provides a synthesis of current views on the priorities for research (the **Agenda**), together with measures proposed for the advancement of understanding (the **Strategy**).

Research Agenda

Eleven **Agenda Themes** were defined during the stakeholder consultations described in Chapter 1.5 and are listed below. More specific research questions (**Agenda Topics**) were identified within each Theme. To assist referencing, these have been allocated unique numerical codes denoting both Theme and Topic (1.1, 1.2 and so forth).

Research Strategy

Strategies for building the foundations of further research have been defined in the preceding chapter, and attention is focused here upon measures for advancing understanding of the research priorities that are defined in the Agenda. These measures are termed **Strategic Objectives**, thus emphasising their close link to the Research Strategy and their focus upon clearly defined goals.

Up to six Strategic Objectives have been defined for each Agenda Theme. For ease of reference, each Objective has been allocated a unique alphanumeric code incorporating the relevant Agenda Theme number (1A, 1B and so forth). Concise descriptions of each Objective, together with supporting references and illustrations amplifying points made in the text, are provided in the following chapter.

Correlations between Agenda and Strategy

Tables listing the Strategic Objectives that form the foundation of the Research Strategy are placed beneath the list of Agenda Topics defined for each Theme. A filled circle indicates which Agenda Topics are addressed by each Objective.

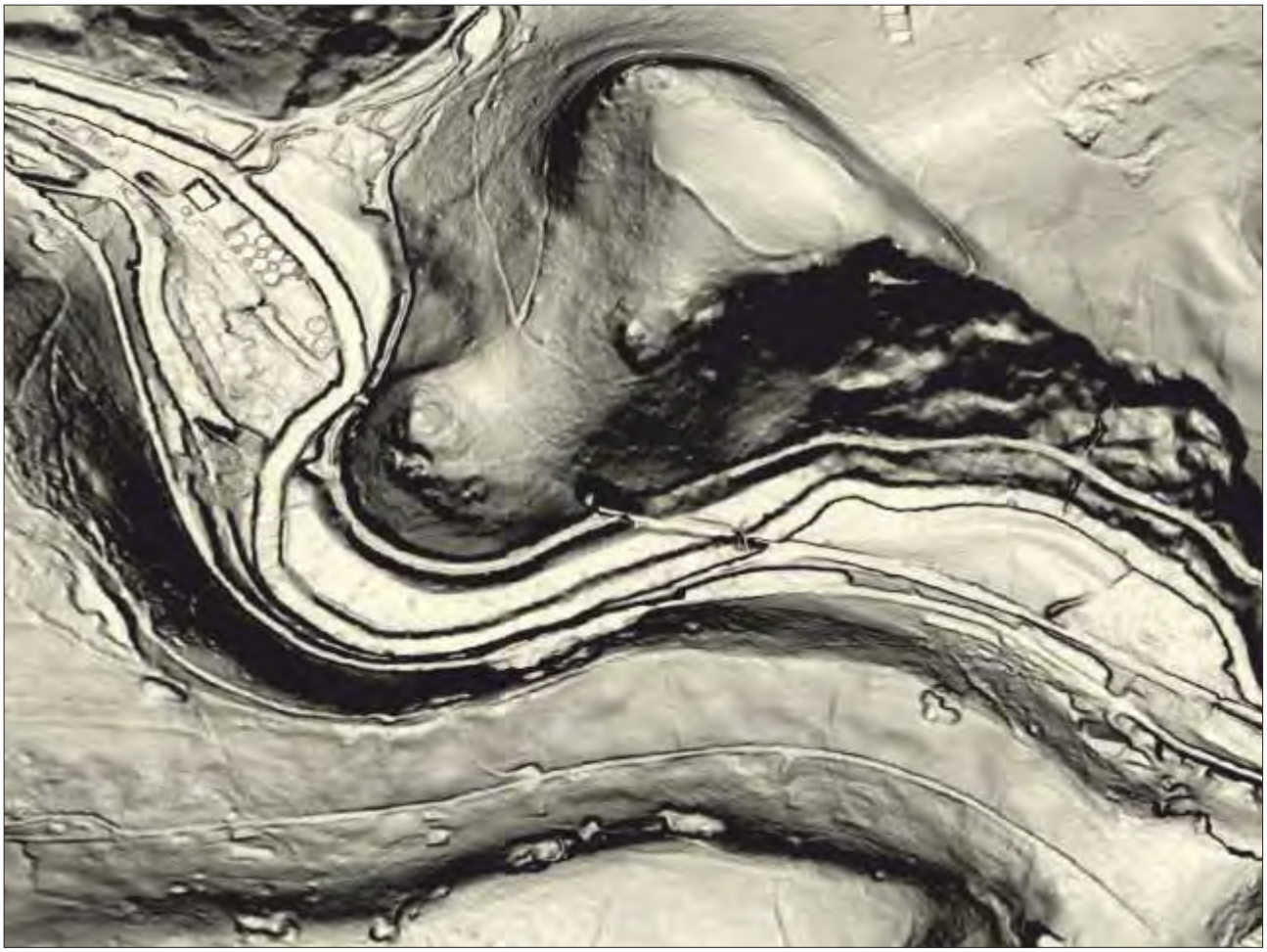


Fig.3.1 Lidar technology[1] provides exciting new opportunities for landscape research, and figures prominently in this research framework. It is a particularly effective reconnaissance technique in densely wooded landscapes, where the facility to filter out vegetation makes it possible to record earthworks and other features concealed beneath the tree canopy. This image shows the extensive earthworks that are concealed beneath the woodland canopy in Lea Wood near Cromford, including what appears to be an embanked ridge-top enclosure of uncertain date and function (centre: top; source data © Environment Agency)

AGENDA THEME 1. CHANGING INTERPRETATIONS OF THE DERWENT VALLEY

AGENDA TOPICS

1.1 How have views on the role of the Derwent Valley as a focus of industrial innovation developed over time, and how may we enhance public understanding of the processes of industrialisation and the significance of the region as a centre of early industry?

1.2 How have historical interpretations of the social, political and economic transformations resulting from industrialisation of the Derwent Valley evolved?

1.3 How have changing interpretations of the Derwent Valley impacted upon approaches to teaching, particularly of the Industrial Revolution?

1.4 How have changing ideas in the fields of social and cultural history, archaeology and geography (particularly in the context of river valley environments) impacted upon studies and interpretations of Derwent Valley communities, and how can we transmit these ideas to the wider public?

1.5 What can further study of wide-ranging historical sources, such as diaries, sketch books and photographs, contribute to our understanding of changing interpretations of the Derwent Valley?

1.6 How has the Valley been portrayed in literature, painting, decorated pottery and other artistic media, and what insights may be gained from these sources into changing perceptions of the region?

1.7 How has inscription of the Derwent Valley Mills on the World Heritage List impacted upon study, interpretation and perception of the region and its socio-economic development, and how does it compare in that respect with other World Heritage Sites (particularly other industrial sites such as Ironbridge and Saltaire)?

1.8 How have views developed on the relationship between the Derwent Valley textile mills, other centres of industrial innovation and cotton-producing areas, particularly the slave-worked plantations of America?

STRATEGIC OBJECTIVES

Objectives 1A –1F	Agenda Topics 1.1 – 1.8							
	1	2	3	4	5	6	7	8
1A Create an integrated digital platform, identifying and collating written, photographic, pictorial, cartographic, oral and other information sources that may shed light upon changing interpretations of the Derwent Valley	•	•	•	•	•	•	•	•
1B Assess the contribution of studies of material culture to our understanding of changing interpretations of the Derwent Valley	•	•			•	•		
1C Compare and critique interpretations of the Derwent Valley in academic studies, fiction, poetry and other textual and media sources, and investigate how these interpretations have evolved	•	•	•	•	•	•	•	•
1D Investigate how the Derwent Valley and its heritage provision is viewed by British diaspora groups, particularly those of African and Indian descent	•	•	•		•	•		•
1E Examine the impacts of inscription upon perceptions of the Derwent Valley and compare with the experiences of other World Heritage Sites	•	•	•				•	•
1F Inspire changes in public perception and understanding of the World Heritage Site by the creation of a digital resource for tours of the Derwent Valley	•			•				

AGENDA THEME 2. INDUSTRY, TRADE AND SETTLEMENT BEFORE THE FACTORY SYSTEM

AGENDA TOPICS

2.1 What can we learn from archaeological, building and documentary sources of the development of metal mining, quarrying and other industries from prehistoric times to the period immediately preceding the Industrial Revolution?

2.2 What roles may medieval monastic communities have played in the early development of industry and what impact may the Dissolution of establishments such as Darley Abbey have had upon economic growth?

2.3 What industries can be identified prior to the Industrial Revolution, how were these interrelated and how did the technical and intellectual skills that developed during this period contribute to the industrialisation of the Derwent Valley?

2.4 What can be deduced from the distribution of prehistoric and later artefacts and raw materials about patterns of exchange and trade prior to the development of the factory system?

2.5 Can we shed further light upon the development of early overland and water-based communication routes (for example, packhorse tracks), what contributions did these make to industrialisation and how may we illuminate the relationship between the utility, bulk and value of cargoes?

2.6 What evidence is there for the management and exploitation of riverine resources prior to the Industrial Revolution (in the form, for example, of fishweirs, wharves and mill dams)?

2.7 What was the extent and nature of domestic spinning and weaving prior to the development from the 18th century of the major textile factories?

2.8 How did the markets for the natural resources and manufactured goods of the Derwent Valley develop prior to the Industrial Revolution?

2.9 Can we shed further light upon changes in the pattern and morphology of pre-industrial settlements?

STRATEGIC OBJECTIVES

Objectives 2A – 2E	Agenda Topics 2.1 – 2.9								
	1	2	3	4	5	6	7	8	9
2A Review the archaeological evidence for the development of industry, trade and exchange before the Industrial Revolution	•	•	•	•	•	•	•	•	
2B Undertake lidar surveys of woodland to locate features indicative of early industrial activity and to guide future documentary, survey and excavation work	•		•		•				
2C Investigate riverine locations for archaeological traces of early mills and other historic water management assets		•			•	•			
2D Review and assess the evidence for the development of textile production in the Derwent Valley prior to the growth of the factory system	•	•	•	•	•		•	•	
2E Review the evidence for settlement of the Derwent Valley before the Industrial Revolution and assess the impact of industrialisation upon settlement morphology and functions	•	•	•				•		•

AGENDA THEME 3. THE ENLIGHTENMENT

AGENDA TOPICS

3.1 How may studies of Derwent Valley society contribute to understanding of the economic, social and political impact of Enlightenment thinkers?

3.2 What may studies of Derwent Valley communities add to understanding of regional variability in the pace and nature of change in 18th century England and the geography and history of the Enlightenment?

3.3 What impact did studies of natural philosophy and the earth sciences have upon communities in the Derwent Valley and how did geological and antiquarian studies in the region revise perceptions of the past?

3.4 What was the relationship between scientific, industrial and technological innovation in the Derwent Valley, and how did developments in these areas impact upon scientific and technical education?

3.5 To what extent may public cultures of Enlightenment have developed across the social spectrum (for example, through regionally based philosophical societies dedicated to the dissemination of knowledge and public lectures)?

3.6 How was the Derwent Valley depicted in the paintings of artists such as Joseph Wright and in other material culture of the Enlightenment?

3.7 What impact did the religious beliefs of the Enlightenment period have upon Valley communities?

3.8 How did 18th century tourism and consumer culture impact upon the Derwent Valley?

3.9 How did 18th century cultures of sensibility influence life in the Valley (in terms, for example, of the spiritual and moral values of women)?

3.10 How did Enlightenment cultures of water shape life and landscapes in the Derwent Valley (for example, by the development of spas and hydropathy)?

STRATEGIC OBJECTIVES

Objectives 3A – 3E	**Agenda Topics 3.1 – 3.10**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
3A Evaluate the extent to which studies of 18th century Derwent Valley communities challenge or support past and present interpretations of the Enlightenment	•	•	•	•	•	•	•	•	•	•
3B Assess the impact of the Industrial Enlightenment upon the development of science, industry, technology and the mechanical arts and skills in the Derwent Valley	•	•	•	•	•	•				
3C Examine the factors underlying the development of tourism during the 18th century and assess the impact upon the Valley of the associated consumer culture			•			•		•		•
3D Assess the impact of Nonconformist and other free-thinking philosophies upon the established knowledge, values and beliefs of Derwent Valley communities	•	•	•		•		•			
3E Investigate the impact of the expanding middle classes upon Derwent Valley society during the 18th century and the details of their business and private lives	•	•	•	•	•		•		•	

AGENDA THEME 4. THE LOW-CARBON INDUSTRIAL REVOLUTION

AGENDA TOPICS

4.1 What attracted the earliest industrial entrepreneurs to the remote stretch of the Derwent Valley between Matlock and Derby?

4.2 How did the innovative system of factory production that was developed by the Lombes at the Derby Silk Mill influence later factory development in the Valley?

4.3 How did the local geology and topography contribute to industrial growth, with respect particularly to sources of constructional and other raw materials and natural energy in the form of water power?

4.4 What contributions may established artisans and mechanics have made to the technological advances of the Industrial Revolution, and what may we learn of their motivations?

4.5 Can we elucidate further the changing relationships between home, workshop and factory-based trades and industries, and how may these patterns have varied from place to place along the Derwent Valley and between this and other regions?

4.6 Can we shed further light upon the variety of different crafts that were conducted in workers' homes, and in particular the relationship between domestic handloom-weaving and framework-knitting?

4.7 What information is available for the financing of early industry?

4.8 How may land ownership, rights over land and water and local political administration have impacted upon the development of early industry?

STRATEGIC OBJECTIVES

Objectives 4A – 4E	**Agenda Topics 4.1 – 4.8**							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
4A Establish the sources of the mechanical expertise that drove industrialisation in the Derwent Valley	•	•		•		•		
4B Determine the impact of factory-based production upon the established economy of home-based manufacture, mining and agriculture					•	•		
4C Investigate the impact of natural resources and geography upon the Derwent Valley textile industry and evaluate the distinctiveness of the Derwent's resource base	•		•					•
4D Review the technological innovations and adaptations that were instrumental in the development of the low-carbon, factory-based industry of the Derwent Valley		•		•				
4E Assess the impact of the ownership and the control of water and land resources upon the development of industry and trade	•		•				•	•

AGENDA THEME 5. INDUSTRIAL METAMORPHOSIS: THE 19TH TO 21ST CENTURIES

AGENDA TOPICS

5.1 How did the individual mill owners react as spinning declined in profitability during the 19th century and the heart of textile manufacture shifted northwards to the fossil fuel-powered mills of Lancashire and Cheshire?

5.2 What impacts did the expansion into the Derwent Valley of the English Sewing Cotton Company have upon the profitability of textile production, beginning with their investment at Masson Mills in 1897 and subsequently at Belper?

5.3 How have factory uses evolved in the 20th and 21st centuries?

5.4 Who took over and invested in the factories as the textile industry declined, who are the current owners and what are their aspirations?

5.5 What will be the socio-economic and built environment legacy of the recent expansion of small medium enterprises (SMEs) into disused mills and other factory buildings, as exemplified by 21st century developments at Cromford and Darley Abbey's Boar's Head Mills?

5.6 How did Derby metamorphose from an early focus of mechanised silk production, following the building of Lombe's water-powered Silk Mill in 1721, into a diverse industrial, commercial and cultural centre of continuing regional importance?

5.7 What is the built environment and archaeological legacy of the industrial innovations and economic and social transformations of the 19th to 21st centuries?

5.8 How has the industrialisation and subsequent de-industrialisation of the Derwent Valley encouraged the development of tourism and recreation?

STRATEGIC OBJECTIVES

Objectives 5A – 5D	Agenda Topics 5.1 – 5.8							
	1	2	3	4	5	6	7	8
5A Identify the factors that encouraged innovation, adaptability and resilience at some cotton mills and in other industries during the 19th and 20th centuries	•	•	•	•			•	
5B Explore the fluctuating fortunes of the post-Enlightenment tourist industry, from the development of the railways in the mid-19th century to the present day							•	•
5C Review the impact of 19th to 21st century industrial and technological changes upon developing lifestyles, society and culture in the Derwent Valley				•	•	•	•	
5D Examine changes in factory ownership as the textile industry metamorphosed from the 19th century to the present day	•	•	•	•			•	

AGENDA THEME 6. THE FACTORY OWNERS, LANDED GENTRY AND MIDDLE CLASSES

AGENDA TOPICS

6.1 How did the mill owners interact with the skilled builders of the factories and industrial infrastructure upon which their wealth depended?

6.2 What contributions may the older landed families have made to the growth of industry, how did members of the landed and factory owners' families interact and influence each other, and to what extent were the profits of the entrepreneurs employed to buy into the establishment?

6.3 How did the members of the industrialists' families interact and influence one another?

6.4 To what extent were the factory owners guided and driven by entrepreneurialism, paternalism, ideology and pragmatism, what moulded their beliefs, and how did their ideology impact on their workers?

6.5 What impacts did the religious beliefs and education of the factory owners have upon their relationships with their employees, and how were their beliefs and values manifested in the industrial communities that they created for the mill workers and their families?

6.6 To what extent was settlement design influenced by the factory owners and how did their wider interests impact on the landscape and on communities?

6.7 Can we elucidate further the role of the factory owners in the development of statutory education and welfare provision?

6.8 What roles were performed by women in the factory-owning families, and what was the impact on family dynamics and inter-generational change?

6.9 Can we develop our understanding of the growth of the middle classes and their impact upon the Derwent Valley communities?

STRATEGIC OBJECTIVES

Objectives 6A – 6F	Agenda Topics 6.1 – 6.9								
	1	2	3	4	5	6	7	8	9
6A Investigate the impacts upon economic growth of the interactions and interdependencies of the early entrepreneurs and the wider social structures that enabled industrialisation		•	•						•
6B Investigate further the developing social, cultural and intellectual interactions of the leading industrialists of the 18th and 19th centuries			•						
6C Establish the business, social and other roles performed by women in the mill owners' families		•	•					•	
6D Investigate the relationships of the mill owners to the builders, millwrights and engineers that constructed the factories and industrial infrastructure of the Derwent Valley		•							
6E Establish how far the religious beliefs, paternalism and pragmatism of the mill owners might have counteracted the threat of revolutionary activity and social unrest				•					
6F Analyse the impact of the ideologies of the factory owners, landed gentry and middle classes upon Derwent Valley communities				•	•	•	•		•

AGENDA THEME 7. THE URBAN AND RURAL LABOUR FORCE

AGENDA TOPICS

7.1 Can we shed further light upon the interactions between pre-factory industrial and agricultural settlements and the impacts upon these communities of the growth of factory production?

7.2 Can we identify the range of employment opportunities for local and migrant workers in industries other than textile production and characterise more closely these industries?

7.3. Can we identify more closely the sources of migrant workers and their social and economic status?

7.4 What was the gender and age balance among factory workers, how did gender and age impact upon workers' roles in the mills and other industrial installations, and how did this balance change over time?

7.5 How did industrialisation, and in particular male and female role divisions in the factory-based production system, impact upon family structure, and especially the relationships between parents and children?

7.6 How did Nonconformism, Luddism, trade unionism, patronage and other social and political developments impact upon the labour force?

7.7 How were the educational, spiritual, recreational and welfare needs of children and adults accommodated, how did these evolve and how did factory owners exercise control?

7.8 What were the impacts of factory work upon the health of the workforce?

7.9 How may the move from a rural to an industrial society have impacted upon folk culture, as manifested for example in music and dance?

7.10 What impact did the spiralling food demands of a growing industrial population have upon the agrarian economy, workforce and infrastructure (including seasonal patterns of employment and the development of the Strutt family's model farms)?

STRATEGIC OBJECTIVES

Objectives 7A – 7E	Agenda Topics 7.1 – 7.10									
	1	2	3	4	5	6	7	8	9	10
7A Review the evidence for the growth of industrial employment and the impact of industrialisation upon the social fabric of established communities	•	•	•							
7B Review the evidence for labour migration and changes in working patterns as the factory system developed		•	•	•						•
7C Assess the impact of the factory system upon class consciousness, gender roles, family dynamics and folk culture				•	•		•		•	
7D Examine the evidence for the servicing and support of the developing industrial communities through welfare, cultural, educational and spiritual services							•	•		•
7E Examine the role of religious ideologies in the lives of the mill communities						•	•			

AGENDA THEME 8. TRANSPORT, POWER AND PUBLIC UTILITIES

AGENDA TOPICS

8.1 What impact did the development of river navigation and the construction of canals have on the industrialisation of the Derwent Valley, and how did these water-based systems evolve over time?

8.2 How did the development of horse-drawn tramways and railways impact upon the industrialisation of the Derwent Valley, and how did they interrelate with elements of the canal network?

8.3 How did the growth of railways impact upon the development of Derby and its hinterland?

8.4 How were turnpikes and other roads integrated with other kinds of transport, and how has the development of motor transport impacted upon the Derwent Valley?

8.5 How can studies of the Derwent Valley contribute to studies of the early development of piped water supplies?

8.6 How have other public utilities such as gas and electricity developed within the Derwent Valley?

8.7 How did the shift towards fossil fuels as sources of power in Lancashire and Cheshire influence the development of the Derwent Valley during the 19th century, and what were the advantages of factories powered by fossil fuels?

8.8 What can studies of the low-carbon, water-powered factories of the Derwent Valley contribute to studies of environmental sustainability (through, for example, the expansion of hydropower at the locations of historic mills)?

8.9 What impacts have improving transport, supply chains and telecommunications had upon the character, development, and profitability of local industry in the Derwent Valley?

8.10 How have transport changes enabled new ways of living and working since 1850 and how have they impacted upon urban infrastructure (for example, by the gentrification of former industrial areas)?

STRATEGIC OBJECTIVES

Objectives 8A – 8D	**Agenda Topics 8.1 – 8.10**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
8A Explore the factors driving the development of canals, railways and roads and trace the evolution of networks for the distribution of raw materials and finished goods	•	•	•	•					•	•
8B Establish the impact of the development of roads and railways upon the continuing development of cotton spinning									•	•
8C Assess the impact of industrialisation and paternalism upon the development of piped water, waste disposal and other public utilities					•	•	•	•		
8D Investigate the harnessing of hydropower from rivers in the Derwent catchment and the reconciliation of competing interests						•		•		

AGENDA THEME 9. THE BUILT ENVIRONMENT

AGENDA TOPICS

9.1 How can we characterise the pre-industrial settlements of the Derwent Valley (from prehistoric to medieval times) and in what ways did industrialists change the morphology of settlement?

9.2 How did domestic building practice evolve in terms of construction methods and materials, architectural style and layout (eg the provision of accommodation and workshops, preparation of meals, storage of food and drink, keeping of pigs and hens and growing of vegetables)?

9.3 To what extent did domestic building practices vary between industrial communities?

9.4 How may industrial workers' housing developments have affected the quality of life of the workforce, how were these houses allocated and was demand satisfied?

9.5 Can we establish the significance of the variety of places of worship, schools and other community facilities that were established to serve the growing industrial settlements?

9.6 What can study of the archaeological evidence for domestic, industrial and agricultural structures contribute to the study of early industry along the Derwent and its tributaries?

9.7 What can studies of textile mills and their varied architectural styles contribute to understanding of developments in mill design, technology, operational practices and the building styles of mill owners?

9.8 To what extent were the textile mill builders influenced by contemporary opinions on polite architecture?

9.9 What can we deduce about the design and construction of other purpose-built industrial structures such as nailshops and framework knitters' workshops?

9.10 How did 18th century and later agrarian changes and the activities of factory owners impact upon the design and construction of farmsteads and other agricultural buildings (including model farms, dairies and field barns)?

STRATEGIC OBJECTIVES

Objectives 9A – 9E	**Agenda Topics 9.1 – 9.10**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
9A Investigate further the functional, social and cultural factors impacting upon textile mill designs and the relationship of mills to the wider built environment							•	•		
9B Assess the impact of the mill owners upon the planning of industrial settlements and their motivations in settlement planning	•	•	•	•	•					
9C Investigate the impact of pre-factory industrialisation upon the architecture of domestic buildings and associated structures	•	•				•			•	
9D Investigate by laser survey the utilisation of floor space in the mill buildings and the potential for elucidating changing patterns of production and organisation							•			
9E Assess the impact of industrialisation upon agricultural processes, farm layout and agricultural building traditions	•	•				•				•

AGENDA THEME 10. LANDSCAPE AND ENVIRONMENT

AGENDA TOPICS

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)?

10.2 How was the rural landscape transformed by the innovations of the Agricultural Revolution and the industrialisation of agriculture (for example, narrow ridge and furrow earthworks created by steam ploughing)?

10.3 How closely were factory owners involved in farming, and what was their influence upon the agrarian economy and landscape (in the vicinity, for example, of the Strutt family's model farms)?

10.4 How far did the burgeoning food demands resulting from industrial expansion and population growth create a regionally distinctive agrarian economy and how was this manifested in landscape terms?

10.5 How have woodland industries developed from the High Medieval to Modern periods, particularly in response to demands for building materials and the needs of local industries, how has this impacted upon the woodland resource and how may management strategies have varied spatially and over time?

10.6 What impacts may the wealth generated by industrialisation have had upon the development of landed estates, and in particular the development of plantations, parklands and gardens?

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?

10.8 What impact may past climatic changes have had upon the Valley environment (for example, in the Medieval Warm Period and Little Ice Age) and how may communities have responded and adapted?

10.9 What impacts may future climate change have upon the heritage resources of the World Heritage Site and what mitigation measures may be adopted to minimise the adverse impacts of this process?

10.10 How can weirs be adapted to allow fish movement to meet the requirements of the Water Framework Directive?[2]

STRATEGIC OBJECTIVES

Objectives 10A – 10E	**Agenda Topics 10.1 – 10.10**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
10A Compile as a resource for understanding human transformations of the landscape an integrated synthesis of the evidence for landscape change	•	•	•	•	•	•	•	•	•	
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 hydrological landscape of the Derwent Valley and identify strategies for improved water management	•		•				•	•		•
10D Elucidate the flood history of the Derwent Valley as a guide to the potential impact of future climate change upon the historic environment resource	•						•	•	•	
10E Investigate the impacts of past mining activities upon terrestrial and river pollution and assess the threats posed to the cultural landscape resource	•						•			

AGENDA THEME 11. NATIONAL AND GLOBAL IMPACTS

AGENDA TOPICS

11.1 What were the national and international markets for Derwent Valley cotton yarns, how did demand for these fluctuate over time, and can we identify more closely the routes of supply and export?

11.2 How closely was the supply of raw cotton to the Derwent Valley mills linked to the trading activities associated with the international slave trade and plantation development in the Americas?

11.3 Can we elucidate further the movement abroad of people and skills originating in the Derwent Valley?

11.4 What impact may industrialisation and population movements have had upon the world views of communities in the Derwent Valley?

11.5 Can we shed further light upon the influence of Derwent Valley industrial workers' housing upon architectural traditions elsewhere in Britain, Continental Europe and North America?

11.6 What was the national and international impact of the 'Cromford Diaspora' upon factory and machinery designs?

11.7 How revolutionary were developments in the Valley in the international context, and why did industrialisation follow different courses and chronologies in countries such as France, Belgium, Germany, Russia and the USA?

11.8 What lessons may be learned in terms of environmental sustainability from study of the Derwent Valley's low-carbon industrial revolution and the potential of hydro power?

STRATEGIC OBJECTIVES

Objectives 11A – 11E	Agenda Topics 11.1 – 11.8							
	1	2	3	4	5	6	7	8
11A Assess the position of the Derwent Valley cotton industry in terms of the Empire, the slave trade and the pressures of global demand and supply	•	•						
11B Explore the wider impact of the ideas, technologies, skills and wealth generated in the Derwent Valley during the Industrial Revolution	•		•	•	•	•	•	
11C Assess the impacts of industrial developments in the Derwent Valley upon the fabric of society in Britain, the Empire and across the globe		•	•		•		•	
11D Investigate the potential to develop the Derwent Valley as a model for the development of sustainable low-carbon economies								•
11E Assess the national and international impact upon industrial and domestic architecture of Derwent Valley mill and housing designs			•		•	•		

Notes

[1] Crutchley, S and Crow, P 2009 *The Light Fantastic. Using Airborne Laser Scanning in Archaeological Survey.* Swindon: English Heritage (https://historicengland.org.uk/images-books/publications/light-fantastic/)

[2] See Chapter 4, Strategic Objective 10E, footnote 9 for explanation

Fig.4.1 A Blacksmith's Shop (1771): detail of one of five paintings by Joseph Wright on the theme of blacksmiths' shops and forges, inspired by industrial workshops that he would have seen in Derbyshire (oil on canvas; © Derby Museums Trust)

4. STRATEGIC OBJECTIVES

Introduction

Summaries are provided in this chapter of each of the Strategic Objectives that were developed from discussions between attendees of the stakeholder workshops described in Chapter 1. Each Objective text comprises a summary description and supporting references, following broadly the template that was devised for the *East Midlands Historic Environment Research Framework* (Chapter 1.1). It is hoped that this format will provide for each Objective a concise and readily accessible source of information that will assist further research and facilitate funding applications by stakeholders.

Thanks are extended to the many stakeholders who have contributed to the Strategic Objective summaries that form the substance of this chapter. The authors of each Objective are noted below, together with those subject specialists who reviewed the contributions to each Agenda Theme prior to final editing. All Objective texts were also submitted to members of the project Steering Group and the former Research and Publications Panel for their comments prior to revision by the volume editor in liaison with each of the authors. The specialist knowledge of all contributors has helped immeasurably in the preparation of this research framework, which as shown by the following list has enjoyed engagement with independent researchers and representatives of a wide range of organisations in the Derwent Valley and beyond.

Agenda Theme 1. Changing Interpretations of the Derwent Valley

Review: Stephen Daniels[27]
Authors:
1A: Pauline Beswick[6,7] and Sarah Chubb[9]
1B: Ros Westwood[4]
1C: George Revill[29]
1D: Susanne Seymour[27] and Lowri Jones[27]
1E: Mark Suggitt[10]
1F: Ros Westwood[4]

Agenda Theme 2. Industry, Trade and Settlement before the Factory System

Review: Tim Allen[12] and Dave Barrett[8]
Authors:
2A: Robin Holgate[1]
2B and 2C: David Knight[18]
2D: Patricia Hudson[20]
2E: Chris King[26]

Agenda Theme 3. The Enlightenment

Review: Celina Fox[34]
Authors:
3A: Paul Elliott[21] and George Revill[29]
3B: Paul Elliott[21] and Robin Holgate[1]
3C: Ros Westwood[4] and Paul Elliott[21]
3D: Paul Elliott[21]
3E: Ros Westwood[4]

Agenda Theme 4. The Low-carbon Industrial Revolution

Review: Patrick Strange[34]
Authors:
4A: George Revill[29]
4B: Garry Campion[24] and Marilyn Palmer[23]
4C: Chris Wrigley[2,28]
4D: Ian Jackson[17] and George Revill[29]
4E: Robin Holgate[1]

Agenda Theme 5. Industrial Metamorphosis: the 19th to 21st Centuries

Review: Marilyn Palmer[23]
Authors:
5A: Adrian Farmer[10] and Mary Smedley[17]
5B: Jane Adams[32]
5C: Jonathan Wallis[5]
5D: Jane Middleton-Smith[16]

Agenda Theme 6. The Factory Owners, Landed Gentry and Middle Classes

Review: Stanley Chapman[25] and Mark Suggitt[10]
Authors:
6A and 6D: Stanley Chapman[25]
6B: Jonathan Wallis[5]
6C and 6E: Marilyn Palmer[23]
6F: Ruth Larsen[21]

Agenda Theme 7. The Urban and Rural Labour Force

Review: Adrian Farmer[10]
Authors:
7A and 7D: Suzanne Lilley[33]
7B: Robin Holgate[1]
7C and 7E: Mark Suggitt[10]

Agenda Theme 8. Transport, Power and Public Utilities

Review: Mike Nevell[30]
Authors:
8A: George Revill[29] and Trevor Griffin[7]
8B: Adrian Farmer[10] and Mary Smedley[3]
8C: Mark Suggitt[10]
8D: Ian Jackson,[17] Joe Smith,[29] Renata Tyszczuk,[31] Julia Udall[31] and Nicola Whyte[22]

Agenda Theme 9. The Built Environment

Review: Louise Brennan,[12] Adam Menuge[12] and Eilis Scott[12]
Authors:
9A and 9C: Mike Nevell[30]
9B: Suzanne Lilley[33]
9D: David Strange-Walker[11]
9E: Barry Joyce[13]

Agenda Theme 10. Landscape and Environment

Review: Tim Allen[12] and Jim Williams[12]
Authors:
10A: Andy J Howard[14] and Rachael Hall[15]
10B: David Knight[18]
10C Georgina Endfield[27] and Carry van Lieshout[27]
10D: Georgina Endfield,[27] Andy J Howard[14] and Lucy Veale[27]
10E Andy J Howard[14]

Agenda Theme 11. National and Global Impacts

Review: Chris Wrigley[2,28]
Authors:
11A: Susanne Seymour[27] and Sherryllynne Haggerty[28]
11B and 11C: Mark Suggitt[10]
11D: Ian Jackson,[17] Joe Smith,[29] Renata Tyszczuk,[31] Julia Udall[31] and Nicola Whyte[22]
11E: Mike Nevell[28]

[1] Archaeological Research Services Ltd, Bakewell
[2] Arkwright Society
[3] Belper North Mill
[4] Buxton Museum and Art Gallery
[5] Derby Museum and Art Gallery
[6] Derbyshire Archaeological Advisory Committee
[7] Derbyshire Archaeological Society
[8] Derbyshire County Council
[9] Derbyshire Record Office
[10] Derwent Valley Mills World Heritage Site
[11] Greenhatch Group Ltd
[12] Historic England
[13] ICOMOS UK World Heritage Committee
[14] Landscape Research & Management
[15] National Trust
[16] John Smedley Ltd Archives
[17] Transition Belper
[18] Trent & Peak Archaeology, York Archaeological Trust
[19] University of Cambridge, Faculty of Architecture and History of Art
[20] University of Cardiff, School of History, Archaeology and Religion
[21] University of Derby, Department of Humanities and Social Sciences
[22] University of Exeter, Department of History
[23] University of Leicester, School of Archaeology and Ancient History
[24] University of Northampton, School of the Arts
[25] University of Nottingham, Business History Institute
[26] University of Nottingham, Department of Archaeology
[27] University of Nottingham, School of Geography
[28] University of Nottingham, School of History
[29] Open University, Department of Geography
[30] University of Salford, Centre for Applied Archaeology
[31] University of Sheffield, School of Architecture
[32] University of Warwick, Centre for History of Medicine
[33] University of York, Department of Archaeology
[34] Independent researcher

Abbreviations of References

Abbreviations employed in the lists of references accompanying the Strategic Objective summaries and in some of the figure captions are listed below.

ADS: Archaeology Data Service
BAR: British Archaeological Reports
CBA: Council for British Archaeology
CUP: Cambridge University Press
DAS: Derbyshire Archaeological Society
DCC: Derbyshire County Council
DAJ: Derbyshire Archaeological Journal
DVMP: Derwent Valley Mills Partnership
DVMWHS: Derwent Valley Mills World Heritage Site
EH: English Heritage
HE: Historic England
HER: Historic Environment Record
IAR: Industrial Archaeology Review
LUP: Leicester University Press
MUP: Manchester University Press
OUP: Oxford University Press
PDNPA: Peak District National Park Authority
RCHME: Royal Commission on the Historical Monuments of England
TPA: Trent & Peak Archaeology
YUP: Yale University Press

Strategic Objective 1A. Create an integrated digital platform, identifying and collating written, photographic, pictorial, cartographic, oral and other information sources that may shed light upon changing interpretations of the Derwent Valley

Pauline Beswick and Sarah Chubb

There is a wide range of material evidence with potential for shedding light on the history of the Derwent Valley and changing interpretations. This includes maps, photographs, paintings and drawings, personal and business manuscripts, objects, published books or articles and oral histories (such as that compiled by *in*Heritage from the memories of people living in the vicinity of Calver Mill, just upstream of the World Heritage Site).[1] These records are spread over a wide range of institutions within Derbyshire, including the Derbyshire Record Office, John Smedley Ltd, Strutt's North Mill, Derby Local Studies Library and Derby Museum and Art Gallery.[2] Important material is also held elsewhere in Britain, including national museums, art galleries and other institutions such as the British Museum, British Library, Tate Britain and the National Archives at Kew, and in North America at the Universities of Columbia and Yale and the Yale Center for Art. Supplementary resources are held by organisations such as Derbyshire County Council, which maintains the county's Historic Environment Record (HER) and manages the Derwent Valley Mills World Heritage Site. The Derbyshire HER is partially available through the Historic England Heritage Gateway,[3] but there are ambitions to create a dedicated website. Archaeological records are held in many locations, including regional and national museums and the digital record curated by the Archaeology Data Service in the University of York[4].

Some of these sources were surveyed as part of the recently completed *Enlightenment!* Project,[5] and it would be useful to establish the location of all other archives and the current state of online access. There is significant potential for an internet-based platform that would allow people to search for and locate information and increase engagement with the heritage resource.[6] This would also help to highlight gaps in our knowledge base and thus facilitate targeted research: for example, the comparative dearth of Quaker and other Nonconformist records relating to the industrial communities of the Valley.[7] At a minimum, the website would provide a searchable database of all key sources. It would have the facility to attach digital images, and should have a simple open-source platform that is not reliant on a web developer for updating the information in the database. It must also integrate with, but not replicate, information in other websites, such as the National Register of Archives.[8] It should require minimal on-going management once it has been set up. An enhanced version would allow interaction with users, such as linking and tagging records, and would provide the facility to upload research articles. It could also host datasets for statistical research.

Fig.4.2 The Strutts' mill complex at Belper, showing to the north of the mills the horseshoe weir across the Derwent that was built by Jedediah Strutt in 1797. The map shows parts of the liberties of Belper, Duffield and Makeney, based on copies of parts of the Enclosure Award plans; it includes alterations to the Strutt Estate that were surveyed by James Hicking between 1805 and 1818 (© Derbyshire Record Office D1564/3)

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Strategic Objective 1B. Assess the contribution of studies of material culture to our understanding of changing interpretations of the Derwent Valley

Ros Westwood

The dramatic beauty of the Derwent Valley, particularly along the limestone gorge between Cromford and Matlock Bath, attracted artists even before Sir Richard Arkwright established his cotton mills at Cromford between 1771 and 1790. One of the earliest artists was Thomas Smith (1721–1767), whose representations of the Cascades below Matlock Bath and Hopping Mill Weir are included in this volume.[1] He was followed by workers in many mediums, including watercolourists, engravers and later, photographers. Their work appeared in books, on gallery walls and on the newest and most fashionable consumer goods that were available to Georgian and Victorian society. Pottery in particular was commonly ornamented with scenes of Derbyshire landscapes and buildings, including the images of Masson Mill and the Derby townscape that were applied to the Derby Porcelain Company products illustrated here. The challenge for further researchers lies not in the further study of well-known published sources, but in the detailed examination of the artefacts, original diaries, sketchbooks and other documents which provide the source material upon which past interpretations have been based.

The Heritage Lottery Fund's *Enlightenment!* programme of 2008 to 2013 facilitated an initial survey of some of these resources, including both artefacts in public ownership[2] and the archival and ephemeral holdings in some of the major libraries.[3] The funding also enabled the purchase of further collections for Derby Museum, Belper North Mill and Buxton Museum and Art Gallery,[4] and enhanced, in particular, the internationally important porcelain collections in Derby and Buxton Museums. There is still a need for a deeper study of the representations used on porcelain[5] and on other objects such as letterheads, watch papers and retailers' boxes. Such images encompass the contemporary sense of place, but particular questions to consider are whether the images are sufficiently realistic or too influenced by artistic need to help us understand the changing landscape of the Valley. Further questions to be addressed by examination of the archive sources include identification of the artists who were commissioned to undertake this work and the markets for their products.

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Fig.4.3 Late 18th century coffee jar with two oval painted panels, including one of Masson Mill (above) and a landscape view. These are attributed to the porcelain painter Thomas 'Jockey' Hill, who worked at Derby between 1795 and 1800 (© Derby Museums Trust)

Fig.4.4 Porcelain dessert dish (c.1820) showing the weir across the Derwent, All Saint's Church (now Derby Cathedral) and the Silk Mill (left). The painting is attributed to Daniel Lucas, who worked at Derby from 1820 to1848 (© Derby Museums Trust)

Strategic Objective 1C. Compare and critique interpretations of the Derwent Valley in academic studies, fiction, poetry and other textual and media sources and investigate how these interpretations have evolved

George Revill

The stretch of the Derwent Valley that is dominated by the mills of the Industrial Revolution is represented in textual sources as locally distinctive and as an exemplar for processes of industrialisation operating at regional, national and international levels. Its location as a gateway to the Peak District for travellers from the south, together with its industrial and scientific history and heritage, has impacted significantly upon perceptions of the Valley. This has been variously portrayed as a cradle of the Industrial Revolution,[1] a hotbed of radical, scientific and Enlightenment thought,[2] a location for forging romantic tourist sensibilities (exemplified by artists and critics such as Joseph Wright and John Ruskin)[3] and a zone of contest between a wide variety of polite, improving and popular recreations. Such leisure pursuits have included taking the spa waters, hiking, cycling and explorations of the Valley's rich archaeological and built environment heritage.

Understandings of the industrial history, heritage and culture of this area can be characterised in terms of two distinctive strands. The first of these focuses upon documentary, archaeological and other material evidence for the histories of these sites and their inhabitants.[4] The second concentrates upon the explicitly social and cultural dynamics of industrialisation, scientific understanding and the rise of tourism. The origins of this latter approach lie in the 1960s with writers such as Benedict Nicholson,[5] but this work has gathered further momentum from the 1980s.[6]

Recent studies of social and cultural trends and of the history and theory of technology provide significant opportunities to review current interpretations of industrial development in the Valley. This could be achieved by reworking accounts based upon archaeological, documentary and cultural sources in terms of new academic understandings and theorisations of material cultures, landscape and the development of scientific and practical mechanical knowledge. It would also involve a critical historiographical appraisal of the relationships between interpretations made at local, regional and national scales. Current modes of cultural representation also provide challenges and opportunities. The Derwent Valley has attracted increased media interest from film, television and the press in recent years, and information derived from these sources provides as yet uncharted layers of interpretative history that would merit further study.[7]

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[7] Eg BBC TV Series *Peak Practice* (1993–2002; http://www.peakpracticeonline.co.uk) and the 2007 film *And When Did You Last See Your Father*, directed by Anand Tucker (based upon the memoir of the same name by Blake Morrison)

Fig.4.5 Joseph Wright's dramatic image of Cromford Mills at night, painted in the 1790s, is one of many representations of the Derwent Valley that moulded public perceptions of the area during the height of the Industrial Revolution (oil on canvas; Private Collection/Bridgeman Images)

Strategic Objective 1D. Investigate how the Derwent Valley and its heritage provision is viewed by British diaspora groups, particularly those of African and Indian descent

Susanne Seymour and Lowri Jones

The industrial development of the Derwent Valley depended in large part on a global trade in raw and processed cotton, facilitated by colonial developments and movements of people and goods as part of the Atlantic slave trade and economy. This makes it a place of both polyvocal and polyspatial heritage, yet this dimension has typically been neglected in interpretations of former mill sites.[1] Recognising these connections clearly means engaging with challenging and sensitive histories and legacies, as well as acknowledging the complex links between heritage and identity.[2] In relation to this, there is an emerging consensus that present social relations and values influence what from the past is deemed worthy of remembering, that multiple, often competing, readings of the past exist, and that these help to form current identities and senses of belonging.[3]

It is all too easy for global heritage sites to replicate the power relations of the colonial past and valorise the colonisers' past at the expense of other parties.[4] There remains a strong legacy of this in the Derwent Valley, both through the conventional focus on powerful, male factory owners and in more recent interpretations which highlight the experiences of white female and child labourers while neglecting the contributions of cotton and textile workers from across the world.[5] Understanding the perspectives of raw cotton and international textile producers on the British cotton industry's past is undermined by prevalent non-inclusive cultural norms and by limited diversity amongst staff working in many heritage and research institutions.[6]

Recent initiatives, including the AHRC-funded *Global Cotton Connections* project[7] and the Heritage Lottery Fund project *British Raj in the Peak District*, have begun to explore how local citizens belonging to Hindu and African diaspora cultural groups view the Derwent Valley and its cotton heritage provision. The activities and legacies of these projects, including an Indian *Heritage Walks* leaflet and a poetry collection[8] and film[9] reflecting upon the experiences of community participants, point the way towards future research informed by the views of British diaspora groups. These legacies also highlight not only the pain involved in remembrance but also the pain of absence and alienation when ancestors' stories are not told and their contributions to the Valley's textile industry remain unrecognised.

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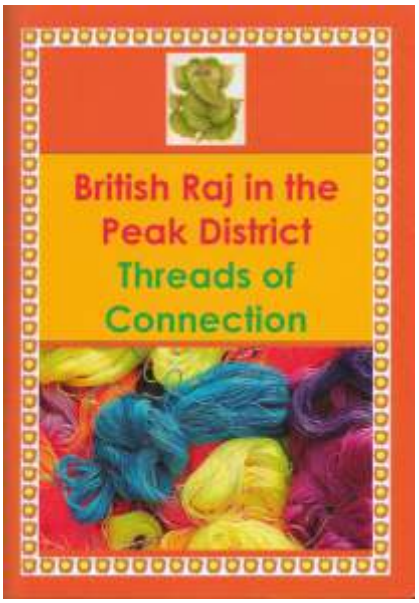

Fig.4.6 Collection of 26 poems and photographs, edited by Debjani Chatterjee, reflecting on Sheffield Hindu Samaj heritage group activities during the British Raj in the Peak District *and* Global Cotton Connections *projects (cover design © Brian D'Arcy & Debjani Chatterjee)*

Strategic Objective 1E. Examine the impacts of inscription upon perceptions of the Derwent Valley and compare with the experiences of other World Heritage Sites

Mark Suggitt

The Derwent Valley Mills is a comparatively new World Heritage Site, having been recognised by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) as a place of Outstanding Universal Value only in 2001. The bid to gain international endorsement of the mills' importance was conceived in the early 1980s and was prompted by the rescue from demolition and development of the world's first water-powered cotton spinning mill at Cromford.[1] The mills, warehouses and workshops that comprised this mill complex were built by Sir Richard Arkwright between 1771 and 1790, but were abandoned as cotton mills during the 19th century and from the 1920s to 1970s were used as a colour pigment factory. The complex was seriously damaged as a consequence of this change of use, and was threatened by demolition in the 1970s. However, the Arkwright Society's bold step of purchasing the mill in 1979 started the rescue process, and culminated in the creation of a linear site extending for some fifteen miles along the densely populated Derwent Valley: from the Derby Silk Mill in the south to the southern outskirts of Matlock Bath, and encompassing the sites of the major mill complexes at Darley Abbey, Milford, Belper, Lea Bridge, Cromford and Masson.

Perceptions of World Heritage Sites are influenced by many factors, including the celebration of heritage, concerns about preservation, ambitions for social and economic advantage and the perceived marketing benefits of World Heritage status.[2] The Derwent Valley Mills bid was inspired by protection, and there is significant potential to investigate how the Site has matched up to the original intentions. It would be particularly interesting to compare the experiences of the Derwent Valley Mills with other industrial World Heritage Sites, both in this country and abroad, with particular emphasis upon the impact of different management, funding and marketing strategies. It has been claimed, for example, that 'World Heritage status is what sites and their Steering Groups make of it', while it has been doubted whether the level of marketing undertaken by each site has had any major effect on visitor numbers.[3] Particular opportunities exist within the Derwent Valley, with its many stakeholders and developing visitor attractions, to examine the impact of inscription upon perceptions of the Site's significance and understanding of its historic development by local people and visitors, and in particular to examine residents' views on the merits of preservation relative to issues such as socio-economic gain.

Fig.4.7 World Heritage Site status has inspired a wide variety of educational programmes. Here, students participating in the Technology Then, Technology Now *project[4] visit the partially restored interior of the first Cromford mill (photograph: Sukie Khaira; © Derwent Valley Mills Partnership)*

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Strategic Objective 1F. Inspire changes in public perception and understanding of the World Heritage Site by the creation of a digital resource for tours of the Derwent Valley

Ros Westwood

Developments in digital technology have provided significant new opportunities for engaging with visitors to the Derwent Valley, with potential for challenging perceptions and developing understanding. It is recommended that opportunities be explored for integrating and disseminating visually the digital data that is hosted by archive collections and by the proposed digital platform.[1] This would be aimed at engaging interested visitors with the cultural and environmental resources of the Valley and providing them with an easily accessible digital resource that is available on appropriate technology. It could, in addition, provide a powerful tool for disseminating more widely the results of research, involving individuals and community groups in that research, and prompting new lines of enquiry.

This resource has the potential to comprise many layers that could be accessed via Geographical Information Systems (GIS) technology. Staff of the British Geological Survey (BGS), for example, have undertaken significant mapping of the Valley and neighbouring areas, which can be provided as photographic or mapped imagery, but this could be enriched. Ideally, this would provide several layers of content for a range of audiences. A printed tourist guide is already available for the World Heritage Site,[2] but an online version with the opportunity to raise modest income through advertising, which in itself would become part of the historic resource of the Derwent Valley, could also be welcomed.

There is, however, much more that can be added, including: a tour through the physical landscape, highlighting the solid and drift geology, ancient river channels, topography, vegetation and other landscape features; an archaeological highlights tour pointing out the clearly visible and more obscure remains relating to human activity from prehistoric to recent times, including traces of lead smelting and of medieval agriculture in the form of ridge and furrow earthworks; a railway engineer's tour, taking the Midland Railway journey through its engineering achievements; an historic photographic tour; an artistic tour including digital images from museums and archives, providing pictures and descriptions that can be observed while experiencing at first hand the landscape; or an historic walk through the business and shopping centres of the many communities along the Valley, with photographs of the shops and markets and the written and oral memories of residents and visitors to the region. This could be a generous resource that visitors can dip into. However, it should also inspire people to explore sites, employing innovative digital technologies, rather than encouraging the armchair traveller. It could have a legacy benefit for several other projects, such as *Derwent Pulse*[3] and *Technology Then, Technology Now*.[4] At the same time, it could encourage visitor interaction with the uploading of information and visitors' own responses to their visits and experiences.

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Fig.4.8 GeoVisionary Software, co-developed by VIRTALIS and BGS, provides the facility to fly through a 3D visualisation of the Valley, with opportunities to view topography, geology, vegetation and other landscape features. This image shows the southern approach to the spectacular Matlock Gorge, cut through Carboniferous limestones from Cromford to Matlock (provided courtesy of British Geological Survey)

Strategic Objective 2A. Review the archaeological evidence for the development of industry, trade and exchange before the Industrial Revolution

Robin Holgate

There is a pressing need for a synthesis of the archaeological evidence for industrial activities in the Valley before the Industrial Revolution and of the associated exchange and trading networks. A review is recommended of the evidence for early industry in the Derbyshire Historic Environment Record, together with an assessment of published and grey literature. This would enable a more informed assessment of the archaeological evidence for early industry, identify key gaps in our understanding, inform research bids and guide the formulation of schemes of investigation prior to developer-funded work. It would also clarify the potential research value of data derived from the Valley: for example, as evidence for enhancing understanding of changing patterns of prehistoric[1] and later[2] pottery production and distribution, Iron Age and Roman quern manufacture[3] and, particularly significant in the context of the Industrial Revolution and its infrastructure, the growth of the lead, iron, building stone, timber and paper industries.[4]

This review should also seek to highlight areas with particular potential for the preservation of evidence for industrial activity. Attention is drawn in Objective 2C to the importance of riverside and island locations as places where evidence for medieval mills and associated structures might survive, and it is worth emphasising also the potential of the Valley's woodlands for the preservation of industrial remains. Previous field investigations, notably at Lea Wood,[5] have demonstrated the wide variety of archaeological remains that might survive in woodland, together with the scope for archaeological and historical research to reveal information on the early industrial development of the Valley. In the case of Lea Wood, the discovery and investigation of late medieval charcoal-burning platforms and 18th century Q-pits[6] producing kiln-dried wood used as fuel by local lead smelters illustrates how detailed research can provide valuable information on the development of the lead and timber industries and associated trading networks.

Both professionals and community groups can play a role in investigating the evidence for early industry, potentially working in partnership to maximise the available resources. High resolution lidar survey of parts of the Valley has provided a valuable framework for further fieldwork, including walkover surveys to investigate possible archaeological features and detailed ground survey, test-pitting and targeted excavation.[7] Such work could shed significant light upon resource exploitation before the Industrial Revolution, especially if combined with further archival research and scientific analyses aimed at elucidating changing patterns of artefact production and distribution.

Fig.4.9 Lea Wood: partially excavated Q-pit, with fill removed from two opposing quadrants. These roughly circular depressions were dug into hillsides and provided with a flue on the downslope side, creating a distinctive Q-shape (photograph © Archaeological Research Services Ltd)

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Strategic Objective 2B. Undertake lidar surveys of woodland to locate features indicative of early industrial activity and to guide future documentary, survey and excavation work

David Knight

The thick woodlands that cloak parts of the western and eastern flanks of the lower Derwent Valley have until recently attracted comparatively little attention from field archaeologists, yet there is a strong likelihood that protection from the erosive impacts of modern ploughing will have assisted the preservation of earthworks with significant potential for elucidating human exploitation of the Valley from prehistoric to modern times. The importance of this landscape zone for the preservation of archaeological features with topographic expressions is highlighted by a number of recent initiatives, including the aforementioned community project at Lea Wood,[1] where survey and excavation identified almost two hundred sites of archaeological interest.

Similar densities of well-preserved archaeological remains may be anticipated in other areas of mature woodland along the Valley, and it is recommended that the programme of high-resolution lidar[2] survey that was initiated in 2015 by the DerwentWISE Landscape Partnership[3] be expanded to assess the character and scale of the archaeological resource that may lie concealed in woodland along the entire length of the Valley. Lidar has significant advantages over other types of survey in woodland environments,[4] where its ability to penetrate much of the forest canopy and understorey vegetation permits the identification of archaeological features that would otherwise be concealed by dense vegetation.[5] High resolution lidar surveys of deciduous woodlands along parts of the Derwent Valley have revealed a significant density of earthwork remains, many relating to activities such as stone quarrying, charcoal burning or lead smelting, together with associated transport routes, and provide an excellent foundation for subsequent ground investigations (including measured earthwork and geophysical surveys, test-pitting and targeted excavation).[6] There is also significant potential for further documentary research – as undertaken elsewhere in the East Midlands in extensively wooded landscapes such as Rockingham Forest[7] – and ample scope, therefore, for more detailed study of changing patterns of woodland management and exploitation.[8]

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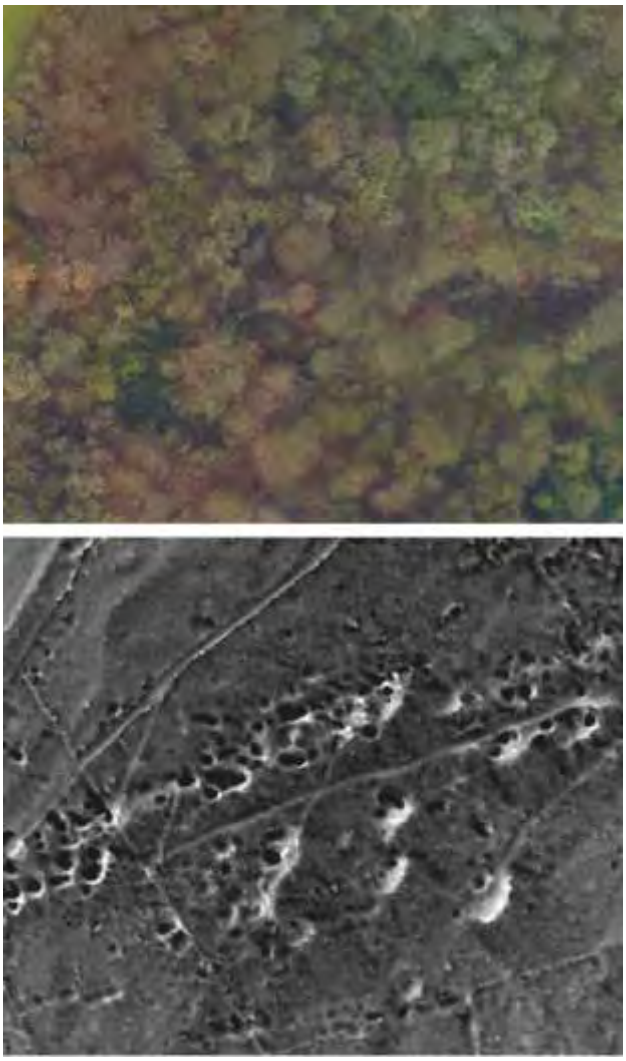

Fig.4.10 Masson Hill lead-mining complex (Derbys. HER 10041). This dense pattern of pits, adits and tracks is concealed by dense woodland on steeply sloping ground (top). High resolution (0.25m interval) lidar survey shows with startling clarity the wide variety of earthworks that survive beneath the tree canopy and provides a sound foundation for further survey and excavation work (source: Malone 2016; © DerwentWISE Landscape Partnership)[6]

Strategic Objective 2C. Investigate riverine locations for archaeological traces of early mills and other historic water management assets

David Knight

Although best known for its 18th century and later textile mills, the Derwent Valley preserves important evidence for a tradition of water-powered mills stretching back well into the medieval period.[1] Documentary records of mills along the Derwent and its tributaries extend back to the Domesday Survey, while later records leave little doubt that mills and associated riverine structures were key elements of the valley landscape during the centuries preceding the Industrial Revolution. At Duffield, for example, two mills are recorded in the Domesday Book of 1086,[2] while Duchy of Lancaster records dating from 1497 note that the '…corne mills and the sythe mills of duffield and hasilwood are letton to Nicholas Khyson for a 20 year term'.[3] Archaeology supports and amplifies the documentary evidence for early water-powered mills and other structures: most notably at Darley Abbey, where investigations preceding construction of a fish pass on an artificial island within the Derwent revealed sandstone wall foundations and upright timbers interpreted as evidence for a 15th or 16th century mill associated with the nearby Augustinian abbey.[4] This echoes the evidence for medieval riverside structures that has been recovered during archaeological investigations elsewhere in the Trent catchment: notably at Hemington, just upstream of the Trent–Derwent confluence, where excavations revealed the foundations of a 12th century mill dam,[5] and beside the River Erewash at Toton, where excavations on the site of an 18th century mill revealed structural timbers dated by dendrochronology to the 13th century.[6]

It is recommended, in view of the potential of the Derwent for the preservation of early mills and other historic water management assets, that developments along the riverside or on islands within the Derwent be closely monitored archaeologically, with appropriate contingency funds to permit recording and targeted excavations where necessary. To facilitate further understanding and management of this resource, it would be useful to compile a detailed and up to date record of the documentary, cartographic and archaeological evidence for early mills and for water management structures such as bankside revetments to prevent fluvial erosion. This could build upon the foundations provided by researchers such as Gifford[1] and Fowkes[7] and the extensive data contained in the Derbyshire Historic Environment Record (HER), thus providing the basis for systematic riverside surveys aimed at locating and recording structural remains that might betray the presence of hitherto unknown water management assets.

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Fig.4.11 Darley Abbey: a watching brief during construction of a fish pass revealed concentrations of sandstone rubble and numerous upright timbers, some forming linear alignments. Further excavation revealed the foundations of sandstone walls, some flanked by or incorporating rows of closely spaced timbers, that were interpreted as probably the footprint of a former mill. Tree-ring dates for seven timber samples indicate dates of felling during the late 15th and early 16th centuries, and hence could signify a late medieval origin for the proposed mill complex (photograph: Peter Webb; © Trent & Peak Archaeology)

Strategic Objective 2D. Review and assess the evidence for the development of textile production in the Derwent Valley prior to the growth of the factory system

Pat Hudson

The great Derbyshire innovators of the 18th century, including Thomas and John Lombe in silk and the Arkwrights and Strutts in cotton,[1] have been extensively studied by historians of the textile industry, but rather less attention has been paid to the small-scale domestic producers who toiled in the farms, villages and towns of the Valley prior to the development of the factory system.[2] We can gain some idea of domestic textile production in that era from later documentary sources: including, for example, the accounts of the farmer and fustian manufacturer James Longsdon.[3] Although his accounts date from 1786 to 1811, by which time the industry was dominated by larger factory producers, much of Longsdon's work was still conducted along traditional domestic lines and included agricultural as well as textile products. Such craft activities would have generated employment for many families in earlier centuries, and would have supplemented farming and industrial work such as the mining and smelting of lead and nail-making. Textile work would thus have boosted the incomes of rural households and, by enabling earlier marriage and lower celibacy rates, would have encouraged population growth. Although often paid in kind as well as cash, textile incomes also boosted the growth of spending and of markets. Such pre-industrial manufacturing would also increase the skills of the rural and urban poor, which may have been a factor in attracting factory employers to the area in the 18th century.

Discussion of the extent and nature of textile employment and manufacturing in the Derwent Valley before the development of the factory system is complicated by the comparative paucity of relevant documentary and archaeological data and by the emphasis in the built environment record upon domestic and industrial structures of the 18th century and later.[4] It is important that relevant documentary sources, such as parish registers and probate inventories, be reviewed and assessed for occupational data that may shed light upon the extent of domestic textile production in the pre-factory era. The Valley's built environment resource should also be assessed, with an emphasis upon detailed building surveys in urban and rural contexts aimed at identifying structures that had been adapted at an early date for domestic textile production.[5] The results of archaeological excavations in Derby[6] and elsewhere should also be reviewed to establish their potential for extending our limited knowledge of textile production in the medieval and earlier periods, with particular emphasis upon the examination of unpublished reports and excavation archives. This would establish a longer narrative within which the revolutionary changes in production techniques in the Derwent Valley could be placed – and thus contribute usefully to the World Heritage Site's educational programme.

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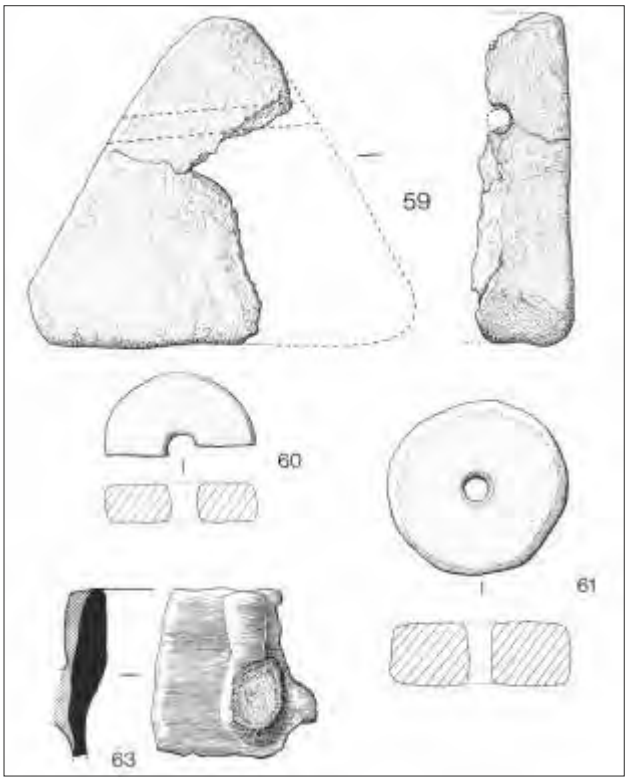

Fig.4.12 Finds from Derby Racecourse[6] emphasise the antiquity of textile production in the lower Derwent. This site yielded Romano-British spindle whorls of pottery (60, 61), bone and lead, plus part of a perforated triangular fired clay object (59) that might have served as a loomweight and on typological grounds might derive from Iron Age activity (source: Dool 1985, fig.94; reproduced by courtesy of the Derbyshire Archaeological Society)

Strategic Objective 2E. Review the evidence for settlement of the Valley before the Industrial Revolution and assess the impact of industrialisation upon settlement morphology and functions

Christopher King

Studies of settlement evolution in the lower Derwent Valley have focused until recently upon the industrial settlements that were built by the mill owners to house their factory workforces,[1] with significantly less emphasis upon the development of settlement prior to the Industrial Revolution. Further research is required to elucidate the earlier history of settlement in the Valley, with particular consideration of the impacts of industrialisation upon established patterns of rural and urban settlement.

The prehistoric settlement of the Valley is particularly poorly researched by comparison with the limestone and gritstone uplands of the Peak District. In those areas, abundant remains of funerary and ceremonial monuments, settlements and field systems, combined with intense antiquarian activity, have painted a picture of dense prehistoric activity that cannot yet be matched by the Derwent Valley between Derby and Matlock.[2] To enhance our understanding of this period, it is recommended that resources be focused initially upon a desk-based assessment aimed at collating Historic Environment Record, air photographic and lidar data, artefactual and documentary records preserved in museums, and information contained in published or unpublished excavation reports. A similar approach is suggested for the Romano-British and later eras, although for these periods significantly more excavation data are available. For the Roman period, information has been obtained principally from excavations in Derby, most notably in and around the Roman small town of Little Chester.[3] Archaeological Investigations of medieval sites in Derby and its environs, notably at Darley Abbey,[4] and of sites farther upstream such as Duffield Castle,[5] have also generated a useful body of evidence that would merit further assessment and synthesis. Work on the last of these sites has also provided a helpful model for site-based research, reappraisal of this poorly known but once impressive 12th century castle having contributed to the development of a conservation and interpretation strategy and the identification of potential avenues for further research.[5]

The work proposed above would provide a springboard for further archaeological and documentary investigations, the results of which could feed into community projects such as the on-going DerwentWISE Heritage at Risk initiative.[6] Such work could include historic map analysis and study of primary documentary records, and could be expanded to include standing building recording and archaeological fieldwork (including geophysical survey, fieldwalking, surveys of upstanding earthworks, test-pitting and targeted excavations to characterise the preserved archaeological resource).

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Fig.4.13 Darley Abbey: very few of the buildings that formed part of the medieval monastic complex survived the Dissolution, and of these the most impressive is this 15th century building on Darley Street.[7] It has undergone many changes of use over the centuries, including accommodation for factory workers in the Boar's Head Mills. It was restored in 1978–79 and is now a public house (photograph: David Knight; © TPA)

Strategic Objective 3A. Evaluate the extent to which studies of 18th century Derwent Valley communities challenge or support past and present interpretations of the Enlightenment

Paul Elliott and George Revill

The Enlightenment, with its emphasis upon reason and individualism and rejection of traditional social, religious and political ideas, was once thought to be a French-focused intellectual movement inspired by the natural sciences – and centred upon a group of philosophers, some of whom were associated with the great multi-volume *Encyclopédie* (1751–72). French *philosophes* such as Diderot strove to apply the methods of the sciences to history and other aspects of human affairs, and some of their work was characterised by religious scepticism and sympathy for political reforms. In recent decades, the importance of distinctive national enlightenments, including English and Scottish movements, has been emphasised.[1] Scholars have also explored through the concept of 'Industrial Enlightenment'[2] the interface between the Enlightenment and the Industrial, Agricultural and Scientific Revolutions, and have broadened the scope of the British Enlightenment to encompass all aspects of thought and culture, including the sciences, the fine and mechanical arts, religion, literature and music.[3]

Taking advantage of this broader definition of the Enlightenment, and utilising rich museum and archive collections, studies of the Valley have moved from focusing upon the origins and impact of the Industrial Revolution towards exploring the interactions between industry, the arts and sciences. The proliferation of printed material and novel ideas, new forms of sociability and opportunities for travel facilitated by improved communications, fostered philosophical networks and created new audiences for the sciences and Enlightenment ideas which require more investigation.[4] Distinctive urban and rural dimensions of Enlightenment cultures also merit greater analysis, including aspects of sociability promoted by the urban renaissance[5] and town government, institutions and associations. We need to enhance our understanding of how the intellectual excitement of the Enlightenment impacted upon the region as the sciences revealed an expanding cosmos, microscopes revealed countless smaller worlds and miners and engineers exposed mysterious subterranean realms. The work of Wright[6] and Darwin[7] has been relatively well studied, but more analysis is needed of the nature of scientific activity and its regional impact, including how experiences of local topography, geology and natural history inspired (and were shaped by) the sciences, literature and artistic representation. This should include further studies of those inspired by the Valley, including writers, natural philosophers, mineral collectors, mechanics, artists and craftsmen, and consideration of the extent to which women, the working classes and young people were captivated by this intellectual effervescence.

Fig.4.14 Clockmaker and engineer John Whitehurst (1713–88) was inspired by lead mining, natural theology and Newtonian mechanics to explore the geology of Derbyshire (by Joseph Wright; oil on canvas; © Derby Museums Trust)

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Strategic Objective 3B. Assess the impact of the Industrial Enlightenment upon the development of science, industry, technology and the mechanical arts and skills in the Derwent Valley

Paul Elliott and Robin Holgate

The 'Industrial Enlightenment'[1] prefigures the close relationships between industry, science and technology that characterise the Industrial Revolution,[2] but debate continues about the nature of these relationships and the extent to which the 'Scientific Revolution' fostered industrialisation. During the 1950s and 1960s, various scholars argued that the sciences had spurred industrialisation through, for example, the activities of the Lunar Society.[3] Less work was done on the Derwent Valley, but Robinson believed that the Derby Philosophical Society had served to promote industrial development.[4] Historians have emphasised how the Newtonian sciences were celebrated as a public cultural activity and informed practical mechanics,[5] whilst Mokyr[6] has emphasised the significance of the 'knowledge economy' in which the knowledge and technological innovation brought by natural philosophers fostered industrial growth.

Some aspects of Derwent Valley industrialisation demonstrate links between science, technology and industrial innovation and support the idea of a preceding 'Industrial Enlightenment'. It would be particularly useful, therefore, to explore the scientific and technological activities and interests of industrialists, entrepreneurs and the labouring population. Whilst the activities of the Strutts and Arkwrights are well known,[7] and Wright's 'scientific' candlelight paintings are familiar,[8] the role of such representations of science and industry in promoting the sciences, mechanical ingenuity and industrial innovation merits more enquiry. Further investigation of the membership and activities of scientific associations would also help, including Derby's Philosophical Society and Mechanics' Institute.[9] Other subjects for study include the kinds of scientific books which were circulated, the role of newspapers and opportunities for scientific education, including the location, content and frequency of scientific lectures and their audiences. The claims for interaction between the sciences, practical mechanics and industry are supported by the activities of individuals such as John Whitehurst and the more shadowy George Sorocold, but further studies are recommended of lesser known mechanics, surveyors, cartographers and engineers. The impact of lead mining upon geological understanding and upon improving cartographic standards also requires more analysis, including studies of miners and mechanics as well as entrepreneurs, mineral collectors, geologists and map-makers.[10] Finally, new and unexpected connections between the sciences and industry might be unearthed by further studies of natural history, agriculture, horticulture, meteorology and the earth sciences, with a focus upon those who actively participated and their audiences.

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[10] Fox 2009, 74–6

Fig.4.15 Detail of Joseph Wright's 'Orrery', showing a philosopher explaining the workings of the solar system to a group of rapt young listeners (oil on canvas; © Derby Museums Trust)

Strategic Objective 3C. Examine the factors underlying the development of tourism during the 18th century and assess the impact upon the Valley of the associated consumer culture

Ros Westwood and Paul Elliott

18th century visitors to the Derwent Valley were initially attracted by the opportunity to take the waters at Matlock Bath and to absorb the sublime and picturesque landscapes celebrated by artists such as Thomas Smith and Joseph Wright[1] and praised in the poetry of Anna Seward and Erasmus Darwin.[2] The mills and their weirs provided additional attractions, drawing tourists ever since the opening of Lombe's Silk Mill in 1721. By the 1730s, intrepid travellers braving the poor valley roads[3] would have found at Matlock lodging houses and stabling associated with the improved Old Bath and, in contrast to the colder Buxton spa with its thermal waters, a temperate climate and water. Early travellers would have relied upon Defoe's *Tour through the Whole Island of Great Britain* (1724–7) as a companion, but by 1818 a contributor to the *Monthly Magazine*[4] observed that 'no county has been more frequently traversed by the curious and inquisitive, or more fully and minutely described' than Derbyshire. By then, travellers would have been enticed by a wealth of literature, which by the mid-19th century included classic works by Rev. James Pilkington, Ebenezer Rhodes, Rev. Richard Ward and William Adam.[5]

Whilst this background is generally understood, further documentary research is required into certain aspects of Derwent Valley tourism prior to the coming of the railways.[6] We need to know more about the kind of people who came and why? Where did they come from and how often? Where did they stay and what itineraries did they follow? How did this affect their lives and the lives of the Valley's residents? We need better understanding of the development of tourist industries.[7] How important was taking the waters, for instance, compared to appreciation of the scenery or curiosity about industrial landscapes? What were the impacts of changes in material culture and patterns of consumption?[8] With disposable income, tourists were keen to purchase mementoes such as mineral specimens, Derby porcelain or Ashford black marble, which mineralogists such as White Watson of Bakewell and John Mawe of Matlock adroitly exploited. How did local people respond to the increasing footfall? While Matlock Bath was soon busy with hotels, lodging houses and museums, did other parts of the Valley benefit? Finally, drawing upon sources such as King George III's Topographical Collection,[9] how did 18th century tourism here compare with rival destinations, such as the Wye Valley, Snowdonia, the Highlands or the Lake District?[10]

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Fig.4.16 Detail of 'Cascades below Matlock Bath, Derbyshire', painted by Thomas Smith (c.1720–67; oil on canvas; © Derby Museums Trust)

Strategic Objective 3D. Assess the impact of Nonconformist and other free-thinking philosophies upon the established knowledge, values and beliefs of Derwent Valley communities

Paul Elliott

Nonconformists or Dissenters[1] were religious groups effectively excluded from the Anglican Church because they failed to accept the re-imposition of the religious hierarchy and *Book of Common Prayer* after the Restoration of 1660. They included religious groups, sometimes known as 'Old Dissenters', such as the Quakers, Presbyterians,[2] Baptists, Congregationalists and Unitarians. The Wesleyans or Methodists, who emerged during the 18th century, remained in the Anglican Church until the death of Wesley in 1791 and are sometimes designated 'New Dissenters'. Although mitigated by the 1689 Toleration Act and various Indemnity acts, Dissenters suffered various disadvantages under the Clarendon Code (1661–5) and Test Act (1673) until the repeal from 1828 of the Test and Corporation Acts,[3] including exclusion from municipal or state offices and Oxford or Cambridge Universities. Some have argued that their religiously motivated work ethic, social disadvantages and close-knit communities spurred Dissenters to play prominent roles in innovative commercial, industrial and scientific activities, thereby helping to stimulate the Industrial Revolution.[4] More recently, historians have learnt to appreciate better the complexity of religious affiliations, and in particular the practice of occasional conformity, in which individuals worshipped in both churches and chapels as it suited them.[5]

The Derwent Valley provides ample opportunities to investigate these matters.[6] Whilst much work has been done on influential Dissenting families such as the Strutts,[7] more analysis of lesser known families would be valuable. This ought to explore the commercial, industrial and cultural behaviour of Nonconformists, including comparison with the activities of Anglican clergy, the role of buildings such as chapels and schools and the impact of social structures and social mobility, in order to reveal underlying patterns and distinctions between communities. We know that many Dissenters worked closely alongside other religious denominations in charitable, improving, religious and political activities; more is to be learnt about co-operation and conflict in relation to these. More comparative research should be undertaken on the composition and behaviour of Nonconformist congregations to assess their role in commercial, industrial and social development, including intermarriage, the status of women and children, and the impact of religious, social and political divisions. The changing relationships between Nonconformists, Anglicans and other denominations also require further study to assess rivalries and co-operation in business, social and cultural affairs and the impact of occasional conformity. Finally, the means by which Dissenters acquired their education should be analysed, including membership of associations, the purchase, circulation and reading of printed material, and the educational role of Dissenting tutors at schools such as those at Derby and Belper.[8]

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Fig.4.17 Joseph Wright's portrait of the Rev John Pickering (1706–90), holding a mathematical diagram, emphasises the strong interest of many of the clergy in the discoveries of the Enlightenment (oil on canvas; Private Collection/Bridgeman Images)

Strategic Objective 3E. Investigate the impact of the expanding middle classes upon Derwent Valley society during the 18th century and the details of their business and private lives

Ros Westwood

It has been argued that, by the middle of George III's reign, England was not a nation of gentry but instead a land with a powerful and extensive middle class.[1] It had grown in response to protracted economic expansion, mild inflation and relatively low taxation. Rising levels of literacy from the 15th century, especially amongst the 'middling sort' engaged in manufacturing, trade and commerce, had contributed further to the growth of the middle classes, and the educational advances of the Enlightenment spurred yet further their development.[2] Never homogeneous, it included industrialists, university-educated lawyers, clerics, doctors and naval and military men, and became a major force in later Georgian society. Its members are immortalised in the novels of Jane Austen and later William Makepeace Thackeray and George Eliot, and are remembered by their authorship of seminal scientific works such as *The Natural History of Selborne*.[3] Members were distinguished from the labouring majority by their possession of property – whether mobile capital, stock in trade or professional credentials – and by their exemption from manual labour. They helped to drive consumption and production, giving entrepreneurs like Sir Richard Arkwright and Jedediah Strutt opportunities for industrial growth and assisting more of those associated with the textile industry to rise through the middle classes.

The middle classes of the Derwent Valley appear in the portraiture of Joseph Wright,[4] but their impact can also be seen in the architectural legacy of churches, chapels, schools, inns and shops. The names of the clergy, teachers and business owners are recorded in Trade Directories and other documents preserved in regional and national archives, and there is a rich seam to be mined of less famous individuals whose activities are recorded in local papers, archives and publications. The ideas, tastes, patterns of consumption and activities of the middle classes are to be found in the diaries, letters, business accounts, wills and personal records of men and women of diverse incomes, abilities and professions. Study of these would enable details of their businesses and personal lives to be stitched together, provide character to the population across the Derwent Valley and generate a richer view of daily lives than is available at present. The Royal Society, Society of Antiquaries, Georgian Society and British Library[5] provide useful sources, along with the regional archives listed in Chapter 5. Recent models for such research can be found in the writing of Amanda Vickery,[6] Jenny Uglow[7] and Richard Holmes,[8] and it would be interesting to extend these discussions to communities in the Derwent Valley.

Fig.4.18 Detail of a pencil, pen and ink sketch by John Nixon (c.1750–1818) portraying the affluent middle class picnicking in the Peak District. It provides an evocative image of the 'Miss Johnsons of Loughborough, J.N. [self-portrait: second figure from the right] and Jasper Atkinson at dinner in a cave in Dove Dale, Derbyshire' (© Buxton Museum and Art Gallery)

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Strategic Objective 4A. Establish the sources of the mechanical expertise that drove industrialisation in the Derwent Valley

George Revill

By contrast with Derby, the Derwent Valley upstream of Darley Abbey cannot claim a legacy of textile engineering and manufacture as a basis for its industrialisation in the later 18th century. To this extent, there seems limited justification for arguing that local mechanical expertise and engineering skills would have been significant causative factors in the textile-based industrialisation of the Valley. However, the mills of the Derwent Valley would certainly have been able to draw on a rich variety of skills, both locally and from neighbouring regions. Prior to the development from the mid-19th century of professional bodies, craft unions and formal qualifications, the diverse knowledge and transferable skills of millwrights and smiths are likely to have been especially prized by industrialists.[1] In the Derwent Valley, workers with mechanical expertise would have been essential for iron-working, the making and mending of mining, quarrying and mineral-processing equipment, the construction and maintenance of associated waterworks, soughs and leats, and work in related agriculturally based technologies such as milling.[2] Neighbouring areas, especially Derby, the mining and iron-working centres of Sheffield, Birmingham and the Black Country, and the lace and hosiery manufacturing centres of Nottinghamshire may also have provided skilled labour resources.[3] From this perspective, the location of the Valley at a crossroads between routes linking Lancashire and Cheshire to Nottingham, and Birmingham and the Black Country to Sheffield, may have had some influence.[4]

In this context, it is recommended that further research focus upon the location of archival sources that may elucidate the following: evolving patterns of demand for particular kinds of mechanical expertise; the impact of such demands upon the nature, success and extent of industrialisation; the means by which mechanical expertise was disseminated and transformed; the specific synergies between local trades and the developing need for skills and expertise; the training and socialisation demands of a diversely skilled workforce in new industrial contexts; the relationships between 'proto-industrial' millwrighting and smithing trades; the development of engineering practice and associated mechanical skills; and changing patterns of mobility and migration for workers with mechanical expertise.

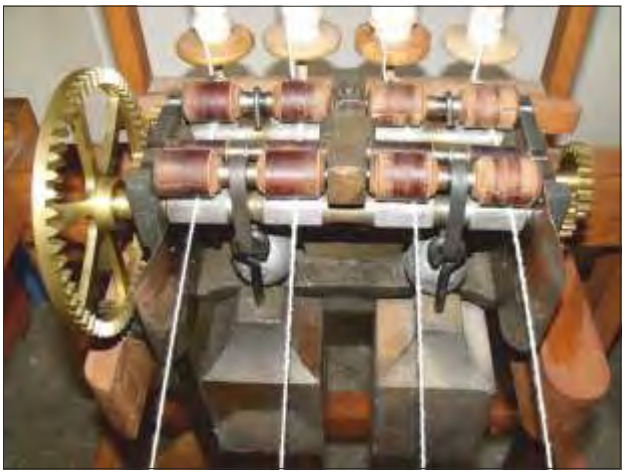
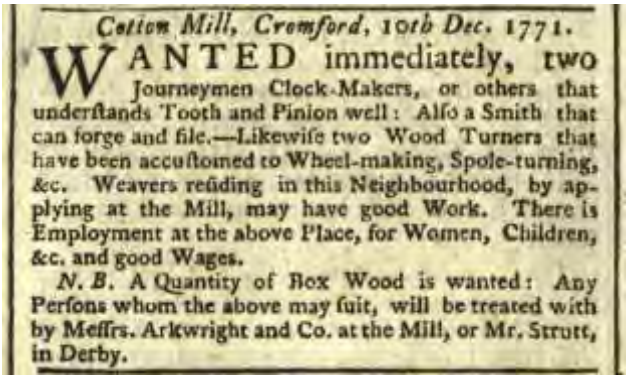


Fig.4.19 Cromford Mill: single 'Arkwright Spinning Head'. This innovative machine formed the heart of Arkwright's water frame,[5] which typically would have required 24 spinning heads and 96 spindles. The components of the water frame and of the associated preparatory machines could have been constructed by local craftsmen, except perhaps parts requiring specialist clock-making skills for their manufacture (photograph © Patrick Strange)



Cotton Mill, Cromford, 10th Dec. 1771.

WANTED immediately, two Journeymen Clock-Makers, or others that underſtands Tooth and Pinion well: Alſo a Smith that can forge and file.—Likewiſe two Wood Turners that have been accuſtomed to Wheel-making, Spole-turning, &c. Weavers reſiding in this Neighbourhood, by applying at the Mill, may have good Work. There is Employment at the above Place, for Women, Children, &c. and good Wages.

N. B. A Quantity of Box Wood is wanted: Any Perſons whom the above may ſuit, will be treated with by Meſſrs. Arkwright and Co. at the Mill, or Mr. Strutt, in Derby.

Fig.4.20 Clock-makers, who head the list of required labour in Arkwright's oft-quoted advertisement in the Derby Mercury *of 10 December 1771, may need to have been sought in neighbouring towns such as Derby, Ashbourne and Nottingham rather than locally (reproduced by permission of the Derby Local Studies and Family History Library)*

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Strategic Objective 4B. Determine the impact of factory-based production upon the established economy of home-based manufacture, mining and agriculture

Garry Campion and Marilyn Palmer

Domestic outworking in textile production was widespread across the East Midlands, particularly for the manufacture of hosiery, from the late 17th century onwards.[1] The Derwent Valley mill owners of the 18th century introduced significant technological innovations, as well as increasing the employment opportunities for family members, but the impact of these changes on existing outworking in the area is not clear.

Recent work has begun to analyse the extensive 18th and 19th century workers' housing that survives in Cromford, Belper, Milford and Darley Abbey,[2] but more needs to be known about how far these buildings were utilised for outworking as well as providing homes for factory-based workers. Some of the houses, as in North Street at Cromford and Brick Row in Darley Abbey, included attics with window lights which, as elsewhere in the East Midlands, could have accommodated framework knitters or weavers.[3] In Belper, the mills were imposed on a small village previously focusing on framework knitting and domestic-scale nail-making.[4-6] These non-factory activities certainly continued throughout the 19th century, and further research is required to investigate how far this workforce interacted with the mill workers and to establish the occupations of residents in the Strutt houses of Belper and Milford. To what extent did members of the same family participate in both types of working, as in south-west England?[7] Was their continuation encouraged by the mill owners to achieve a diversified workforce, providing employment for more men than could be employed in the mills? Further analysis of the houses and associated workshops in these and other settlements in the Valley, following on from the work of Suzanne Lilley,[8] may help to clarify the importance of outworking in relation to factory-based industries. This should be combined with analyses of census returns, parish and probate records, rent books, personal documents and Parliamentary Commission Reports relating to domestic industry – building for instance upon on-going work by Belper North Mill volunteers[9] on the occupants of the nearby Strutt houses. A detailed scrutiny of William Felkin's account of the hosiery and lace industries, which contains a statistical analysis of the 1844 Framework Knitters' Report,[10] would also be of considerable value.

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Fig.4.21 Three of the gritstone terrace houses on North Street, Cromford, which Arkwright built in 1776 for his mill workers and their families. Domestic accommodation was provided on the ground and first floors, while the top floor was employed as a workshop. The elongated third storey windows would have ensured sufficient light for home-based textile workers (photograph: David Knight; © Trent & Peak Archaeology)

Strategic Objective 4C. Investigate the impact of natural resources and geography upon the Derwent Valley textile industry and evaluate the distinctiveness of the Derwent's resource base

Chris Wrigley

The prime natural resource of the region from the perspective of the early factory builders derived from the River Derwent and its major tributaries – especially where watercourses were fast-moving and regular in their flow. The advantages of these rivers as sources of power had long been recognised, enabling the early entrepreneurs to select sites with good track records for the harnessing of water power. This locational strategy is demonstrated at Masson Mill, which was built next to an earlier paper mill (Fig.4.22),[1] and at Boar's Head Mills, which postdated a complex sequence of medieval and later water-powered fulling, corn, paper, flint and leather mills.[2] Building upon this natural resource, engineers often devised ingenious solutions to the problem of maintaining a reliable water supply and ensuring sufficient water energy. At Arkwright's Cromford Mills, for example, water derived from diversion of the Bonsall Brook was supplemented via the Cromford Sough by a steady flow of water that did not freeze in winter.[3] Similarly, at Belper, Jedediah Strutt provided the extra water energy that was required to support his expanding factory complex by investing in a water management scheme that culminated in 1797 with his remarkable Horseshoe Weir.[4]

Many mills in other areas were of course powered by fast-running water, including Quarry Bank Mill at Styal in Cheshire and New Lanark near Glasgow, but a distinctive feature of the Valley in the northern reaches of the World Heritage Site is the juxtaposition of riverine water power and lead ore resources: another key natural resource that by means of its sough networks (Strategic Objective 10C) provided important additional sources of water power. This point was certainly not lost on Arkwright, whose exploitation of the Cromford Sough was crucial to the success of his pioneering cotton-spinning mills. Moreover, by providing significant employment for men, lead mining also created for the mill owners a potential labour force of unskilled and semi-skilled female and child labour accustomed to textile outwork. Other natural resources, such as locally available building stone, are also likely to have impacted upon locational decision-making, especially in view of the region's poor transport links in the 18th century (Strategic Objective 8A).[5] Further documentary research is recommended into the exploitation of natural resources, the distinctive nature of these and the transport viability of the Valley in the late 18th century – especially by counterfactual economic history such as has been carried out for the early British railway network.[6] Finally, less a natural resource than an accident of geography, the proximity of the Derwent Valley to Nottingham, Derby and Leicester, all of which were important centres of 18th century framework knitting, would no doubt have strengthened further its locational appeal. In the longer term, however, this locational advantage assumed less significance than proximity to raw materials and overseas markets, as demonstrated by the rise to dominance in the 19th century of the factories of Lancashire and Cheshire.

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Fig.4.22 Extract from George Robertson's watercolour of Masson Mill (c.1790) looking upstream along the limestone gorge between Cromford and Matlock. The building in the middle distance, adjacent to the weir across the fast-flowing Derwent, is thought to be Masson Paper Mill. The latter was built in 1770, some13 years before Masson Mill, and was influential in the siting of the later cotton-spinning mill (© Derby Museums Trust)

Strategic Objective 4D. Review the technological innovations and adaptations that were instrumental in the development of the low-carbon, factory-based industry of the Derwent Valley

Ian Jackson and George Revill

The Derwent Valley Mills were inscribed as a World Heritage Site in recognition of the pivotal importance of the Valley for the development of the factory system, which significantly was driven not by fossil fuel but by water energy. The harnessing of water power generated by rivers and soughs is well documented, but there remains scope for further study of how the Valley managed to grow as a low-carbon community for over seventy years and to compete effectively with fossil-fuel powered mills in areas such as Lancashire and Cheshire. From this perspective, measures by which the mill owners and their engineers were able to harness more efficiently the available water resources to meet growing demands merit particular attention. There is also an opportunity to learn how the developing industrial communities of the Valley were able to feed the rapidly growing population. This would help to enhance understanding of key elements of the low-carbon food supply of the period, and in particular the development of model farms.[1]

Along the 24km stretch of the World Heritage Site, with its varying topography and geology, the various mill owners developed a wide variety of methods for securing and managing their water supply. These included the complex network of soughs and brooks that was developed at Cromford and the innovative horseshoe weir at Belper, discussed above,[2] together with weirs at Masson, Milford and Darley Abbey.[3] Particular attention should be drawn to the wide variety of technical innovations in the 18th and 19th centuries that, together with the increasing availability of cast and wrought iron, enabled construction of water wheels of improved efficiency, reliability and longevity, permitting therefore effective competition with fossil-fuel powered mills in other areas of the country.[4] The contributions of Thomas Hewes, the 'ingenious mechanic and engineer of Manchester',[5] including his development at Belper of the innovative suspension wheel,[6] merit special consideration, no less so than his achievements at the contemporary Quarry Bank Mill at Styal in Cheshire.[7] It is clear that his innovations in the control of water, such as the regulation by double hatch and the adaption of governor technologies,[8,9] allowed the Belper Mill complex to expand to an impressive eleven water wheels.[10] However, for all his achievements Hewes remains a comparatively neglected pioneer in water engineering. Another important innovation, described by Abraham Rees in his early 19th century *Cyclopaedia*,[11] is the wooden water wheel that was installed by Strutt in the now demolished West Mill at Belper (Fig.4.23).[12] Further research into such technical developments, including detailed study of references to water power in Rees's *Cyclopaedia*, would be invaluable as a means of elucidating further this comparatively neglected but highly significant aspect of the Industrial Revolution in the Derwent Valley.

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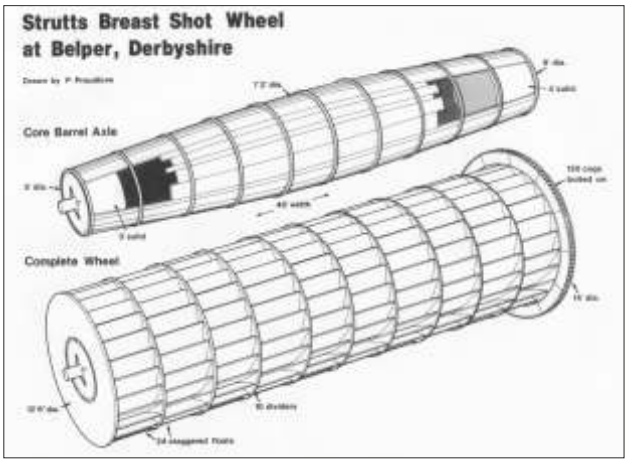

Fig.4.23 Visual interpretation by Alan Gifford of Abraham Rees's description[11] of the cylindrical wooden water wheel that was installed at Belper's West Mill (redrawn by Phillip Proudlove; reproduced by courtesy of Alan Gifford)

Strategic Objective 4E. Assess the impact of the ownership and the control of water and land resources upon the development of industry and trade

Robin Holgate

The control and ownership of land and water resources were key factors in the development of early industry and the growth of the factory system that drove the Industrial Revolution, not only in the Derwent Valley[1] but also in England generally.[2] In the 18th century, factories were located on rivers which could provide water power, whilst proximity to navigable rivers (and subsequently canals) was important for the transportation of relatively fragile as well as heavy goods – as exemplified by the movement of cargoes of pottery, ironwork and other commodities along major rivers such as the Severn[3] and Trent.[4] Competitively priced land with good access to a water course, and with no restrictions on its use, was a vital consideration in the location and growth of major industrial centres, and further study of the role of Derwent Valley land-owners in the initiation and proliferation of industrial growth may be identified as a fruitful area for investigation. Recent studies in the establishment of the factory system of production in north-western England[5] have emphasised the importance of the availability of land as a factor enabling industrial development to flourish – and highlight the scope for further research, where documentation permits, into the extent to which local landowners seized the opportunity to make money from industrial enterprises.

Several recent studies of Derwent Valley archive collections point the way for further research. These include an examination of estate records for Lea Wood by members of the Dethick, Lea and Holloway Historical Society, which has revealed the important role of the Nightingale family in the development of the lead-smelting industry on their lands downstream of Cromford.[6] In addition, detailed scrutiny of documents preserved in the Derbyshire Record Office and other archive collections has shed significant new light upon the important role of Peter Nightingale junior (1736–1803) in the establishment of Sir Richard Arkwright's cotton-spinning mills at Cromford.[7] Further research on the documentation relating to land ownership that is held in archive repositories may help to identify and chart the progress of emerging landowning entrepreneurs and to elucidate further the role they played in the industrialisation of the Valley (as well as providing information on emerging markets and patterns of trade). As demonstrated by recent archaeological surveys and excavations in Lea Wood,[8] this may also assist in identifying areas that would benefit from field survey to locate and record early industrial sites, thus contributing to progress on Strategic Objective 2A.

Fig.4.24 Front elevation of the younger Peter Nightingale's imposing house at Lea Hall, near Cromford, showing the classical frontage that he added in the mid-18th century to the original farmhouse. Recent documentary research[7] has demonstrated the pivotal role played by this wealthy landowner and lead merchant in the financing of Arkwright's cotton mills, workers' housing and associated infrastructure (photograph © Jane Middleton-Smith)

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Strategic Objective 5A. Identify the factors that encouraged innovation, adaptability and resilience at some cotton mills and in other industries during the 19th and 20th centuries

Adrian Farmer and Mary Smedley

Despite growing competition from elsewhere in Britain and abroad, some of the early mills in the Derwent Valley adapted by innovation to the changing economic conditions of the 19th century and remained in operation into the last quarter of the following century. Following the initial wave of innovation in textile production, the next generation continued to develop and improve on this work, striving to embrace new ideas and to harness them for use in the mills, associated industrial settlements and farms to ensure efficiency and rapid growth. This ensured that each new mill, particularly those constructed by the Strutt family at Belper and Milford, was an enhancement of its predecessor, leaving an impressive built environment and archaeological legacy.[1] This progressive mindset was passed on to future generations throughout the 19th century, ensuring that factories benefiting from further investment in innovative technologies continued to thrive after the initial expansion of production.

William Strutt's ground-breaking experiments in engineering and construction ensured greater resistance to fire,[2] further enhanced by the use of gas as an alternative for lighting from 1822, while the spoked waterwheels developed by Thomas Hewes provided greater power from reduced water flows.[3] A deeper understanding is needed of these and other innovations, which ensured continued profitability and reduced risks and contributed to the growth of a more content, healthier and productive workforce than was usual for the time.[4] Innovations embraced and developed by the Strutts encouraged others to keep pace, ensuring that the Derwent Valley continued to see developments across the industrial spectrum as the region experienced growth in textile manufacturing and other industries and in farming. With the implosion of the British cotton industry at the close of the 19th century, both the Strutts and the Arkwrights saw the value of consolidating with other British companies to compete more effectively in a global market. This collaborative approach stimulated a new wave of development and growth within the Valley, particularly at Belper and Masson, which ensured continued production for nearly a century. As part of this process, the need for, creation of and continuing adaptability of the English Sewing Cotton Company (permitting it to survive changes in the global market) is a subject of particular interest that would warrant further investigation.[5]

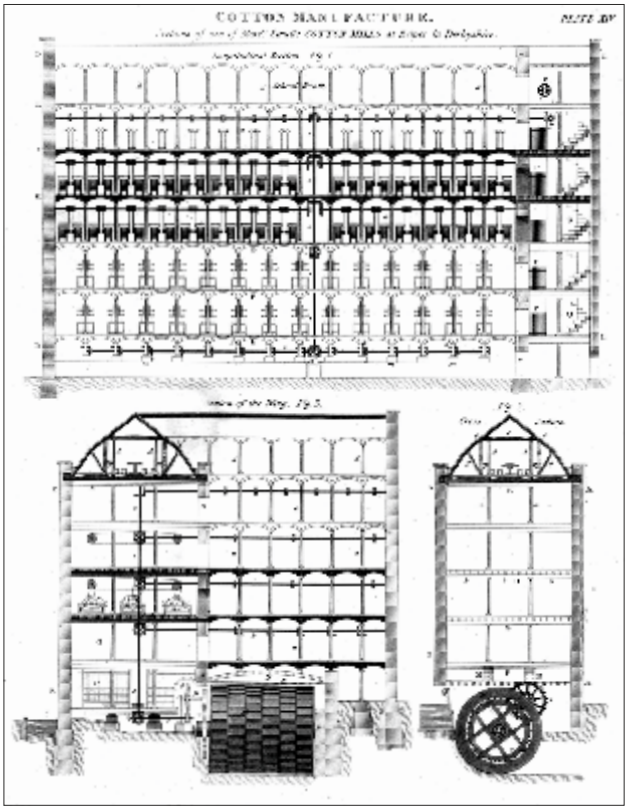

Fig.4.25 Cross-section of North Mill in Rees's Cyclopaedia.[6] *This iron-framed mill, rebuilt in 1804 by William Strutt, incorporated a host of innovative features designed to resist combustion*

Fig.4.26 Laser survey of the fire-proofed basement of North Mill, showing the rows of stone piers that carried cast iron columns supporting the floors above (source: Derbyshire County Council)

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Strategic Objective 5B. Explore the fluctuating fortunes of the post-Enlightenment tourist industry, from the development of the railways in the mid-19th century to the present day

Jane Adams

This strand of the research framework will explore the changing character of tourism in the Derwent Valley from around 1840 to the 21st century. National trends, including the development of an integrated rail infrastructure, rising incomes among the middle classes and changing patterns of leisure and consumption, led to a rapid expansion in tourist destinations across the country from the mid-19th to mid-20th centuries.[1-3] The attractive rural scenery and dramatic geological formations that had long attracted visitors to Derbyshire continued to appeal to the growing proportion of the population living in urban environments and industrial settings, while the spectacular success of Matlock Bank as a centre for hydropathy from the 1850s to the 1940s spurred developments at Matlock Bath, the premier resort in the Derwent Valley.[4-6] The region's distinctive pattern of industrial development, with many key sites easily accessible by rail, also continued to be celebrated. By the early 20th century, travellers included growing numbers of working class visitors able to take advantage of scheduled leisure time, cheap rail tickets and coaching services. Cheaper travel influenced the length of time visitors spent in the valley, and the increasing popularity of day trips shaped the amenities and facilities that were developed to fulfil the needs of tourists. The creation in the 20th century of leisure destinations catering for the local population and visitors from farther afield is another important theme of interest which would warrant further study, together with the impact upon tourism of the Valley's inscription on the World Heritage List (Strategic Objective 1E).

The Valley's place within the competitive national market can be assessed through the wealth of printed publicity and marketing material that circulated widely throughout this period, but which has yet to be studied systematically from this perspective. These include *The Gem of the Peak*,[7] the *Shell Guide to Derbyshire*[8] and numerous local publications, including guidebooks[9-11] and newspapers.[12] Further research is also required to establish how the economic decline associated with closure of many of the textile factories impacted on these established patterns of tourism and led to initiatives to shape the Valley's industrial heritage assets as visitor attractions. The role of local authority and national funding bodies was central to these developments, and the documentary archives preserved by these bodies merit particular attention.

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Fig.4.27 Detail of an early 1900s postcard showing the Royal Hotel at Matlock Bath, built in 1878 and destroyed by fire in 1927. The hotel is overlooked by the iron and glass Old Pavilion, built in 1884 and incorporating a central concert hall, assembly rooms, refreshment saloon and reading room. The Pavilion had fallen into serious disrepair by the 1950s and the site is now occupied by Gulliver's Kingdom theme park, founded in 1978 (Valentine & Sons, Dundee and London; image courtesy of Derbyshire Local Studies Libraries and www.picturethepast.org.uk: DCHQ001699)

Strategic Objective 5C. Review the impact of 19th to 21st century industrial and technological changes upon developing lifestyles, society and culture in the Derwent Valley

Jonathan Wallis

The Victorian era witnessed significant industrial expansion, mainly powered by coal and steam, in large metropolitan conurbations like Manchester, Sheffield, Birmingham and to some extent Derby, but upstream of that city the Derwent Valley remained essentially rural in character. Derby itself expanded massively during the 20th century as Rolls Royce[1-2] and the rail industry[3-4] continued to grow. However, although industries continued to develop elsewhere in the Valley, the pattern of small, tightly-knit industrial settlements within a rural setting that developed in the 18th century, and is a defining feature of today's World Heritage Site,[5] was maintained.

Considerable numbers of industrial workers still lived close to their places of work in the 19th century, and a number of factory owners continued to build houses and other facilities for workers and their families into the early part of that century.[6] However, as the textile industry declined, and as demands for factory workers slackened, many families migrated to the larger urban areas for work. The pattern of migration into Derby provides a particularly interesting case study, and additional research into early census records and other primary sources is recommended to elucidate further this topic. More recently, the accelerating rise in car ownership, combined with significantly improved train services on the Derwent Valley Line between Derby and Matlock,[7] has spurred further demographic changes, with Duffield, Belper, Cromford and Milford developing as dormitory settlements for both Derby and Nottingham. The process of gentrification and the social, economic and political impacts of new residents merit further research to explore questions such as the role of middle class newcomers in maintaining and developing community, arts and cultural initiatives, and their impacts upon the variety of shops, restaurants and service industries in the Valley.

Research efforts need also to be focused upon the impacts of changes in transport technology and availability upon the growing tourist industry, discussed by Jane Adams above,[8] and the socio-economic impacts of developing telecommunication and digital technologies. High speed broadband connections now enable many businesses to operate in attractive rural areas, some in regenerated heritage assets such as Boar's Head Mills at Darley Abbey[9] and Arkwright's Cromford Mills.[10] The successful development of these mill complexes as business centres flags them as models for future regeneration projects, while the installation of a heritage interpretation centre in the ground floor of the newly created business hub in Cromford Mill emphasises the opportunities created by such schemes for enhancing public understanding of the technological and social importance of the factories.

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Fig.4.28 Boar's Head Mill, Darley Abbey: west elevation of the West Mill, constructed from 1821, and in the foreground the mill's dining room, built probably in the 1820s or 1830s and since converted to a restaurant.[11] The Evans family's textile mill complex is now enjoying a new lease of life as the focus for a wide variety of small to medium industrial and other commercial enterprises and as a wedding venue (photograph: David Knight; © TPA)

Strategic Objective 5D. Examine changes in factory ownership as the textile industry metamorphosed from the 19th century to the present day

Jane Middleton-Smith

The principal figures in the 18th century Industrial Revolution and Enlightenment have, to date, claimed centre stage in research centred upon the Derwent Valley Mills,[1] with rather less emphasis upon the factory owners of succeeding centuries.[2] However, all of the original companies were passed to a second generation, and all contributed to the huge growth of the British textile industry during the reign of Queen Victoria. The largely public school and classically educated young men who took up the reins from their more artisan fathers took to their responsibilities as industrialists with differing degrees of diligence and focus. Surprisingly, comparatively scant attention has been devoted to later generations of the Arkwright family, either in the Derwent Valley or farther afield.[3] Equally, although William Strutt's pioneering work as an inventor and architect has been widely discussed, less has been written about other members of the second and third generations of the Strutt family and the later progress of his company at Belper and Milford. However, the physical evidence of Belper's giant East Mill, built in 1912, represents an optimism and output that was of significance and deserves prominence in the research agenda. As for the Evans family, although Jean Lindsay's study of the Darley Abbey industrial community[4] and Adam Menuge's work on the Boar's Head Mills[5] have advanced significantly our understanding of the family and its achievements, a real opportunity exists to write a definitive study. In short, the role of the mill owners in maintaining the Derwent Valley mills as key suppliers of cotton to the growing industrial towns of Britain and to the Empire is a fertile area for future researchers.[6]

Most of the Derwent Valley mills survived into the mid-20th century in the hands of their original families. However, since the 1960s, all (with the exception of John Smedley)[7] were absorbed by conglomerates: notably the English Sewing Cotton Company and Courtaulds,[8] the former ceasing operations in the Valley in the 1980s and the latter in 2016. Research into the demise of these mills in the mid- and late 20th century and accompanying changes in ownership would provide an important contribution to the study of the textile industry as an indicator of the wider British and world economy.[9] There is an opportunity to be seized to record now the accounts of managers, staff and County Council members, as time is limited and as records would appear to be scant. Finally, changes of ownership and redevelopment of the mills in the 21st century as heritage destinations, retail outlets or foci for new small to medium enterprises offer another fertile area of study for geographers, social economists, planners and others (see also Strategic Objective 5C).

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Fig.4.29 Belper's North Mill, rebuilt by William Strutt in 1804 after a disastrous fire, lies in the shadow of the gigantic East Mill, built in 1912 by the English Sewing Cotton Company (photograph: David Knight; © Trent & Peak Archaeology)

Strategic Objective 6A. Investigate the impacts upon economic growth of the interactions and interdependencies of the early entrepreneurs and the wider social structures that enabled industrialisation

Stanley Chapman

The early mining and manufacturing industries of Derbyshire generated a distinctive social structure in response principally to the financial risks associated with development. Lead mining was a particularly risky business, with serious welfare issues,[1] in which large fortunes were won and lost.[2] The essential capital investments of drainage soughs and steam pumping engines were hugely expensive, with soughs costing as much as £30,000 to £50,000 according to John Farey's authoritative *Agriculture of Derbyshire*.[3] This must be compared with a financial investment of just £3,000 to £5,000 for the early Arkwright-type cotton mills.[4] Significant risks, high costs and a lack of investment banks compelled the gentry to work closely together in networks of interlocking partnerships, supported by a host of smaller investors of all social classes.[5] These social structures have never been mapped and further research into these networks could add significantly to our understanding of the social framework that underpinned industrialisation. The main problem is locating appropriate source material, including letters, diaries, stakeholder lists and masonic records, such as those relating to the Derby Tyrian Lodge, established in 1785.[6] Family pedigrees,[7] showing capitalists interlocked by marriage connections, can provide an introduction but need fleshing out with much more information. Unfortunately, few family archives have yet entered the public domain or been adequately listed, thus limiting at present the scope of research.

Capital costs and risks were lower in the textile era, from around 1770, and profits in the pioneer years up to *c.* 1800 were much more certain; in consequence, cotton mill entrepreneurs with few connections sprang up throughout Britain. Many failed, but a few prospered sufficiently to form new dynasties; in the Derwent Valley, the Arkwright, Strutt and Evans families are the best known names.[8,9] There are more records available for this era, but insufficient are currently available for researchers to write with easy assurance on social structure. Ironically, the best-documented Derwent Valley entrepreneur, John Smedley, abandoned all connections with local industrialists, parsons and lawyers! Evidently this is not an area of research for beginners or the faint-hearted, at least until more accurate documentation becomes available. It is recommended, therefore, that the emphasis be placed at present upon the location, classification and assessment of documentary records such as those preserved in the factory of John Smedley Ltd at Lea Bridge, near Cromford.[10]

Fig.4.30 Terrace housing at Lea Bridge, comprising three cottages built in 1783 for workers at Peter Nightingale's cotton mill and a later extension (far end of terrace). This mill was acquired in 1818 by the Smedley family, whose factory preserves an unrivalled archive for study of the Valley's hosiery and knitwear industry. The business records, which have significant potential for study of the family's commercial interactions, are currently being catalogued by Jane Middleton-Smith in collaboration with the author (photograph: David Knight; © Trent & Peak Archaeology)[11]

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Strategic Objective 6B. Investigate further the developing social, cultural and intellectual interactions of the leading industrialists of the 18th and 19th centuries

Jonathan Wallis

The pioneer industrialists of the 18th century comprised a relatively small group of individuals who were connected with each other on many levels. These connections were important for the development of their business ventures,[1] as discussed by Stanley Chapman above,[2] but also extended into the social arena. Business relationships commonly developed into friendships and ultimately into family connections by marriage: as illustrated by the close links that developed between members of the Evans, Strutt, Hurt and Arkwright families.[3] Thomas Evans, for instance, was a partner in the Evans Crompton Bank, which supported the Arkwright and Strutt business partnership, and seeing the commercial potential of the cotton industry he opened the mills at Darley Abbey in 1783.[4] Both his son Walter and his daughter Barbara married children of Jedediah Strutt, while the Hurts and the Arkwrights became linked by the marriage of Sir Richard Arkwright's daughter Susannah to Charles Hurt. Most of the social and family connections of the 18th century mill owners were between the families of other businessmen, industrialists or smaller landowners rather than the aristocracy, and in the case of William Strutt, for example, extended to such key Enlightenment figures as Joseph Wright and Erasmus Darwin.[5] Many of these social connections resulted not only in further business ventures but also in collaboration on a broad range of philanthropic and other initiatives – such as the establishment by William Strutt and Lunar Society member Erasmus Darwin of the Derby Philosophical Society.[6] There is significant scope for investigating further the wider interactions of the mill owners and the social consequences of these relationships which, from the examples cited above, can be shown to have extended beyond the economic and social arenas into the fields of philosophy and religion.

Business, marital and other connections continued into the 19th century and beyond, and it would be of particular interest to investigate the impact of the early factory owners' successes upon later entrepreneurs and the social relationships between established and upcoming industrialists. Middling landowners and industrialists like Peter Nightingale,[7] and farmers such as Ellis Needham and Thomas Frith at Litton Mill in the neighbouring Wye Valley,[8] invested in cotton spinning in attempts to emulate the successes of Arkwright and other early entrepreneurs. There is scope to re-examine the historical record and to evaluate how the new mill owners and their families were received by the established élite and how they negotiated and influenced a world of economic and social change.

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Fig.4.31 Joseph Wright's portrait of Francis Hurt (1722–1783): a wealthy landowner and industrialist whose connections with the lead industry are symbolised by the fragment of galena on the table. The marriage of his son Charles to Arkwright's daughter Susannah strengthened the links between these pioneer industrialists (oil on canvas; © Derby Museums Trust)

Strategic Objective 6C. Establish the business, social and other roles performed by women in the mill owners' families

Marilyn Palmer

Marriage links between the mill owners' families were clearly important in cementing business relationships in the closely knit industrial communities that developed in the Derwent Valley during the 18th and 19th centuries, as demonstrated by the complex ties that linked members of the Strutt, Arkwright, Evans and Hurt families.[1] It would be interesting to know more about the motivations behind these marriages. How far, for example, did they benefit the social position of the mill owners? Sir Richard Arkwright, whose social pretensions are well known, became High Sheriff of Derbyshire not long after the wedding of his daughter Susannah to Charles Hurt: an important Derbyshire landowner and rising industrialist, with interests in lead mining and iron founding.[2] Similarly, Thomas Evans' role as lord of the Derbyshire manor of Alsop-en-le-Dale, as well as builder of the Darley Abbey mills, may have enhanced further for Jedediah Strutt the attractions of the marriage alliances that were formed by the marriage of his children to Thomas Evans' son and daughter, Walter and Barbara.[3]

It is difficult at present to establish how far the wives of the early mill owners were able to influence decisions about business affairs, but it should not be assumed that they performed passive roles in the running of the family concerns. Jedediah Strutt's wife Elizabeth, for instance, appears to have played a significant business role to judge from her letters to her husband[4] and, as noted by Fitton and Wadsworth, 'this very capable woman…perhaps supplied the drive that her introspective, self-centred husband had hitherto lacked'.[5] There is also compelling evidence for positive engagement of the mill owners' wives with the wider community, notably in the religious and philanthropic arenas. John Smedley's wife Caroline, for example, wrote eloquently on the subject of religion and hydropathy, as well as working closely with her husband on his business ventures.[6] In addition, Elizabeth Evans, the wife of Wirksworth mill manager Samuel Evans and aunt of George Eliot, has been identified as an inspiration for the Methodist preacher Dinah Morris in Eliot's first full-length novel, *Adam Bede*.[7] Study of the family papers and other documents contained in the archives of Derbyshire and beyond would be valuable as a means of bringing together this evidence and exploring further the range of educational, social, charitable and other activities in which the female members of the mill owners' families might have been involved. David Seker's authoritative study of Hannah Greg of Quarry Bank Mill in Cheshire[8] provides a model for the kind of study that could be attempted where comprehensive documentary archives such as those relating to the Smedley family have survived.

Fig.4.32 A rare family portrait of the mill owners: this picture by Joseph Wright of Derby, painted in 1790, shows Richard Arkwright Junior (1755–1843) with his wife Mary and daughter Anne (oil on canvas; © Derby Museums Trust)

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Strategic Objective 6D. Investigate the relationships of the mill owners to the builders, millwrights and engineers that constructed the factories and industrial infrastructure of the Derwent Valley

Stanley Chapman

The success of British industry in the 18th century lay in the development, improvement and diffusion of ideas and processes, not least through the utilisation of the skills and technical competence of a great variety of artisans and mechanics.[1] In this respect, considering the importance of builders and millwrights in the development of the Arkwright cotton mill system, it is surprising how little interest researchers have shown in them. In truth, there is little to report at present. However, recent study of the manuscript collections relating to Sir Richard Arkwright's architect and builder, William Stretton, and his wheelwright, Thomas Lowe,[2] has highlighted the potential of the surviving records for elucidating the developing relationships between the factory owners and mill builders.[3] The relationship between Arkwright and his model makers and draughtsmen was also crucial when defending his patents.[4] Additional research, aimed at identifying and scrutinising manuscript sources that might shed further light upon the relationships between mill owners, builders and wheelwrights, is identified as a priority for advancing this comparatively neglected area of study.

The engineers of the Industrial Revolution have fared rather better in terms of research interest, due in large part to the enthusiasm of transport historians. Particular attention may be drawn to the substantial biographies of the canal engineers William Jessop[5] and Benjamin Outram,[6] whose outstanding achievement within the World Heritage Site is the 10.5km length of canal that linked Cromford Canal Wharf and Ambergate via the spectacular Wigwell Aqueduct.[7] The topic that has attracted most academic interest, however, is the supposed connection between science and industry in the 18th and 19th centuries. This has been championed by a number of writers, most notably by Musson and Robinson in their study of science and technology during the Industrial Revolution.[8] Sceptics, however, emphasise the strong empirical tradition in British industry, particularly in textile production: a manufacturing tradition with which Derwent Valley industrialists have been most concerned. Here, therefore, is a hot topic to debate, and it is recommended that future research efforts be focused particularly upon study of the practical impact on the mill owners of new scientific thinking.[9]

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Fig.4.33 The Wigwell Aqueduct, visible in the distance, was built in the early 1790s by William Jessop with the assistance of Benjamin Outram and carried the Cromford Canal for almost 200m across the Derwent. The adjacent Leawood Pumphouse, constructed in 1849, housed a steam pumping engine to increase the supply of water from the river to the canal (photograph: David Knight; © TPA)

Strategic Objective 6E. Establish how far the religious beliefs, paternalism and pragmatism of the mill owners might have counteracted the threat of revolutionary activity and social unrest

Marilyn Palmer

The idea that religious developments in 18th century Britain helped to prevent social unrest was first suggested by Elie Halévy in an essay of 1906 on the birth of Methodism in England[1] and was developed in his *History of the English People in the Nineteenth Century*, published from 1913 onwards.[2] In his first volume, he tried to explain why England, which had undergone vast social, economic and religious changes in the 18th century, had, unlike most countries in Europe, managed to avoid violent social change or political revolution. He suggested that it was due to the growth of Methodism: an argument which was stringently criticised by the Marxist historian Eric Hobsbawm.[3] Nevertheless, there was a strong tradition of Nonconformism amongst the mill owners of the Derwent Valley,[4] and it is interesting to consider how far the beliefs and practices of Nonconformists such as the Strutts, with their strong Unitarian philosophy, or indeed Anglicans such as the Arkwrights, might have reduced levels of social tension (see also Strategic Objective 7E).

Previous biographers have argued that the religious beliefs of the Derwent Valley mill owners were demonstrated in their paternalism, notably in their provision of housing within the mill communities.[5] This thesis has been questioned since, notably in recent work by Suzanne Lilley, who argued that pragmatism was probably a stronger influence on housing provision than paternalism.[6] Further work might help to shed more light upon motivations for the construction of places of worship or social and educational facilities within the mill communities. It would also be useful to see a breakdown of stated religious affiliations, perhaps by a more detailed analysis of parish registers, Nonconformist records or the Religious Census of 1851.[7] Such work could address a variety of issues, including, for example, the role of members of the mills' workforce in the organisation of their congregations and the level of engagement with the mill owners' religion. There is also scope for further investigation of the evidence for civil strife. Some signs of tension are to be found in the mill architecture. William Strutt, for instance, was sufficiently concerned about the Luddites that he placed gun embrasures in the covered walkway linking two of his mills in Belper, whilst the defended entrance to Cromford Mill suggests similar anxieties.[8] Events such as the Pentrich Revolution of 1817,[9] the Derby Silk Trades Lockout of 1833–4[10] and the unsuccessful 1911–12 strike at Lea Mills[11] are also part of the story of changing labour relations, along with studies of the involvement of mill workers in trade union activity, and all would benefit from further study.

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Fig.4.34 The Strutt family's concerns about social unrest, and in particular the security of their West Mill counting house, are demonstrated by the addition of gun embrasures either side of this arched footbridge, built c.1795 to link Belper's West Mill (left) with other factory buildings. Another embrasure was positioned above the arch on the other side of the footbridge (photograph: Adrian Farmer; © Derwent Valley Mills Partnership)

Strategic Objective 6F. Analyse the impact of the ideologies of the factory owners, landed gentry and middle classes upon Derwent Valley communities

Ruth Larsen

The notion of ideology, whether it be a Marxist interpretation relating to power or a broader understanding of the term relating to the belief systems that mould normative behaviour, has been recognised increasingly by historians as having a direct impact on the behaviour of communities. The ideology of the landed classes, with their focus on tradition and the improvement of their estates, has been seen as shaping their responses to new commercial opportunities. James Ackerman, for instance, has stressed how the ideology of retreat was central to the aristocratic focus on the country house and the development of large private estates within rural areas, where a clear distinction existed between leisure grounds and working land.[1] In addition, recent work by Eric Jones has argued that this element of gentry culture, along with the commitment to artisan-made rather than mass-produced commodities, was pivotal in the stifling of industrial growth in southern England during the late 18th century.[2] Within Derbyshire, however, there is plentiful evidence for the engagement of members of the social élite in the establishment of new industries.[3] The Dukes of Devonshire, for example, exploited extensively the lead, copper, iron and coal reserves of their estates,[4] while the prominent Derbyshire landowner, Charles Hurt, had significant interests in both the lead-mining and iron industries.[5] The Derwent Valley provides, therefore, an excellent case study for exploration of why the landed gentry, able to live comfortably on income from property or investments, either encouraged or failed to prevent the growth of industrialisation within the East Midlands.

Ideology could also influence the ways that factories were managed and designed or how the industrial settlements that were constructed by the mill owners to house the factory workers were planned.[6,7] The most famous example in the Derwent Valley of an ideologically driven mill design is William Strutt's panopticon Round Mill at Belper, which was inspired by Jeremy Bentham's innovative architectural designs.[8] Ideology could also shape significantly the daily lives of those living in the local communities, bearing in mind that the choice of parliamentary representative, clerical incumbent, school teacher and even whether there was a community public house was usually under the control of a select few. The degree to which Enlightenment ideologies, which were especially influential amongst the middle classes, shaped the lives of employees, villagers and farmers in this area, warrants particular attention, and should be pursued as a priority in future documentary research.

Fig.4.35 William Strutt's unique Round Mill at Belper, photographed by A. N. Smith in 1959 shortly before its demolition in the 1960s. The panopticon Round Mill, built between 1803 and 1813, was designed according to the architectural principles developed by Jeremy Bentham. It was divided into eight segments, with an 'overlooker at the centre, like the spider at the heart of his web, [who] could see everything that happened in them'[9] (photograph © Derbyshire Record Office: Local Studies Library photographs)

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Strategic Objective 7A. Review the evidence for the growth of industrial employment and the impact of industrialisation upon the social fabric of established communities

Suzanne Lilley

Research into the development of Derwent Valley communities has focused traditionally upon the 18th and 19th century cotton-workers' communities that form key elements of the cultural heritage of the World Heritage Site. Conversely, significantly less emphasis has been placed on the impact upon post-medieval and later settlement of other important local industries – such as lead mining and ore-processing,[1] the iron, stone quarrying and timber industries,[2] and long-established manufacturing activities such as nail-making.[3] This imbalance in knowledge contrasts with the neighbouring Peak District, where significantly more research has been conducted on agricultural and mining settlements and on landscapes impacted by extractive industries.[4] Understanding of settlement development in the Valley and the social, economic and political interactions of community members is consequently biased strongly towards the industrial settlements that were constructed to accommodate and control the factory workers and their families, with significantly less emphasis upon the wider industrial framework.

Future research needs to redress this imbalance in knowledge, with more studies along the lines of a recent project by Jurecki that focused upon the socio-cultural, economic and political interactions between established agricultural and mining communities around Cromford and Belper during the early post-medieval period.[5] In particular, further light needs to be shed upon the demographic changes that occurred within agricultural or mining communities and other settlements with an established industrial base as the factory system developed, with consideration of changes in community structure, land ownership and tenure arrangements, and the impacts of population mobility. Consideration should be given to the evidence for social and political frictions between established and incoming communities: at Belper, for example, between immigrant mill workers and local nailmakers or between established groups and navvies brought in to work on railway, canal and other infrastructure projects.[6] It would be worth highlighting too the difficulties of moving from one working sphere to another: nailmakers, for example, protected their industry fiercely and viewed outsiders with suspicion. To achieve these aims, research needs to be coordinated and systematic, with consideration not only of documentary sources but also of built environment and archaeological evidence. This should help to answer wider questions and elucidate further how established Derwent Valley communities developed as industrialisation progressed.

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Fig.4.36. 8 Joseph Street, Belper: a rare survival of the nailshops that would once have been familiar features of the townscape. This building dates from the early 19th century, and was constructed of coursed gritstone with tile roof, brick chimney and cast iron windows (photograph: David Knight; © Trent & Peak Archaeology)

Strategic Objective 7B. Review the evidence for labour migration and changes in working patterns as the factory system developed

Robin Holgate

Prior to the Industrial Revolution, from the 16th to early 18th century, documentary sources indicate that most workers in key Derbyshire industries, such as lead mining or smelting, would have been born locally.[1] However, with the growth of water-powered factories from the 18th century onwards, especially at sites away from major centres of population, demands for labour with appropriate craft or mechanical skills and for unskilled workers to mind machines increasingly outstripped supply – as illustrated by the constant advertisements of Arkwright and Strutt for factory labour (Fig. 4.20).[2]

Male labourers were not required for machine-minding work as women and children provided more fruitful sources of cheap labour. In consequence, the 18th century witnessed significant changes in working patterns based upon gender and age. The reliance of mill owners upon women and children prompted imaginative solutions to the problem of achieving sufficient male employment to attract families, including the development of innovative terrace housing incorporating, in the uppermost storey, multiple windows to illuminate workshops to be used by male weavers or framework knitters whilst their wives and children toiled in the mills.[3] These changes in working roles are likely to have imposed significant new pressures upon family relationships, and in particular upon the role of children.[4] Currently, however, there is little evidence for how these tensions might have been resolved during these early years.

There is rather more scope for assessing how working patterns developed during the later 19th and 20th centuries, including study of the movements of professionals and other workers to elucidate migration patterns. Studies of 19th century census returns, data from family history studies and workers' autobiographies may prove fruitful from this perspective, and should be scrutinised alongside papers associated with mill and estate owners with the additional aim of charting changes in working patterns. There is also more scope in these later centuries for interrogating documentary sources to establish the variety of factors encouraging labour mobility.[5] It is generally presumed that there was a significant increase in population numbers and a shift from agriculturally-based rural dwellings to settlements close to factories as industrialisation progressed in the 18th and 19th centuries.[6] However, the picture once portrayed of migrant workers leaving subsistence farming for the emerging manufacturing industries is an oversimplification, and needs to be tempered by consideration of other processes that might have spurred movement from the countryside; these include the impacts of the industrialisation of agriculture and the increasing pace of enclosure which, as in other areas of the Midlands, caused the displacement of agricultural workers and a swelling of the ranks of the landless rural poor.[7]

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Fig.4.37 Hopping Hill, Milford: end of the easternmost of two terraces, built on newly enclosed common land by Jedediah Strutt between 1792 and 1797 as housing for his rapidly expanding factory workforce (photograph: David Knight; © TPA)

Strategic Objective 7C. Assess the impact of the factory system upon class consciousness, gender roles, family dynamics and folk culture

Mark Suggitt

The social and political impacts of mechanisation were explored by Friedrich Engels in his seminal study *The Condition of the Working Class in England*, published in Leipzig in 1845. His statement that 'the proletariat was called into existence by the introduction of machinery'[1] has been echoed by many historians, including E.P. Thompson who, some 120 years later, wrote memorably that the English working class 'did not rise like the sun at an appointed time', but had been created and was present at its own making.[2] Thompson also argued that between 1780 and 1832 (coincident with the main period of growth of the factory system in the Derwent Valley), 'English working people came to feel an identity of interests as between themselves, and as against their rulers and employers'.[3] The social and political consequences of the Industrial Revolution have been debated vigorously ever since Engels' treatise, in some cases from more optimistic viewpoints that have identified winners as well as losers in the emerging working classes.[4] A key element of many interpretations has been recognition of the impact upon working class consciousness of the far-reaching socio-cultural developments of the 'Age of Improvement': a time when England still remained a predominantly agricultural and trading nation, but from when huge changes in society may be traced.[5]

These interpretations provide a useful background to studies of the social and political impacts of industrialisation in the Derwent Valley in the late 18th and early 19th centuries and, in particular, of the impacts of factory development, changing modes of transportation and urbanisation upon family interrelationships, gender and age roles, popular culture, marriage and childbirth patterns. The cotton industry, described as 'a lonely hare in a world of tortoises',[6] was a new industry unfettered by traditional organisation, and was a driver of significant socio-political as well as economic change. It also required the development of new management skills to guide successfully large industrial operations:[7] a field in which it has long been recognised that Arkwright excelled.[8] The Derwent Valley provides, therefore, a valuable case study for research into cultural change during the later 18th and 19th centuries. Particular subjects for research, which it is recommended be targeted during further documentary study, include the impact of factory-working upon family dynamics and age and gender roles,[9] continuities with established rural traditions, the creation by mill owners of new social customs[10] and the impacts upon workers of renouncing 'their desultory habits of work…[and identifying]...themselves with the unvarying regularity of the complex automaton'.[11]

*Fig.4.38 Boar's Head Mills, Darley Abbey: working the doubling-frame machines (*Illustrated Times*, July 1862; image courtesy of Derbyshire Local Studies Libraries and www.picturethepast.org.uk: DRBY004963)*

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Strategic Objective 7D. Examine the evidence for the servicing and support of the developing industrial communities through welfare, cultural, educational and spiritual services

Suzanne Lilley

The historically rich and archaeologically diverse industrial communities of the Derwent Valley offer an unparalleled insight into daily life in late 18th and early 19th century England, and provide a research resource of international significance. The importance of these communities has been highlighted by industrial, architectural and textile historians such as Adam Menuge[1] and Stanley Chapman[2] and, from the perspective of buildings conservation and research, is emphasised in documents such as Historic England's *Listing Selection Guide*.[3] However, research to date has focused principally upon the descriptions of these communities that are contained in surviving documentary sources and, in particular, upon the archive information that is provided by close reading of the important publications by Fitton and Wadsworth on the Strutts and the Arkwrights.[4,5] In consequence, there has been a tendency to focus on the welfare, cultural, educational, spiritual and housing provisions of the 19th century, coincident with most of the surviving documentation. This has resulted in a research bias towards the later history of these communities, and has fostered an interpretation that community development was planned and formulaic across the Derwent Valley.

Recent work by Anthony Peers[6] and the author[7] has begun to address these concerns through the study of the surviving building fabric in conjunction with documentary sources. This research has focused principally on workers' housing and has highlighted the variations in living experiences within and between urban communities along the Derwent Valley. Additionally, it has demonstrated that the apparent temporal variation in settlement development indicated by these studies is not fully represented by previous historically led approaches, and that changes were often made organically rather than fully planned in advance. These studies demonstrate, therefore, the strength of an interdisciplinary methodology and provide an important lens for exploring these early industrial communities. There is significant scope to expand these multi-methodological studies to include other welfare, cultural, educational and spiritual provisions. A systematic and in-depth investigation of the late 18th and early 19th century building resource, including schools, churches, chapels, workshops, shops and farms, alongside further scrutiny of extant documentary sources, would provide valuable insights into the daily lives of workers and the intentions of the factory owners who invested in the industrial settlements that are especially well preserved in the historic cores of Cromford, Belper, Milford and Darley Abbey.

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Fig.4.39 Baptist Chapel, Chevin Road, Milford: one of many Nonconformist chapels that were constructed to service the spiritual needs of the Valley's industrial communities. This small chapel with hipped slate roof was built in 1849 and was constructed of coursed stone on a high rusticated stone plinth (photograph: David Knight; © Trent & Peak Archaeology)

Strategic Objective 7E. Examine the role of religious ideologies in the lives of the mill communities

Mark Suggitt

The beliefs of Derwent Valley communities immediately preceding the development of the factory system were principally of the Anglican persuasion,[1] but evidence for a growing tradition of dissent implies that from the religious perspective not all were 'comfortable in their silent vegetation'.[2] The pioneering years of Arkwright, Strutt and the other factory masters coincided with the rise of Methodism[3] which, despite its promotion of education and self-improvement, was essentially hierarchical and authoritarian. It was the religion of many industrialists and their workers, and its tenets chimed well with the mill owners' requirements for docile and obedient workforces who were able to cope with the monotony of long hours of factory working.

The early mill owners of the Valley are known to have embraced a wide diversity of Christian beliefs, sometimes with great fervour, and it is interesting to speculate how their views might have impacted upon the ideologies of working communities. Sir Richard Arkwright, for example, was of Anglican persuasion and built for private worship St Mary's Chapel,[4] Jedediah Strutt converted from Presbyterianism to Unitarianism after his arrival in Belper,[5] and the increasingly pious and eccentric John Smedley developed his own fiery version of Evangelicalism.[6] All used religion and basic education to promote 'industry, decorous behaviour, attendance on public worship and general good conduct'.[7] Sunday Schools were provided for the education of workers' children,[8] notably at Boar's Head Mill[9] and Belper's North Mill,[10] while John Smedley's workers had to endure his compulsory sermons 'full of piety and brimstone'.[11] This emphasis upon religious instruction did not necessarily prevent political dissent, as shown by the collective action of workers during the 1833–4 Derby Silk Trades Lockout,[12] but such actions were not typical of areas upstream of Derby.

Many questions remain to be addressed by further study of the surviving mill records, amongst which the substantial archives compiled by the Strutts and John Smedley Ltd have perhaps the greatest potential for advancing understanding. In particular, to what extent did the religious beliefs of the mill owners impact upon the provision of places of worship?[13] How far did the investment by the factory masters in Day Schools and Sunday Schools help to educate the working communities? Was the combination of education and religion successful in delivering a compliant workforce, or were the inducements of regular wages and good housing more effective? Finally, how engaged were the Derwent Valley's working communities in the broader religious and cultural politics of the 19th century?

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Fig.4.40 Boar's Head Mills, Darley Abbey: the attic storey of the Long Mill, converted by the Evans family for use as a Sunday School in 1792, provides the earliest known example of its kind in the Derwent Valley.[9] This laser survey shows the condition of the building in 2014 (source: Derbyshire County Council)

Strategic Objective 8A. Explore the factors driving the development of canals, railways and roads and trace the evolution of networks for the distribution of raw materials and finished goods

George Revill and Trevor Griffin

The Derwent Valley developed as an important transport artery during the Industrial Revolution, linking the industrial towns of the Midlands with Manchester and the north-west. This spurred a fundamental reorientation of established patterns of movement, immortalised in the writings of 17th and 18th century travellers such as Celia Fiennes and Daniel Defoe.[1] The new canals,[2] railways[3] and roads[4] of the 18th and 19th centuries mainly utilised the valley floor, overlying a hill-based network of principally east-west packhorse tracks and roads for wheeled vehicles.[5] The Derwent's role as a transport corridor developed in a relatively piecemeal and halting fashion, with the aim of facilitating the export of local lead, textiles, timber, stone and other products and the import of raw materials, particularly for the manufacture of cotton goods. These developments also made the area more accessible for travellers, stimulating a nascent tourist industry. Key events in the development of a more integrated transport network include the building of the Cromford Canal, opened in 1792–3,[6] and, in the 19th century, the construction of the Cromford to Belper Turnpike, Cromford and High Peak Railway and Manchester, Buxton, Matlock and Midland Junction Railway.[7]

Studies of transport developments and their wider impacts should consider a broad range of issues, including the constraints of geology and topography, competition between transport companies and the ambitions of land and mill owners. From the landscape perspective, it would be interesting to investigate how the hill-based road network had to be modified to meet the needs of valley industry. From the economic viewpoint, it would be useful to establish the impact of transport costs upon industrial viability by comparison with other regions, the relationships between the commercial activities of industrialists and their investments in transport infrastructure, and how the developing infrastructure met the needs of industrialists. There is also a need to investigate the impacts of changing communications patterns and technologies upon established settlements with respect to their commercial and industrial viability, migration, mobility, accessibility and the development of tourism. Finally, it would be interesting to establish the extent to which transport improvements embedded communities within wider regional and national networks. In this last respect, factors spurring the growth of communication networks, including finance, entrepreneurial activity, technology, infrastructure, traffic and trade, are crucial to the forging of regional and national economies, social networks and community identities from the 18th century into the modern era.[8]

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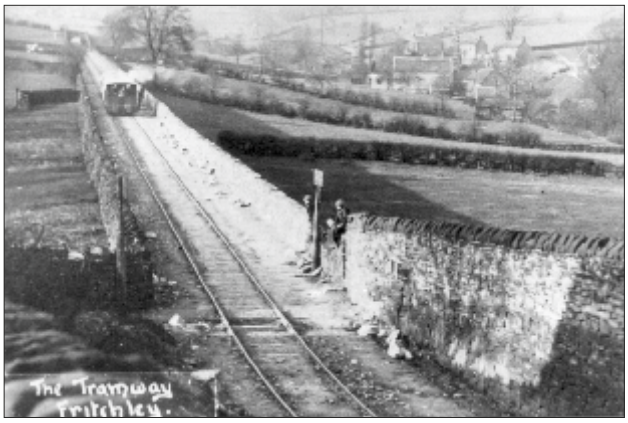

Fig.4.41 Field survey and documentary research by members of the Butterley Gangroad Project[9] has shed important light upon the development of this early railway, built in the 1790s as a feeder line between limestone quarries at Crich and the Cromford Canal and closed in 1933. This 1930s postcard shows the mid-19th century Fritchley embankment (reproduced by courtesy of Derbyshire Archaeological Society)

Strategic Objective 8B. Establish the impact of the development of roads and railways upon the continuing development of cotton spinning

Adrian Farmer and Mary Smedley

Travel in the 18th century was challenging, especially when moving heavy goods such as stone, ore, coal and cotton.[1] The early mills were established close to river bridges, with water available for power, and packhorse routes already established.[2] For mass production to thrive in the Derwent Valley, as it developed into an industrial hub, the need for better transport links became a necessity. Rare contemporary accounts of travel through post-medieval Derbyshire emphasise the difficulties of road travel, which was time-consuming and often arduous. As noted by Celia Fiennes, for example, recounting the events of her Derbyshire tour of 1697: 'All Derbyshire is full of steep hills…which makes travelling tedious, and the miles long'.[3] The development of the factory system, which began with Derby's Silk Mill and was expanded and refined by Sir Richard Arkwright and Jedediah Strutt at Cromford and Belper, spurred the development of better transport links. The opening in 1792–3 of the Cromford Canal,[4] linking the Erewash Canal at Langley Mill to Cromford, began these improvements, but this was by no means sufficient. Better roads were needed, linking key industrial sites with the improving national network. From this perspective, the building with cotton-spinning profits of a turnpike running parallel to the River Derwent represented a crucial development for future economic growth in the Valley. The supporting infrastructure for this road, built after an Act of Parliament was passed in 1817, is not fully understood, and would merit further study.

Early examples of road-building survive within the Derwent Valley and, whilst some survey and excavation work has been conducted,[5] a greater understanding of how and why they were constructed is needed. Due in large part to Derby's central position within England, the coming of passenger-carrying railways from 1839 increased the town's population dramatically and brought greater prosperity and opportunity for industrial expansion as a central hub for the national network.[6] The establishment of high-quality road and rail links greatly impacted on the region's industrial prosperity and, in the narrow valley between Ambergate and Cromford, resulted in an intertwined system of road, railway, river and canal routes reflecting the engineering constraints imposed by topography. How these improved links helped to expand industries within the valley is neither clearly understood nor well documented, and would merit further study. Recent proposals for Midland Main Line electrification have highlighted the historic and architectural importance of the significant stretch of Stephenson-built Midland Railway that runs through the World Heritage Site, as well as the need for greater understanding not only of its impact upon continuing textile production but also of how the line was established and constructed.[7]

Fig.4.42 View northwards along the turnpike linking Belper with Matlock in a postcard of 1880, showing the Ambergate tollgate (right) at the junction between the turnpike and the road to Ripley (A610). The embankment of the railway from Derby to Matlock may be seen to the north of the tollgate (source: Adrian Farmer collection)

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Strategic Objective 8C. Assess the impact of industrialisation and paternalism upon the development of piped water, waste disposal and other public utilities

Mark Suggitt

The Industrial Revolution generated a string of new communities along the Derwent, from Cromford in the north to Belper, Milford and Darley Abbey in the lower reaches of the Valley. All were 'a deliberate creation',[1] begun in the later 18th century by mill owners such as Sir Richard Arkwright at Cromford and Jedediah Strutt at Belper, 'without assistance from the State or local authority and with no public services'.[2] The houses that were provided for mill workers and their families represented a significant improvement on rural cottages in terms of their design and sometimes their architectural pretensions.[3] In terms, however, of services such as piped water or effective sewage treatment, there was little to choose between the lives of residents in the new industrial settlements and those that endured the insanitary conditions of neighbouring villages[4] and the growing industrial towns.[5] In such circumstances, households were forced to rely for essential drinking water, cooking and washing services upon the streams that flowed into the Derwent, together with springs, standpipes and wells, with consequent risks to their general health and well-being.

Comparisons with the achievements of the mill owners' successors in other regions of the country are instructive and raise questions about their priorities and motivations, as does the chronology of utility provision, The Ashworths of Bolton, for example, provided water for their workers' houses in 1835, while the West Yorkshire model villages of Saltaire and Ackroyden followed suit in the 1850s and 1860s.[6] By contrast, water and sewage provision for the industrial communities of the Derwent Valley lagged behind, despite the advantages demonstrated elsewhere of ensuring a healthy workforce through hygienic sanitary arrangements. Belper, for instance, acquired piped water only in the 1890s,[7] while Cromford's sewage provision remained inadequate well into the following century, with nightsoil collection from properties with outside toilets continuing into the 1960s.[8] The installation of gas lighting was less protracted and was accomplished from a significantly earlier date. The Strutt family, for example, built a gas works at Milford Mills as early as 1822, enabling surplus gas to be utilised for lighting the streets,[9] and a similar exercise was repeated in Belper.[10] Street lighting may have had a philanthropic impetus, but its early introduction, well in advance of water and sewage provision, might have been a more pragmatic decision aimed at ensuring efficient use of surplus production.

Real improvements came only with the development of efficient local government, backed by empowering legislation, during the late 19th and 20th centuries, raising further interesting questions about the mill owners' motivations. In this context, it would be useful to establish how far the activities of the factory owners extended into the public realm and how they interacted with the owners of private utility companies and with local authority officers.

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Fig.4.43 Short Row, Belper: one of 47 red-brick terrace houses with slate roofs, built by the Strutts for mill workers around 1788. The development comprised four separate rows of mainly one-up, one-down cottages, all originally lacking piped water and other basic utilities (photograph: Mark Suggitt; © DVMP)

Strategic Objective 8D. Investigate the harnessing of hydropower from rivers in the Derwent catchment and the reconciliation of competing interests

Ian Jackson, Joe Smith, Renata Tyszczuk, Julia Udall and Nicola Whyte

The Derwent has served as an important power source for flour-milling and other industrial activities since at least the medieval period,[1] although its flow characteristics and hence potential power output would have fluctuated in response to climatic or land-use changes affecting levels of surface water discharge.[2] The potential for power generation has also changed in response to technological developments, notably in water wheel design and water turbine technology,[3] and in recent years by the development of hydropower.[4] The Derwent is currently characterised by a reliable, vigorous and abundant flow of water, and hence is ideal for hydropower. In consequence, several organisations in the region have begun to research and use this energy source,[5] and there is a growing interest in exploring means by which the often conflicting interests of stakeholders can be reconciled.

Issues to be reconciled include meeting the needs of local settlements, for which the river provides both water and amenities, the maintenance of the authenticity and setting of the riverside historic assets that contribute to the Outstanding Universal Value of the World Heritage Site, enhancement of biodiversity, the fostering of industry, tourism and employment opportunities, mitigation of climate change impacts, enhancement of water quality and compliance with the regulatory framework for water abstraction and impoundment. Managers of the Site's historic assets have already commenced work on these topics,[6] along with local Transition Town groups[7] and regionally based organisations such as the DerwentWISE Landscape Partnership[8] and the Derwent Catchment Partnership.[9] Work by these groups and by participants in multidisciplinary research initiatives such as the *Future Works* strand of the *Stories of Change* project,[10] points the way forward. Transition Belper members, for example, have set up Amber and Derwent Valley Community Energy (ADVyCE Ltd)[11] with the aims of enhancing understanding of the Valley's hydropower potential and of developing community-owned hydropower stations. Such groups are well placed to bring people together to discuss these concerns and to develop governance models and strategies for the future negotiation of shared interests. This requires interdisciplinary working and careful facilitation, plus sustained effort to ensure effective communication and the sharing of resources.

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Fig.4.44 One of two hydropower turbines operating at Belper's East Mill, each with a capacity of 175kW. When in full flow, the power generated by both turbines is sufficient to provide 1,767,000 kWh per annum. Based upon current average rates of household energy use, this is enough to provide 535 houses with electrical power for a year (assuming 3,300kWh per annum for each house; photograph © Ian Jackson)

Strategic Objective 9A. Investigate further the functional, social and cultural factors impacting upon textile mill designs and the relationship of mills to the wider built environment

Mike Nevell

The history of purpose-built water-powered textile mills in the British Isles began in 1721 with Lombe's Silk Mill at Derby (if we exclude fulling mills), and continued from 1771 at Cromford with the first of the cotton-spinning mills that were erected to house Arkwright's ground-breaking water-frame.[1] All were primarily functional buildings, built and run with profit as the overriding motive, but their design was influenced by many factors other than functionality.[2] The architectural history of several mills has been studied in recent years,[3] although synthetic publications such as those compiled for the mills of Yorkshire, Manchester or South-West England[4] are still lacking. We are, therefore, well placed to study the functional and socio-cultural influences upon mill architecture[5] and the impact of mill design upon buildings such as model farms (Strategic Objective 9E).

Mill design underwent a continual process of development, centred on improvements in their construction and operation.[6] Despite much work on this subject, there remains significant scope for further research on the design implications of the developing and often innovative technology. An important aspect of the early mills, for example, was experimentation with space heating, where heat was circulated via horizontal and vertical ducts: pioneering work that is significant for wider studies of heating and ventilating technology.[7] Changes in mill morphology also merit further attention, including study of the development from the mid-19th century of the integrated textile factory, comprising sprawling complexes that might include preparation buildings, spinning blocks, weaving sheds, finishing works, warehouses, leats and reservoirs.[8] This could also include research into the impacts of new forms of power and changing building materials. From the social and cultural perspectives, debate continues on how far mill builders were influenced by polite architectural styles. Some structures, including the elaborate frontispiece of Masson Mill or the gritstone and red Accrington brick Italianate water tower of the East Mill at Belper, imply a desire to impress, and further study of the relationship between vernacular and polite styles, the social implications of these choices and the motivations and preferences of the mill owners would be beneficial. Other areas for study, drawing upon available documentary, buildings and archaeological evidence, include: the control of work-spaces and operational practices; regulation of the workforce and any evidence for resistance to this; security provisions; evidence for social, political, ethnic and gender identities in the design and use of buildings; and, with the emergence of industrial brands from the late 19th century, the projection of corporate images.[9]

Fig.4.45 The imposing brick-built frontispiece of Masson Mill, with its stone dressings, lunettes and Venetian windows of Palladian inspiration, proclaims Arkwright's growing wealth and social aspirations (photograph: David Knight; © TPA)

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Strategic Objective 9B. Assess the impact of the mill owners upon the planning of industrial settlements and their motivations in settlement planning

Suzanne Lilley

Industrial settlements along the Derwent Valley display significant diversity in their architectural styles, the spatial arrangements of the dwellings and the processes impacting upon their development.[1] These settlements, which were laid out during the late 18th and 19th centuries, represent some of the earliest and most complete examples of cotton textile communities in the East Midlands[2] and beyond, and accordingly have received national prominence.[3] However, research to date has traditionally focused upon a restricted range of building types, with an emphasis upon unusual forms such as the cluster houses of Darley Abbey and Belper,[4] terrace houses with top-floor workshops at Cromford[5] and interlocking housing at Milford,[6] and has generally followed the hypothesis that they were constructed by reference to a paternalistic agenda.[7] Consequently, the narrative of the patron has dominated historical research.[8] There are significant opportunities to broaden investigations to include all housing types and associated structures and to seek, therefore, a better understanding of the mill owners' roles in settlement planning.

Recent work has begun to analyse in greater detail workers' housing in Cromford, Belper, Milford and Darley Abbey.[9] This research has sought to balance the traditional reliance on historical sources and the bias towards the mill owners by consideration of the surviving building fabrics and some of the socio-economic factors that might have impacted upon their construction. This approach has also highlighted the importance of understanding the influence of local building customs and established traditions of textile manufacture on the actions taken by mill owners. Further investigations are required to establish the developing morphology of these settlements, with regard especially to investment in community amenities such as schools or chapels[10] and strategies for provisioning the workers' families: for instance, by the building of pigcotes and the establishment of allotments and market facilities. Additionally, much greater emphasis should be placed upon the restrictions that might have been imposed on new workers' housing by established land ownership and tenurial arrangements and the specific impacts of land-use rights upon housing developments and their associated infrastructure. To achieve these ambitions, new research needs to promote the investigation of the surviving building fabric alongside study of the documentary records relating to early housing developments. This should also help to answer wider questions, such as the extent to which individual mill owners might be considered genuinely paternalistic in the development of these industrial settlements and how their world views impacted upon settlement character.

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Fig.4.46 Swift's Hollow, Cromford: late 18th or early 19th century pigcote, incorporating a shelter and an open area for exercise with feeding troughs (photograph: David Knight; © TPA)

Strategic Objective 9C. Investigate the impact of pre-factory industrialisation upon the architecture of domestic buildings and associated structures

Mike Nevell

Studies of the impact of industrialisation upon domestic building traditions in the Derwent Valley have focused traditionally upon the industrial settlements that were developed by the mill owners from the late 18th century,[1] with comparatively little emphasis upon the impacts of pre-factory industrialisation on building forms or usage. A review of the evidence for domestic buildings and associated structures predating the factory colonies is long overdue, and would provide a valuable benchmark against which the architectural changes of the later 18th and 19th centuries could be judged. It would also enable informed assessment of the potential of the Valley's built environment resource to elucidate the impact of early industry upon building construction methods and materials, their internal spatial organisation and architectural styles.[2]

A review of the buildings resource prior to *c.*1750 would chime well with some of the research actions recommended in the Farmstead Guidance documents that are being developed by the Peak District National Park in liaison with stakeholders and Historic England, although the methodology proposed in these would need some refinement for historic settlements.[3] These documents will include a *Farmsteads Character Statement* and *Recording and Research Guidance*, with advice on research priorities and recording methods, and will complement reports that have been prepared recently for neighbouring Staffordshire.[4] Surveys of Peak District farms have emphasised the importance of establishing whether traces of earlier structures might survive in buildings that, from external inspection, appear to date from the late 18th or 19th centuries and, if so, whether evidence for domestic-based textile production or other industrial activities might survive. Detailed survey, aimed at locating and recording early domestic structures, such as that shown here at Dalley Farm,[5] would address directly the questions highlighted above. It is recommended, therefore, that a systematic survey of Derwent Valley farm buildings be undertaken for this purpose, with expansion later to consider historic settlements. A detailed survey of this kind could employ the methodologies recommended in the forthcoming Farmstead Guidance document, while the pattern of landscape character types that has been defined for Derbyshire[6] would provide a useful geographical framework for study. The results could be fed into the Derbyshire Historic Environment Record, ensuring that information would be readily available for future use, both as a research resource and as a management tool in the assessment of development threats to the World Heritage Site's internationally important built environment heritage.

Fig.4.47 Dalley Farm, near Belper. This early 19th century model farm incorporates a 17th century dwelling[7] which in this c.1948 photograph can be seen projecting from the rear elevation of a c.1890 farmhouse (far left). The three narrow cast iron windows above the door compare with the elongated windows of textile workshops (Fig.4.21), while the farmer, John Fletcher, recalls that the first floor had once housed stocking-making machines (source: Gilbert 2015, fig.163; A Gilbert: pers. comm)

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Strategic Objective 9D. Investigate by laser survey the utilisation of floor space in the mill buildings and the potential for elucidating changing patterns of production and organisation

David Strange-Walker

The potential of laser survey as a tool for creating accurate high-definition and georeferenced digital surveys of standing buildings and their fittings has been demonstrated by surveys of several mills and other buildings as part of the *Technology Then, Technology Now* project,[1] including Boar's Head Mill, Darley Abbey (Figs 4.40 and 4.48), Belper's North Mill (Fig.4.26) and Leawood Pumphouse (Fig.2.1). The advantages of laser scanning over traditional recording methodologies are emphasised by the image below, which shows with startling clarity the wear patterns on factory floors. This provides graphic evidence for the position of machines and routes of movement, and highlights the unexploited potential of factory floor-wear patterns as evidence for changing machinery types and layouts, workforce circulation routes and changing patterns of production and organisation.[2]

Successful projects would need to be supported by robust methods for quality control, archiving and the dissemination of results,[3] with leadership by a buildings specialist to guide the choice of factory spaces, ensure appropriate data evaluation and advise on methodological refinements during the course of survey. In common with the recently completed *Technology Then, Technology Now* project, such initiatives could provide excellent opportunities for community involvement in the collection, processing and interpretation of data. Projects of this kind would be expected to create a readily accessible archive of accurately measured and georeferenced digital surveys that could be analysed alongside documentary and photographic records to assist interpretation of observed variations in machinery layouts and workforce circulation networks. If evidence permits, it might also be possible to investigate temporal variability in circulation patterns. The datasets created by such work would also provide invaluable resources for future research and management initiatives, thus contributing to creation of the digital archive of building plans recommended above (Chapter 2.1.6). In addition, there is potential for the creation of publicly accessible photorealistic 3D digital models or virtual reality tours[4] that would add value from an educational as well as research, management and visitor display perspective.

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Fig.4.48 Boar's Head Mills: rendered laser-scanned point cloud of the third floor, coloured by elevation across a 7cm vertical range. The higher green and blue areas show where mill machinery once stood, while the lower red and magenta areas show eroded paths between machines (source: Derbyshire County Council)

Strategic Objective 9E. Assess the impact of industrialisation upon agricultural processes, farm layout and agricultural building traditions

Barry Joyce

The model farms that were built by the Strutt family around Milford and Belper during the early and mid-19th century were identified as significant components of the Derwent Valley's cultural landscape at the time of its inscription on the World Heritage List, but little has been published on the effects of industrialisation upon agriculture and farm designs. Published material includes brief descriptions[1] and discussions[2] of the farms, but for further information researchers must delve into reports held in the Derbyshire Historic Environment Record[3] and the substantial body of Strutt family records preserved in the Derbyshire Record Office. Recent research by Alex Gilbert[4] has emphasised the potential of the latter for study of the complex relationship between industrialisation and agriculture, and provides a valuable insight into this rich but rarely considered[5] resource.

There is, within the local research community, a debate into the extent to which farms built by the Strutts were a reaction to the growth in the need for foodstuffs or were more a response to the fashion of gentry landowners to build model farms.[6] Whatever their exact motivations, scrutiny of the Strutt family's meticulously compiled business records reveals a complex system of production and distribution, geared to feeding the local workforce, that was gradually transformed during the 19th century as regular rail services provided new opportunities for the import of food products. What seems beyond dispute is the considerable extent to which forms of fire-proof building construction and modes of processing material, developed for industrial purposes at the mills, were adapted for agricultural application to the model farm complexes.[7] The link between factory and farm is illustrated convincingly by Gilbert's study of the buildings at Dalley Farm. The flows of raw materials and outputs between these buildings recall strongly the strict division of tasks on the factory floor, and emphasise the extension to the countryside of factory-based models of work, behaviour and authority.[8]

Another enquiry within the local research community is into the possibility of links between the remarkable density of small field barns in Bonsall Parish, the population growth in and around Cromford that was prompted by Arkwright's activities in the late 18th and early 19th centuries, and the late 18th century enclosure of Bonsall Moor and Bonsall Leys.[9] The opportunity remains for further systematic investigation of the evidence for local population growth arising from lead mining; domestic textile production and expansion of the cotton mills; increased demands for foodstuffs and resultant changes in agricultural practices; and assessment of how and to what degree field barn expansion might reflect these changes. Another aspect of the food-producing economy that is of interest, and that would merit further investigation by reference to the Strutt records (particularly the 'Provision Books'), is the extent to which the communities' food needs were supplemented by the cultivation of allotments, many of which still survive.

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Fig.4.49. Dalley Farm: the transfer to farm buildings of mill design and construction techniques is shown by the use in this c.1835 hayloft (left) of cast iron columns that resemble closely the roof supports employed at Belper's North Mill (right; photographs: Gilbert 2015; reproduced by courtesy of the author)

Strategic Objective 10A. Compile as a resource for understanding human transformations of the landscape an integrated synthesis of the evidence for landscape change

Andy J Howard and Rachael Hall

Since the end of the last glaciation, around 12,000 years ago, humans have impacted dramatically upon the landscape of the Derwent catchment. We can trace during this period of climatic amelioration the expansion of itinerant hunters and foragers in the early postglacial woodlands and, in later prehistory, can identify landscape changes associated with the expansion of farming and settlement, construction of ritual and funerary monuments, mining of ore deposits and exploitation of river resources.[1] All of these activities were undertaken against a background of changing climate which, in turn, underpinned changes in vegetation dynamics and catchment hydrology.[2] Since the earliest hunter-gatherers, who may have modified the landscape by selective burning of woodland to enhance the browsing resource for wild game,[3] these natural processes have been increasingly influenced by the activities of humans: for example, by woodland clearance for agriculture, leading to soil erosion, the accumulation of alluvial and colluvial sediments and the release of contaminants by metal mining and ore processing.[4]

The legacy of natural environmental change and human activity within the Valley is manifested by a rich variety of landscape features, including palaeochannels that may preserve organically rich sediments permitting the reconstruction of past environments,[5] together with a wide range of remains relating to human activity, including earthworks, buildings, mines and formal parklands.[6] A general synthesis of this evidence is recommended as a means of enhancing our understanding of past environmental and landscape changes and, by providing insights into the potential impact of future climate change, assisting management of vulnerable heritage assets and natural resources.[7] The unravelling of long and complex sequences of human activity requires a holistic approach to the collation and analysis of information, which needs to be drawn from disciplines including archaeology, history and the geosciences. Natural landscape analysis should utilise data from remote sensing, hydrology, geomorphology, geochemistry, palaeoecology, environmental modelling, historical mapping and documentary archives (including information on technological innovations to control the riverine environment). Cultural landscape analyses should take into account historical mapping and documentary archives relating to enclosure and the creation of formal landscapes, including historic parks and gardens.[8] Supporting fieldwork should include landscape archaeological survey, dovetailing traditional approaches such as earthwork and place or field-name surveys with innovative technologies, including the mapping and identification of features using lidar: as shown below by the palimpsest of earthworks recorded in the lower Derwent Valley near Duffield (Fig.4.50).

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Fig.4.50 Lidar image of the Derwent floodplain near Duffield, showing earthworks near Moscow Farm (centre right). Ridge and furrow shows particularly clearly, including a block south of the Milford Tunnel that is cut by the North Midland Railway, opened in 1840 (Contains Ordnance Survey data. Crown Copyright and database rights 2016. Source data © Environment Agency)

Strategic Objective 10B. Explore the hydrological history of the landscape by identifying, mapping and investigating relict riverine landforms

David Knight

The broader expanses of the Derwent's valley floor, principally between Milford and the Derwent–Trent confluence, preserve a variety of abandoned riverine landforms that together provide significant evidence for evolution of the floodplain landscape. Some abandoned river channels survive as linear depressions that may refill with water during times of flood. Other ancient channels may be mapped from sinuous parish boundaries or hedgerows that would originally have followed the courses of rivers and streams, while yet more may be deduced from inspection of aerial photographs or of images derived from airborne lidar surveys[1]: for example, as bands of darker soil correlating with organically rich channel fills. Other features deriving from past fluvial activity may also be observed on the ground or from the air, such as the distinctive ridge and swale topography that provides physical evidence for the lateral migration of rivers across their floodplains.[2]

Work has recently been conducted on mapping and analysis of the palaeochannels, ridge and swale earthworks and other landforms of the valley floor,[3] building upon earlier work conducted previously for the Trent Valley.[4] It is hoped that this will provide a firm foundation for future projects aimed at investigating the evolution of channel networks and the identification of locations preserving associated organic remains. Abandoned river channels provide important sediment traps and can preserve organically rich deposits containing pollen, insects and macroscopic plant remains that provide important evidence for land-use, vegetation and climatic change.[5] Targeted sampling of organic deposits is recommended to establish the potential of the resource, together with high-precision radiometric dating of associated material. This, in turn, will provide a solid foundation for studies of landscape evolution, climate change and the impact of human activity upon the valley landscape during the twelve millennia since the end of the last glaciation.

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Fig.4.51 The River Derwent in flood, just upstream of Darley Abbey. Sinuous linear depressions in the alluvial floodplain have refilled with water, highlighting the courses of relict river channels (photograph: Lee Elliott; © Trent & Peak Archaeology)

Fig.4.52 Ridge and furrow earthworks on the Derwent floodplain near Darley Abbey, partially inundated by the waters spreading from a refilled palaeochannel. The low, broad ridges represent the remains of the deliberately created, self-draining seed beds that formed the cultivation strips of the medieval open fields, signifying arable cultivation of uncertain duration in the period preceding their enclosure[6] (photograph: Lee Elliott; © TPA)

Strategic Objective 10C. Investigate the impact of human modifications to the hydrological landscape of the Derwent Valley and identify strategies for improved water management

Georgina Endfield and Carry van Lieshout

The Derwent Valley's long industrial history has impacted profoundly on its hydrological landscape. The landscape of the main valley floor and tributary streams has been modified significantly since the medieval period by field drainage, weirs, dams and channel diversions aimed at altering river volumes and speeds of flow to generate power for mills, and from the 16th to 19th centuries by the construction of soughs to drain water from lead mines.[1] More recently, dam construction in the upper reaches of the catchment has impacted upon the fluvial geomorphology of the entire valley. Many changes in the fluvial regime, including rates of erosion and deposition and changes in channel morphology upstream and downstream of weirs, may be traced back to such interventions. Moreover, many of the unintended consequences of human activity, such as the accumulation in alluvial sediments of toxic contaminants derived from lead mining, pose problems that have assumed urgency as research highlights the potential of climate change for destabilising the valley ecosystem.[2]

Improvements in water management strategies are crucial in order to reduce current levels of river pollution and to mitigate the geomorphic changes that might accompany predicted increases in the level and intensity of precipitation. These include fluvial redeposition of toxic floodplain sediments, erosion of valley-side archaeological sites by slope wash, landslides and other slope processes, and bankside erosion that might undermine building foundations. In addition to valley-side and floodplain environments, particular attention should be given to the intricate systems of soughs that characterise the northern part of the World Heritage Site.[3] These were created to lower the water levels in lead mines, resulting in lowered ground water levels and modified discharges into rivers. They could also serve as sources of water and energy, but, as Arkwright discovered to his cost, this also created ample opportunities for conflict.[4] Mostly constructed between the mid-17th and mid-19th centuries, soughs represent an important heritage asset, with significant conservation value. They also present both opportunities and problems for the landscapes they drain and the rivers into which they discharge. Many drain to rivers or wetlands that have significant conservation status and present both hazards (eg rapid transfer of pollutants from agricultural land) and opportunities (eg maintenance of water flows) for ecosystem management. Lack of maintenance has caused some soughs to collapse, causing disruption to water flows. Although 41 Derbyshire soughs have been identified as nationally important,[5] natural degeneration and management responses to water resource conflicts pose major threats. Further survey to ascertain the current state of soughs is thus vitally important, as are investigations into the drainage routes of sough water.[6]

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Fig.4.53 The 'Bear Pit', built by Arkwright in 1785 to allow access to the Cromford Sough. The sough was dammed and provided with a sluice that when closed enabled water to be diverted via an underground channel to enhance the mills' water supply (photograph: David Knight; © Trent & Peak Archaeology)

Strategic Objective 10D. Elucidate the flood history of the Derwent Valley as a guide to the potential impact of future climate change upon the historic environment resource

Georgina Endfield, Andy J Howard and Lucy Veale

Although the British climate has been relatively stable since the last glaciation, studies of geomorphological, geochemical, palaeoenvironmental and documentary data have demonstrated significant climatic fluctuations during the last 12,000 years.[1] As rivers carry the discharge associated with changing precipitation, they are highly sensitive to climate change in terms of flood frequency and magnitude. Throughout Britain, post-glacial discharge variations have been identified by radiocarbon and dendrochronological dating of organic and cultural remains in palaeochannel fills and associated floodplain deposits. Statistical analyses of these dates have identified periods of enhanced fluvial activity, which have been correlated with other sources of palaeoclimatic data such as bog surface wetness, lake levels and geochemical signals.[2]

For more recent periods, documents charting flood height and extent have been analysed for the River Trent.[3] Flood records for the Derwent can be correlated partially with those for the Trent, and reveal the significant damage and disruption to people, farmland and built structures caused by such events, many of which were linked to unusually heavy rainfall, storms and snowfalls preceding sudden temperature rises and rapid thaws. Belper resident James Harrison, for example, recorded several flood events, including 'the great flood on Derwent Dec 9th 1740 which was higher by 2 feet than it ever was talked before'.[4] Floods after snow melt also destroyed 'the old bridge' at Belper in 1795,[5] while the Valley made national news following floods on the 29th and 30th December, 1901, when it was described as a 'scene of desolation', with floods affecting hundreds of businesses and homes.[6] The regulation of the Derwent by 20th century dams has created a relatively benign river, but flooding may still cause serious problems, highlighting that it can still be a 'fury of a river'.[7] Understanding the Derwent's past flood history is important for assessing future risk as well as for contextualising the past. The mapping and dating of landforms and sediments permits construction of long chronologies, while documentary studies are critical for assessing how communities might be affected by, comprehend and respond to future floods. Special interest may be attached to the identification of landforms relating to the Medieval Warm Period (*c.*900–1300) or Little Ice Age (*c.*1450–1850). Recent lidar mapping of ridge and furrow earthworks in the lower Derwent has shown these to extend across floodplain pasture and to be cut by now abandoned river channels that must relate to later fluvial erosion.[8] It has been argued that this could signify expansion of arable farming to the floodplain in the more congenial climate of the Medieval Warm Period, followed by erosion during a time of enhanced fluvial activity correlating with the cooler and wetter conditions of the Little Ice Age. Such changes have major implications for understanding and managing the historic environment resource of the valley floor, and systematic radiocarbon dating of organic-rich fills is needed to test the chronology of these changes and the validity of this interpretation.

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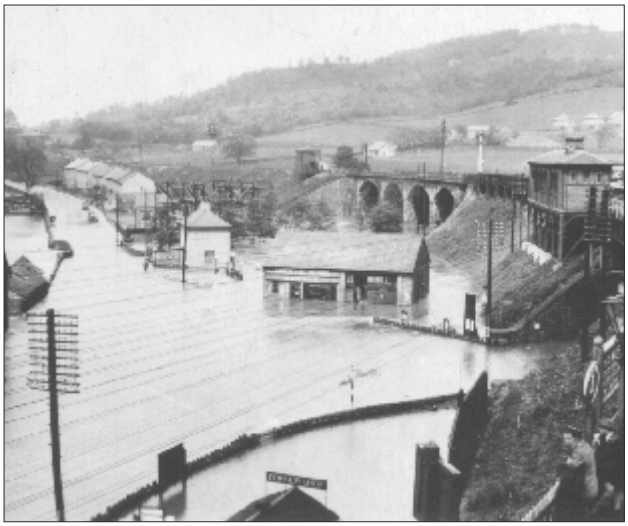

Fig.4.54 The Great Flood of May 1932 caused significant damage to properties in Derby and elsewhere along the Valley. This photograph of the submerged junction between the A6 from Derby to Matlock and the A610 (right) is taken from broadly the same viewpoint as the 1880 photograph of the Ambergate tollgate (Fig.4.42; photograph reproduced by courtesy of David Beevor)

Strategic Objective 10E. Investigate the impacts of past mining activities upon terrestrial and river pollution and assess the threats posed to the cultural landscape resource

Andy J. Howard

In the upper and middle parts of its catchment, the Derwent and its tributaries cut through Carboniferous limestones, sandstones and shales forming the eastern flank of the Southern Pennine Orefield. During the Permo-Triassic period, mineralisation associated with hydrothermal activity along bedding planes, faults and joints led to the deposition of metalliferous ores. In this region, these comprise principally lead, but with some copper and zinc, all associated with fluorspar, barytes and calcite, which are used in industrial processes; trace elements are also associated with the major minerals, including cadmium and arsenic. These minerals form deposits of up to a kilometre in length, but generally only a few metres in thickness. The discovery of inscribed lead ingots indicates the exploitation of these deposits during the Romano-British period, although evidence for Bronze Age copper mining around Ecton in the Manifold Valley[1] demonstrates that the origins of metal mining are considerably earlier. Production grew steadily during the Post-Medieval period, peaking during the 17th and 18th centuries as market demand spiralled and as new pumping technologies permitted mine waters to be drained via soughs and deeper mineral deposits to be exploited; thereafter, mining began a slow decline that continued during the 19th and earlier 20th centuries.[2]

The Derwent Valley preserves comparatively limited evidence for lead mining, but significantly more evidence for smelting of the ore.[3] The archaeological and documentary evidence for these activities[4] and records of atmospheric pollution[5] have been relatively well-studied, but significantly less attention has been paid to the investigation of metal contaminants in spoil heaps or reworked and stored within alluvium.[6] There is a clear need for further studies investigating the geochemistry, contamination levels, mobility and dispersal mechanisms for metals around mining or smelting sites and within the Valley, as conducted recently in the North Pennine Orefield.[7] This is especially urgent in the light of climate change, given the potential for redeposition of stored contaminants if rainfall levels and thus processes such as bankside erosion and landslip increase,[8] and in view of the requirements of the Water Framework Directive.[9] Studies should also seek to integrate geochemical and hydrological studies with the archaeological and documentary evidence for production and processing sites.

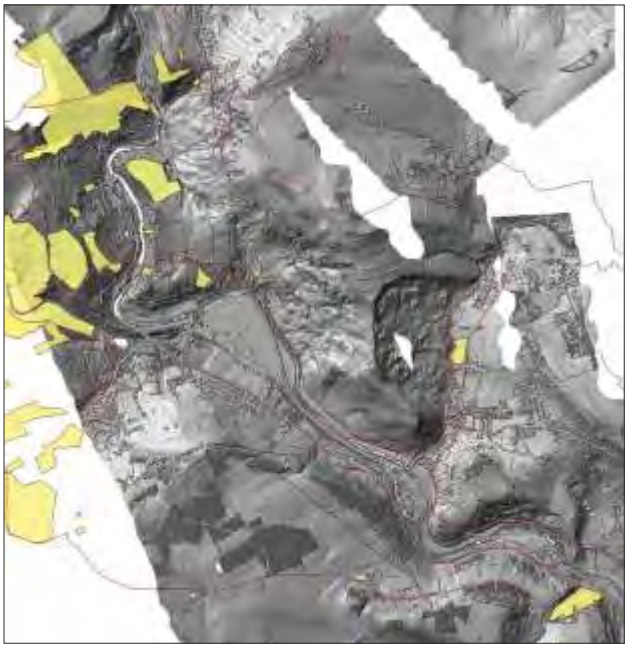

Fig.4.55 Areas of lead mining (yellow) in the DVMWHS Core and Buffer Zones in the vicinity of Cromford. Plotting against lidar data shows their relationship to valley slopes prone to disturbance by fluvial and slope processes (mining data provided by courtesy of Derbyshire HER. Contains Ordnance Survey data. Crown Copyright and database rights 2016; source data © Environment Agency)

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Strategic Objective 11A. Assess the position of the Derwent Valley cotton industry in terms of the Empire, the slave trade and the pressures of global demand and supply

Susanne Seymour and Sheryllynne Haggerty

British cotton manufacture expanded greatly from the mid-18th century, with cotton becoming Britain's leading textile by the early 1800s and a key driver of wider industrialisation.[1] The industry was fed by raw cotton from around the world, including the Ottoman Empire, West Indian colonies, Brazil, the southern states of America and, in the wake of the American Civil War, India.[2] By the 1790s, British cotton goods had substantially replaced those produced in India for the British market, and were challenging Indian cottons as barter goods for African slaves (although India remained the leading cotton textile producer). Many more products were sent to the British colonies and the wider Americas, playing an important role in Atlantic plantation economies.[3] Yet, despite wide scholarship, only limited attention has been paid to the global context of Derwent Valley cotton goods. European colonisation, the slave trade and associated global trading systems, increasingly identified as important drivers of the Industrial Revolution, are rarely explicitly linked to the Valley's textile factories.[4]

Previous research has highlighted the spread overseas of technological developments from the Derwent Valley,[5] but there has been little focus on these innovations as drivers of the Atlantic slave trade and instigators of New World cotton plantation systems or, conversely, on the implications of plantation-based innovations (such as Whitney's cotton gin of 1793) for developments in the Valley. Furthermore, the technological changes pioneered in the Derwent Valley need further evaluation vis-à-vis other institutional and political drivers for change, particularly in relation to impacts on established cotton textile industries in the Indian subcontinent.[6] The international sourcing of supplies of raw cotton for the Derwent Valley mills has long been recognised,[7] but only recently has it been linked explicitly to the expansion of European empires and to the Atlantic slave trade (notably in the *Global Cotton Connections* project).[8] The picture regarding global markets for Derwent Valley cotton goods is much less clear and warrants further research, as do the personal attitudes of leading industrialists of the Valley towards slavery. There is clear potential, therefore, for further examination of the records of Derwent Valley cotton manufacturers from these global perspectives. The *Global Cotton Connections* project[9] provides some insights into how this might be achieved by drawing on recent studies of Liverpool and London merchant networks, wider narratives of global capitalism and slavery and online resources such as the Transatlantic Slave Trade and Legacies of British Slave-ownership databases.[10]

Fig.4.56 Picking cotton on a Georgia plantation: drawing in Ballou's Pictorial ***14****, 1858, 49; reproduced by courtesy of the Library of Congress (LC-USZ62-76385)*

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Strategic Objective 11B. Explore the wider impact of the ideas, technologies, skills and wealth generated in the Derwent Valley during the Industrial Revolution

Mark Suggitt

Innovations in the Derwent Valley in the factory production of silk and then cotton, followed at a later date by the adaptation of Arkwright's inventions for the worsted and flax industries,[1] contributed significantly to the spectacular growth of textile production in Britain during the 18th and 19th centuries. Contemporaries saw the achievements of textile pioneers such as Arkwright in much the same light as the innovations of James Watt in steam technology and Josiah Wedgwood in pottery manufacture, and as more than making up for the economic loss of the American colonies in the 1770s.[2] The Derwent's pre-eminence was relatively short-lived, dwindling from the late 18th century as patents were lost and as the early technical innovations were made redundant by later technologies such as steam power, the spinning mule and the power loom.[3] However, before the shift northwards in the focus of textile production, the industrial innovations in this short stretch of valley had wide repercussions in many other sectors of the British economy, including shipping, ports, inland transport, chemical engineering, building, banking, finance and insurance.[4] The loss of Arkwright's patents in 1785 was a major turning point, spurring a 'cotton rush' leading to over 200 similar mills in Britain by 1788.[5] The importation of new technology was seen by entrepreneurs as the key to emulating the Valley's success, but to what extent the socio-cultural aspects of the Derwent's factory system were emulated, and how a narrow focus upon technological innovation might have impacted on the success or failure of these new concerns, are major issues for further research.

Despite legal prohibitions from 1774 until well into the 19th century on the export of 'tools and utensils' associated with the cotton and linen trades, Arkwright's inventions found their way to France, Belgium, Germany and Austria, and to New England via Derwent Valley textile workers Samuel Slater and Thomas Marshall.[6] The Derwent's mill owners advertised for skilled workers to manufacture and maintain the machinery, but it would be interesting to know how many of those who were attracted to the Valley stayed to enjoy stable employment or were enticed, like Slater and Marshall, to sell their skills elsewhere.[7] The Derwent Valley also developed new types and standards of workers' housing. How widely were these copied in and beyond Britain, and was their quality due, at least in part, to the need to compete with industrial cities that had no need to publicise their employment opportunities?[8] Finally, where did the money go? The Arkwrights, Strutts and the Evans family made fortunes, and within two generations had become landed gentry, peers and financiers. How influential were later generations of the textile pioneers' families in the decline of Britain's industrial spirit during the later 19th and 20th centuries?[9]

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Fig.4.57 Detail of Joseph Wright's portrait of 1789–90, showing Sir Richard Arkwright seated beside a model of the rollers which formed the crucial parts of both his spinning and carding machines. These required machine minders rather than skilled operators and provided the foundation of his entrepreneurial success (oil on canvas; from private collection by courtesy of Derby Museums Trust)

Strategic Objective 11C. Assess the impacts of industrial developments in the Derwent Valley upon the fabric of society in Britain, the Empire and across the globe

Mark Suggitt

The industrial developments that reshaped the British economy during the 18th century can be seen as entrepreneurial responses to rising wealth, growing population, changing consumer tastes and expanding markets. Imported luxury goods such as coffee, tea, tobacco and sugar,[1] along with products such as Chinese porcelain and Indian cottons,[2] fundamentally changed patterns of consumption in the home market; this in turn guided and spurred further industrial investment. Arkwright's inventions[3] and his factory system extended across Europe and to the eastern seaboard of North America, allowing large-scale mechanised production of cheap clothing and household textiles. The factory production of yarn, followed by mechanised weaving, led to cotton becoming the world's most important textile for over a century. Spiralling demand stimulated the large-scale cultivation of cotton plants, particularly in the Americas and the Indian sub-continent, while later inventions such as the sewing machine helped to maintain the dominant position of cotton in the market.[4]

Industrialisation and urbanisation transformed British society and politics in the 19th century. Industrial and military power supported the growth of the British Empire, its cotton industry fuelled the development of the plantation system and the exploitation of slave labour in the Americas,[5] and the 'shock cities' of the 1830s[6] produced some of the worst excesses of poverty and exploitation. The debate on whether industrialisation had a positive or a 'disastrous and terrible'[7] impact upon British society continues. What it meant for working people of the time remains, in Griffin's words, 'a question of innate human interest…[and]…one of enduring relevance in our own times as other parts of the globe industrialise at a galloping pace'.[8] The Derwent Valley mill owners were, by the standards of their time, patriarchal but fair. Questions remain, however, regarding their awareness of the broader implications of the enterprises that they managed – particularly with respect to the slave-based production systems that underpinned their cotton supplies. The Strutts, for example, worked with slave traders as well as merchants who opposed enslavement, but in their private and public lives family members criticised the slave economy. There is scope, therefore, for further archive work to unravel the views and practices of the industrialists on this subject.[9] There is also an opportunity for a review of modifications of the factory system as it spread across the world and, building upon this, the extent to which the system developed by Arkwright and his peers to manage the workforce and maximise productivity[10] should be held responsible for shifts in culture and society beyond the Valley.

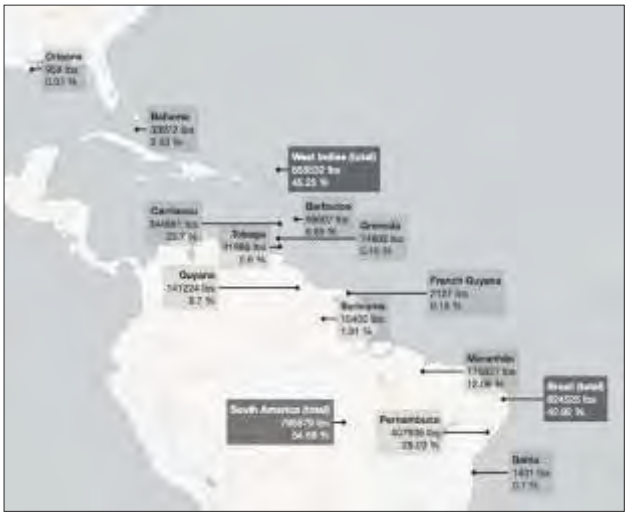

Fig.4.58 Origins of the Strutts' raw cotton supplies, 1793–1798, based on cotton weight data in a Derbyshire Record Office cotton ledger (DRO D6948/2/5; Seymour et al *2015, 156–63; provided by courtesy of Lowri Jones and Susanne Seymour)*

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Strategic Objective 11D. Investigate the potential to develop the Derwent Valley as a model for the development of sustainable low-carbon economies

Ian Jackson, Joe Smith, Renata Tyszczuk, Julia Udall and Nicola Whyte

We have considered in Objective 8D the Valley's hydropower potential, and focus here upon the wider lessons that may be learned from the low-carbon industrial economy that developed in the region during the 18th century. The first factories were driven wholly by water power, and the communities that they supported provide exemplars of low-carbon usage that may serve as models for the development of future energy strategies.[1] The hydrological properties of the Valley and its long history of harnessing water power provide an invaluable opportunity to research low-carbon systems that work with, rather than against, the local environment. The region already hosts several well-connected organisations concerned with promoting the technological skills required to face the challenges of future energy needs. These include Transition Belper,[2] which aims to reduce electricity generation and use, and is monitoring the impact of current changes in use upon carbon dioxide emissions in the area. Installations at Masson Mills,[3] Belper and Milford, owned and run by Derwent Hydro Ltd, illustrate how hydropower can work profitably while safeguarding the landscape and environment. Transition Belper members have also established the Amber and Derwent Valley Community Energy Company;[4] this seeks to develop collaborative approaches to hydropower production and to advance education and awareness by community engagement.

It is imperative that work continues on the development of technologically advanced factories and research laboratories that acknowledge and actively use the Valley's historically significant setting as a catalyst for energy change. There is huge potential to bring different groups together and to promote initiatives beyond the region. Recent work on place attachment and community engagement offers a vital pathway for promoting changes that are sensitive to the nature and meanings of local environments.[5] There are also technical requirements associated with harnessing hydroelectricity, including head drop and water flow, while variations in the riverine environment require different types of turbine.[6] Experience gained from testing in this region can thus contribute usefully to studies of other locations in the UK and beyond. In addition, there are opportunities to learn how the early industrial communities were able to feed their growing populations, enhancing understanding of key elements of low-carbon food production and links between industry and agriculture. Study of food products and production methods, notably of the Strutts' model farms,[7] can improve understanding of nutrition, seasonality and output per hectare. A rigorous and ambitious feasibility study for the creation of a low-carbon region could thus contribute significantly to sustainable energy debates[8] and, as shown by the *Stories of Change* project,[9] may provide inspiration for others. Participants in the *Future Works*[10] strand of that project, which focused upon the Derwent, found this a powerful context for the study of energy challenges, precisely because of its historical significance.

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Fig.4.59 View of water turbine in the demolished Milford Mill, photographed c.1907 (© Derbyshire Record Office: D3638-59). The turbine pit and supporting beam shown here may still be seen in the garden of the Mill House public house

Strategic Objective 11E. Assess the national and international impact upon industrial and domestic architecture of Derwent Valley mill and housing designs

Mike Nevell

The rapid industrialisation of the Derwent Valley in the latter half of the 18th century resulted in a remarkable transformation of its built environment, with significant innovations in both industrial and domestic architecture. The pioneering textile industries at Derby, Darley Abbey, Milford, Belper and Cromford were at the forefront of innovations in textile mill construction during this period, as indicated by the development of sophisticated water-powered technology, fireproof construction methods, and heating and ventilation systems.[1] These innovative designs influenced the architecture of mills in Cheshire, Lancashire, Yorkshire and beyond, including Scotland, Ireland, Continental Europe and North America. However, with the establishment of rival centres of cotton production and the growth of steam-powered mills, the 19th century witnessed a fundamental shift in the focus of innovation towards northern England.[2] The creation of new industrial settlements for factory labour represents a second important area of innovation. New types of purpose-built workers' housing, created in the Derwent Valley from the late 18th century,[3] became common in other textile colonies and in growing industrial centres in many other parts of the world.[4] Key examples of this influential workers' housing include the terraces with second-floor workshops at North Street, Cromford, terraces with interlocking plans at Belper and Milford, and the cluster houses of Darley Abbey and Belper (Strategic Objective 9B).

A combination of detailed archaeological survey and targeted historical research[5] is needed to discover to what extent the industrial and domestic buildings which were first developed in the Derwent Valley had a direct influence on wider national and international trends.[6] The early chronology of the Derwent Valley mill buildings is clear, but the mechanisms by which they may have influenced developments elsewhere require further investigation. Engineers and managers moving from site to site no doubt shared innovations and expertise, while descriptions and visual images of the Derwent Valley mills are likely also to have played a role. There is, however, a need for a synthesis not only of the extent of the Valley's influence in Britain and beyond but also of the processes involved in the transmission of these new ideas.

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Fig.4.60 Slater Mill, Pawtucket, Rhode Island. Samuel Slater, born in Belper in 1768 and employed at Strutt's Mill from the age of 10, was the first migrant to achieve a profitable transfer of Arkwright's technology across the Atlantic.[7] With partners William Amy and Smith Brown, he established at Pawtucket in 1793 a wooden water-powered mill dedicated to the manufacture of cotton thread (American School, c.1790: oil on canvas; Smithsonian Institution, Washington DC/Bridgeman Images)

Figs 5.1 and 5.2 Two of Joseph Wright's later works, showing respectively Cromford Mills and Willersley Castle, were acquired by Derby Museums Trust in April 2016, augmenting their internationally important collection of Wright paintings. The addition of two Derwent Valley scenes is of particular importance as it enhances significantly the museum's collection of Wright's Derbyshire landscape paintings (oil on canvas; © Derby Museums Trust)

5. DERBYSHIRE ARCHIVE COLLECTIONS

Important documentary and cartographic archives and collections of artefacts relating to the World Heritage Site are preserved in a wide variety of institutions outside Derbyshire, including the British Library, British Geological Survey, British Museum, Corporation of London Records Office (Guildhall Library), Manchester Archives+, the National Archives (Kew), University of Nottingham (Manuscripts and Special Collections), University of Oxford (Bodleian Library), Sheffield Archives, University of Sheffield Library, Tate Britain and, in North America, the Universities of Yale and Columbia and the Yale Center for Art. Further details of some of these archives are provided in *The Derwent Valley Mills and their Communities*,[1] but significant additional work is required to establish a comprehensive list of archive sources beyond Derbyshire.[2]

There is also a need for the preparation of a comprehensive record of Derbyshire archives incorporating material relating to the World Heritage Site. This too is beyond the scope of the present volume, but to facilitate future research we list below the principal Derbyshire archives that are known to include material relating to the World Heritage Site and are accessible to researchers. Brief summaries have been provided by curators, archivists and others who are familiar with these collections of their contents, web addresses (where available) and other contact details. It is recommended that this list be enhanced as part of a programme of work that would create an integrated digital platform identifying written, photographic, pictorial, cartographic, oral and other information sources relating to the World Heritage Site (Chapter 4: Strategic Objective 1A).

5.1 The Arkwright Society
Rosemary Annable (Volunteer Archivist)

The Arkwright Society was established in 1972 following the success of the 1971 Festival celebrating the bicentenary of the arrival of Richard Arkwright in Cromford and the construction of his first mill. In 1979, the Society purchased the Cromford Mills site that is now the centre of its activities. Its archival holdings include the administrative and business records of The Arkwright Society and its trading arm Cromford Mills Ltd. These provide details of Society events and activities, conservation work on buildings, sites and landscapes owned by the Society, and research concerning the history of the site and its technology. The collection also includes photographs and images relating to the Cromford Mills site and other Society projects (Lumsdale, Slinter Wood and the Cromford Venture Centre), archaeological material, original maps, plans and artefacts, a small collection of books on the textile industry, the Aspin Archives (research resources donated by Chris Aspin) and some records (in poor condition) of the Cromford Colour Company. The collection is in the process of being sorted and rehoused and will then be catalogued. As such, access is currently very limited. A collection of family and business papers of the Arkwrights of Cromford, including material from Willersley Castle, is deposited with the Derbyshire Record Office (D7573).

Address: The Arkwright Society, Sir Richard Arkwright's Cromford Mills, Mill Lane, Cromford, Matlock, Derbyshire, DE4 3RQ
Telephone: 01629 823256
Email: officemanager@arkwrightsociety.org.uk
Web: www.cromfordmills.org.uk

Fig.5.3 View of Cromford Mills in the Arkwright Society Collection. This watercolour, painted possibly in the 1780s by an unknown artist, provides some unique insights into the architecture of the mills and village. Perhaps the most striking feature is an elegant decorative arch, surmounted by a greyhound, at the entrance to a yard fronting the inn known as the Black Greyhound or Black Dog (reproduced by courtesy of the Arkwright Society)

5.2 Bakewell and District Historical Society and Old House Museum
Anita Spencer (Manager of Old House Museum) and George Challenger (Bakewell Historical Society Council)

Bakewell Old House is a registered charity and accredited museum, owned by the Bakewell and District Historical Society, which was formed to save this Tudor building from demolition in the early 1950s. The most significant connection with the World Heritage Site is the building itself, which was converted into five cottages for Sir Richard Arkwright's mill workers. An additional cottage, which is now derelict, was added at that time to the front of the building. The museum contains over 9,500 objects that have been collected from the locality over a period of sixty years. These comprise a wide variety of domestic objects,

kitchenware, tools, ceramics, early cameras, medical equipment, toys and an important and extensive costume collection, including samplers, quilts, militaria and lace. The museum also holds a wide range of documentary and photographic archives relating principally to the Old House, Bakewell town and its environs, together with archive material relating to Arkwright's Lumford Mill (including original documentation illuminating its later use as a battery factory) and his role in providing workers' housing (including the Old House cottages).

Address: Old House Museum, Cunningham Place, off North Church Street, Bakewell, Derbyshire, DE45 1DD
Telephone: 01629 813642
Email: bakewellmuseum@gmail.com
Web: www.oldhousemuseum.org.uk

5.3 Belper Historical Society
Ray Marjoram (Treasurer)

The Belper Historical Society was founded in 1957, and has been collecting photographs, documents and artefacts ever since. They collections are focused upon Belper, the Strutts and their mills, textile manufacture and other local industries, but also include information on Milford and nearby villages where relevant. The photographic material is digitised and recorded with metadata in a Modes[3] database. The photographs range from the latter part of the 19th century to the present and include topographical material, portraits and industrial, school and event records. Documents include material from the Strutt Estate, the Dalton/Silkolene oil industry and theatrical and church events. Collections from earlier historians and collectors are summarised in the database. The physical artefacts cover broadly similar topics and represent the local industries and the lives of the population in the last century. There is a small library of Derbyshire books and material representing leisure interests in the last century.

Address: awaiting move to new premises in Belper; currently Southfield House, Portway, Coxbench, Derby, DE21 5BE
Telephone: 01332 880600
E-mail: enquiries@belperhistory.org.uk

5.4 Belper North Mill
Mark Higginson (Manager)

Strutt's North Mill, run by the Belper North Mill Trust, is a small, independent, accredited museum housed in part of Belper North Mill. The museum's collections policy focuses on the Strutt family, the members of which played a key role in the development of the factory system, and the history of cotton spinning and stocking manufacture, which were the main industries of the town for almost two centuries. Most of the collections are on loan from other institutions, including Belper Historical Society and Amber Valley Borough Council. The collections comprise Strutt family portraits, including a particularly fine portrait of William Strutt by Ramsay Richard Reinagle, spinning, cotton

Fig.5.4 The collections of Strutt's North Mill preserve a wide range of artefacts relating to the cotton industry. This rare survival of macramé twine, still contained in its original packaging, was manufactured for sale around 1913 (source: Westwood and Rhodes 2013, 94; reproduced by courtesy of the authors)

processing and hosiery manufacturing machinery, and archival materials and hosiery samples from Brettles (a major hosiery manufacturer in Belper). The museum also incorporates a small library with a range of books relating to the textile industry, spinning technology and the history of the site and area (including copies of *Yarns*, the English Sewing Cotton Company's in-house magazine of the 1920s and1930s). A small photographic collection includes group portraits of Strutt mill workers taken in 1896. The collection is currently being catalogued.

Address: Strutt's North Mill, The Derwent Valley Visitor Centre, Bridgefoot, Belper, Derbyshire, DE56 1YD
Telephone: 01773 880474 or 0845 5214347
Email: manager@belpernorthmill.org.uk
Web: www.belpernorthmill.org

5.5 Buxton Museum and Art Gallery
Ros Westwood (Derbyshire Museums Manager)

The main resources for the Derwent Valley include a collection of 18th and 19th century watercolours, oils and prints of topographic views relating to the area from Matlock to Cromford. These include works by William Day, Ramsay Richard Reinagle and Richard Henry Nibbs. A partner in the Heritage Lottery Fund's *Enlightenment!* programme, the museum was able to purchase several significant views of the Derwent Valley which are illustrated in the project catalogue[4] and blog. The museum also houses social history material associated with the Valley, including Ashford Black Marble and mineral specimens, pottery with topographical views and banking material produced for Arkwright, Toplis and Co: a Wirksworth bank established in 1780 as John Toplis, but renamed when Richard Arkwright Junior joined the partnership in 1804. There is a modest

selection of local history guides, complementing those in the local studies libraries.

Address: Buxton Museum and Art Gallery, Terrace Road, Buxton, Derbyshire, SK17 6DA
Telephone: 01629 533540
Email: buxton.museum@derbyshire.gov.uk
Web: www.derbyshire.gov.uk/leisure/buxton_museum
Blog: www.enlightenmentderbyshire.wordpress.com

Fig.5.5 Cup and saucer manufactured in 1795 by the Derby Porcelain Company, decorated with images of Cromford Mill (saucer) and Little Eaton (cup). The picture on the cup is a copy of a watercolour by Zachariah Boreman of the 'Lower Mill', painted in 1787; the A-frame in the foreground is thought to represent a frame for bleaching yarn in the sun (Buxton Museum and Art Gallery, 2012.13; source: Westwood and Rhodes 2013, 89; reproduced by courtesy of the authors)

5.6 Chatsworth House Trust: The Devonshire Collection James Towe (Archivist and Librarian)

The archives at Chatsworth reflect the lives and interests of the Cavendish family and the people who lived and worked with them on their estates in England, Ireland and Scotland over five centuries. The archives include much material relating to properties and estates in Derbyshire and along the Derwent Valley. Key collections include the personal, political and family papers of the Dukes of Devonshire and the Cavendish family; building accounts and household and staff records for Chatsworth; and surveys, accounts, rentals, maps, plans and other papers for the Derbyshire estates of the Cavendish family. The archives are cared for by the Chatsworth House Trust and are accessible to researchers by prior appointment. Reading fees apply.

Address: Devonshire Collection, Chatsworth, Bakewell, Derbyshire, DE45 1PP
Email: archives@chatsworth.org
Web: www.chatsworth.org

5.7 Chesterfield Museum and Art Gallery Maria Barnes (Museum Collections Officer)

Chesterfield Museum is operated by Chesterfield Borough Council. Its displays focus upon the history of the town, from its origins as a Roman fort to its development as an important industrial centre. The development of Chesterfield was linked closely to the North Midland Railway (later the Midland Railway) which opened in 1840. The museum's collection includes many items relating to Chesterfield's railways, including signs, timetables, plans and signalmen's tickets. The town's close links with George Stephenson are also reflected in the collections. Stephenson engineered the line of the North Midland Railway that runs through the World Heritage Site, as well as founding a mining company and iron works at Clay Cross. He lived in Chesterfield during the final years of his life and is buried in Holy Trinity Church. The collections include a variety of items relating to this important figure, including his cucumber straighteners, a pair of candlesticks used in surveying, an oil painting by John Lucas ('The Birthplace of the Locomotive') which was commissioned by Stephenson's son, Robert, and the portrait of George Stephenson below (Fig.5.6).

Address: Chesterfield Museum and Art Gallery, St Mary's Gate, Chesterfield S41 7TD
Telephone: 01246 345727
Email enquiries: museum@chesterfield.gov.uk
Website: www.chesterfield.gov.uk/museum

Fig.5.6 Portrait of George Stephenson (1781–1848), engineer of the North Midland Railway, by an unknown artist (oil on canvas; reproduced by courtesy of Chesterfield Museum and Art Gallery)

5.8 Crich Tramway Village: National Tramway Museum
Laura Waters (Curator of Collections and Library)

The National Tramway Museum is home to a world-renowned vintage tram fleet and vast collections of photographs and archive materials relating to trams, tramways and railway history, including material of interest to Derwent Valley researchers. The John Price Memorial Library holds a unique collection of books, pamphlets, reports and Acts of Parliament covering the history of British, European, North American and other tramways and light railways, together with a small selection of resources relating to Derbyshire limestone quarrying, George Stephenson and Crich. The holdings include the records of transport operators, including British Electric Traction and those previously lodged with the Bus and Coach Council, and the minutes of associations such as the Municipal Tramways and Transport Association and the Municipal Passenger Transport Association. An extensive Journal collection is held, including *Tramway and Railway World, The Light Railway and Tramway Journal, Electric Railway Journal, The Electrician* and the *Electrical Review*. The printed book collection contains descriptions of the world's tramway and light railway systems, including electric, steam, cable and horse traction. There is information on the manufacturers of vehicles and equipment, transport law and planning. The Photographic and Film Archive covers the tramway systems of Great Britain and the world, and includes negatives, glass plates, prints and commercial postcards.

Address: The National Tramway Museum, Crich Tramway Village, Crich, Derbyshire, DE4 5DP
Telephone: 01773 854321
Email: enquiry@tramway.co.uk
Web: www.tramway.co.uk

5.9 Friends of the Cromford Canal Archives
Hugh Potter (Honorary Archivist)

This small archive has been built up since the formation of the FCC in 2002. It comprises items which have been donated to, or acquired by, FCC, along with a large digital resource assembled from diverse museums, collections and archives. Relevant documents, including extensive correspondence, have been photographed. Many hand-written documents have been transcribed by volunteers so and are now more readily searchable. In addition, the archive holds the data from the Trent Navigation gauging tables as a searchable database; these list most boats authorised to trade on the canal as well as elsewhere in the region. An on-going project is transcribing surviving Toll Permit books documenting boats that passed through Langley Mill. So far, over 40,000 entries on the database offer an insight into trade, traffic and people on the canal as a whole, as well as the length within the World Heritage Site. The entire minutes of the Cromford Canal Company (1789–1852) have been transcribed into a searchable format. A large archive of photographs in various formats, all digitised, is also held and can be searched by prior appointment.

Location: Ambergate, Derbyshire
Telephone: 01773 852009
Email: archivist@cromfordcanal.org.uk
Web: www.cromfordcanal.info

5.10 Darley Abbey Historical Group
Alan Bradwell (Chair)

The Group was formed by a group of local enthusiasts in 2004 to investigate and record the history of the village and its people, and in particular the remains of the Augustinian monastery that was established in the mid-12th century. Darley Abbey is best known for its monastic remains and mills, associated water management features and workers' housing relating to the Industrial Revolution. Research is carried out on all of these subjects by group members and is recorded in research reports. The archive includes these reports, a collection of books, magazines, photographs and copies of maps relating to the local area, and some personal and mill artefacts donated by local residents. All of this material has recently been catalogued and incorporated in a research report. There is no library location, but researchers can attend the Group's monthly meetings, when material is made available to members.

Location: meets at Darley Abbey Village Hall (third Friday of each month at 7.30pm)
Email: bradwell95@btinternet.com
Web: http://www.darleyabbey.com/index.asp
Archive report: Complete List of Holdings of DAHG. *DAHG Report No. 68/2016*

Fig.5.7 Early 20th century cotton reel bearing a label showing the Boar's Head Mill of Walter Evans and Co. (Derby Museums, 2010-295; source: Westwood and Rhodes 2013, 94; reproduced by courtesy of the authors)

Fig.5.8 Late 19th century brass-bound mahogany cotton box, with marquetry inscription on the top. The box would have been used to store cotton from Boar's Head Mill, Darley Abbey (Derby Museums, 2012-325; source: Westwood and Rhodes 2013, 119; reproduced by courtesy of the authors)

5.11 Derby Local Studies and Family History Library
Mark Young (Manager of Local and Family History Services)

The library holds an extensive range of primary and secondary sources relating to Derby and Derbyshire. The collection is based upon two 19th century private libraries and includes manuscript and printed material dating back to the 16th century. Family papers, correspondence, business and administrative records, maps, plans, engravings, photographs, broadsides, local newspapers and periodicals, sales catalogues and published books are just some of the types of material held. While it is possible to highlight specific records relevant to study of the Derwent Valley, such as Joseph Wright's correspondence, a full search of the library's finding aids is advisable for anyone with an interest in this area of study.

Address: Derby Local Studies and Family History Library, Riverside Chambers, Full Street, Derby, DE1 3AF
Telephone: 01332 642240
Email: localstudies.library@derby.gov.uk
Web: www.derby.gov.uk/libraries

5.12 Derby Museum and Art Gallery, Silk Mill and Pickford's House
Daniel Martin (Curator of Making)

Large and varied collections of objects, prints and archives relating to the World Heritage Site are housed in Derby Museum and Art Gallery, Derby Silk Mill and Pickford's House. These items range from domestic artefacts, including porcelains, photographic prints, books and busts, to industrial items such as bricks, drills, lamp posts and objects relating to transportation. Derby Museums' principal remit has been to collect items with a direct link to the city, but there is a good deal of material relating to other areas, including the Derwent Valley Mills World Heritage Site. Of particular interest are the Joseph Wright collection and the associated Joseph Wright Study Centre at Derby Museum and Art Gallery. In addition, Derby Silk Mill houses the Midland Railway Study Centre: an archive and collections resource relating to the Midland Railway between 1844 and 1922. This resource represents the combined collections of Derby Museums, the Roy F. Burrows Midland Collection Trust and the Midland Railway Society, and includes a vast array of items from posters and tickets to nameplates and signal levers.

Address: Derby Museum and Art Gallery, The Strand, Derby, DE1 1BS
Telephone: 01332 641901
Email: info@derbymuseums.org
Web: www.derbymuseums.org

Fig.5.9 Portrait of Hannah Wright (1732–1810), attributed to her brother Joseph: one of many paintings in Derby Museum and Art Gallery that illuminate studies of the World Heritage Site (oil on canvas; © Derby Museums Trust)

5.13 Derbyshire Archaeological Society
Barbara Foster (Honorary Secretary)

The Derbyshire Archaeological Society was founded in1878 and has an archive in the Derbyshire Record Office comprising a wide range of original archaeological drawings and notes, photographs, sketches, ancient deeds and letters, together with the Society's own records (DRO: D369). The whole catalogue can be viewed on the DRO website (see below). We also have a collection of water colours by Zachariah Boreman (1738–1810): a well-known porcelain artist of the day. The paintings feature 18th century Derbyshire views, including Cromford, Masson Mills and the two Derwent Valley views below. They are on permanent loan to the Derby Museum and may be viewed by appointment; digital versions may be viewed on our website. The first Journal was published in 1879. It is still published annually and contains major archaeological

reports, together with articles on aspects of Derbyshire history. A searchable index of these reports can be found on our website. All journals have been scanned and searchable electronic versions may be accessed from the Archaeology Data Service at the University of York. We also publish *Derbyshire Miscellany*, which is devoted to local history; its contents are listed on the Society's website.

Enquiries: www.derbyshireas.org.uk/ContactUS.html
Web: www.derbyshireas.org.uk;
Zachariah Boreman collection:
http://www.derbyshireas.org.uk/Pictures.html

Fig.5.10 Two watercolours by Zachariah Boreman of Derwent Valley landscapes, reproduced by courtesy of the Derbyshire Archaeological Society
a) 'View of a stone quarry at Duffield Bank'(1787; top)
b) 'View of Matlock High Torr Taken near where the Ingine draws the water from a Lead mine near the Road' (undated)

5.14 Derbyshire County Council HER
Nichola Manning (HER Officer)

The Historic Environment Record (HER) is the main source of archaeological information for Derbyshire and the City of Derby. It covers not only known archaeological sites, including above-ground and buried remains, but also everything from historic buildings and landscapes to chance finds reported by members of the public. It includes anything that contributes to the historic environment of the county, whether nationally designated or just of local interest, and dating from the Palaeolithic through to the 20th century. The records have been created using a variety of sources, including antiquarian writings, documentary sources such as historic maps, aerial photographs, correspondence from members of the public and reports from archaeological excavations, field surveys and other investigations. One of the primary functions of the HER is to inform archaeological advice given as part of the planning process. Any reports of archaeological investigations requested as a result of the planning process are deposited with the HER to further our knowledge of the historic environment of Derbyshire and to help inform future planning decisions.

Address: Derbyshire County Council, Shand House, Darley Dale, Matlock, Derbyshire, DE4 3RY
Telephone: 01629 533362
Web and email: www.derbyshire.gov.uk/environment/conservation/archaeology

5.15 Derbyshire Record Office
Sarah Chubb (Archives and Local Studies Manager)

Derbyshire Record Office holds the historic archives of Derbyshire and the City of Derby and also houses the Local Studies Library. Key collections relating to the Derwent Valley include the Strutt family and business archives, Arkwright family papers and records relating to the development of the Derwent Valley Mills World Heritage Site. The Record Office's broader collections document the social, administrative, religious and economic history of the Derwent Valley area and of the rest of the county and city. They include records of churches, local government and administration, landed estates and local people, businesses, clubs and organisations, maps, books and photographs.

Address: Derbyshire Record Office, New Street, Matlock, DE4 3FE
Telephone: 01629 538347
Postal enquiries: Derbyshire Record Office, County Hall, Matlock, Derbyshire, DE4 3AG
Web: www.derbyshire.gov.uk/recordoffice

Fig.5.11 Based in the Derbyshire Record Office, Picture the Past provides access to over 100,000 searchable photographs, postcards, paintings and other images relating to Derbyshire and Nottinghamshire (courtesy of Derbyshire Local Studies Libraries and www.picturethepast.org.uk)

5.16 Little Chester Heritage Centre
Joan D'Arcy (Chair, Little Chester Local History Group)

The Heritage Centre occupies the south aisle of St. Paul's Church, and is staffed by volunteers from the Little Chester Local History Group. Little Chester takes its name from the Roman town that was located here on the east bank of the Derwent, and coins, pottery and other artefacts from the Roman occupation, together with models, maps and photographs of archaeological excavations, are on display. The area was partially industrialised in the 19th century, and preserves streets of terraced houses built in Victorian times. The collection includes a range of material associated with this industrial phase, including documents relating to the Derby Co-operative Movement. There is also a large collection of written material relating to the area's history, including records of the floods of 1931–32 and 1965 plus biographical details of men of the parish who fought and died in World War One. Material may be viewed by appointment or on Sunday afternoons during the months that the Centre is open.

Address: Little Chester Heritage Centre, St. Paul's Church, Mansfield Road, Derby, DE1 3RT
Telephone: 01332 363354
Email enquiries: info@littlechester.org.uk
Web: http://littlechesterhistoryderby.btck.co.uk

5.17 Sir Richard Arkwright's Masson Mills Working Textile Museum
Robert Aram (Owner of Masson Mills)

The working textile museum includes a comprehensive machinery collection that provides a valuable insight into all major aspects of cotton manufacture and production from the 18th to 20th centuries. This collection includes machines associated with cotton preparation, spinning, doubling and weaving. In addition, the museum houses steam engines and working hydro-electric turbines, and incorporates workshops and a boiler house with 'economisers' that used waste gases generated during coal-firing to pre-heat water entering the boilers. Masson Mills also house an important private collection of archives relating to the textile industry. These archives include material relating specifically to Masson Mills and records of significance for study of textile production in the Derwent Valley and the British Isles.

Address: Sir Richard Arkwright's Masson Mills Working Textile Museum, Derby Road, Matlock Bath, Derbyshire, DE4 3PY.
Textile Museum enquiries: 01629 581001
www.massonmills.co.uk/contact-form.php;
Archive enquiries: by post to the above address
Web: www.massonmills.co.uk

Fig.5.12 Cotton doubling machine, installed at Masson Mills following manufacture in 1954 by Prince-Smith and Sells Ltd of Keighley, West Yorkshire. The doubling frame combines the process of drawing the cotton yarn with twisting of the yarn to give it strength (www.massonmills.co.uk/Museum/M/; reproduced by courtesy of Robert Aram)

5.18 Midland Railway Trust
Chris Deeth (Vice-Chair)

The Midland Railway Trust preserves a nationally important collection of photographic, documentary and other material relating to the Derbyshire Midland Railway and other British railways. Its core collections comprise a number of exceptional photographic archives, including a comprehensive collection of glass negatives produced by Ron Jarvis of Derby between the 1930s and 1950s. These are supplemented by sets of railway periodicals dating back to the late 1830s and by an extensive archive of printed books, notably from the libraries of the Midland Railway Institute in Derby and the former Midland Railway London solicitors, Beale and Co. The Trust also holds an important collection of original manuscripts and Midland Railway line plans, including the Weston Collection of Derbyshire Midland Railway track plans. Other material includes signalling plans, railway timetables, accident reports, Acts of Parliament relating to Midland lines, engineering drawings, personnel records, technical manuals, rule books, operating instructions, training materials and a wide variety of ephemera (including waybills and wagon labels from Midland Railway stations and yards).

Address: Midland Railway Trust Ltd, Butterley Station, Ripley, Derbyshire, DE5 3QZ
Most of the archive, excluding the larger items of rolling stock, is stored at Butterley Station in Cumberland House
Telephone: 01773 747674
Email: midland.railway@btconnect.com
Web: www.midlandrailway-butterley.co.uk

5.19 Peak District Lead Mining Museum
Laura Smith (Senior Museum Assistant)

The Peak District Lead Mining Museum, open to the public since 1978, houses collections of over 6,000 items relating to the mineral mining industry in Derbyshire and the surrounding area. These include many extraction tools, pumps and engines for water removal, items relating to underground transportation and personal items belonging to miners. The museum also has several extensive mineral collections, which contain specimens from across the world. A welcome new addition has been a collection relating to the history of Matlock Bath as a spa town, with many images, postcards, artefacts and documents.

Address: Peak District Mining Museum, Grand Pavilion, South Parade, Matlock Bath, Derbyshire, DE4 3NR
Telephone: 01629 583834
Email: mail@peakmines.co.uk
Web: www.peakdistrictleadminingmuseum.co.uk

5.20 John Smedley Archive
Jane Middleton-Smith (Company Archivist)

John Smedley Ltd, which was established in 1784, is now the world's oldest family-owned knitwear and hosiery manufacturer that is still operating on its original site. The collection, which is specific to the company and the Smedley family, is one of the largest and most complete archives of its type in Britain and America. It includes over 7,000 garments, items of equipment, machinery and ephemera, all related to the manufacture of fine gauge knitwear. It also houses a significant archive that covers many aspects of the company's operations, including production, accounts and personnel records, correspondence, photographs and publicity material, together with family and estate records. It is important to note that at present the archive is in the process of being catalogued and that access is very limited. In addition, some items are restricted for reasons of their commercial sensitivity.

Address: John Smedley Archive, John Smedley Ltd., Lea Mills, Lea Bridge, Matlock, Derbyshire, DE4 5AG
Telephone: 01629 530484
Email: archive@johnsmedley.com

5.21 Wirksworth Heritage Centre
Lucy Godfrey (Audience Development and Collections Officer)

The Centre has moved recently to new premises that are being renovated with the support of the Heritage Lottery Fund. There is currently limited access to the collections, which until renovation is completed are available by prior appointment. They include items illuminating local silk and velvet production, together with possessions of Samuel Evans, manager of Wirksworth's Haarlem Mill. The collection is being reassessed and reorganised as part of the current project, with the aims of enhancing understanding of the holdings and their relevance to the town's history. It comprises a small but varied collection of artefacts, including prehistoric stone and antler tools, textiles and items relating to domestic social history. There is a small body of material illustrating the town's tape weaving industry, plus artefacts and ephemera reflecting its links with George Eliot. Wirksworth provided the inspiration for Snowfield in Eliot's 1859 novel *Adam Bede*, which revolved around Dinah Morris: a lay preacher who is thought to be inspired by Eliot's aunt Elizabeth Evans.[5] Along with her husband, Elizabeth was a Methodist preacher; both are commemorated by a memorial tablet which will be displayed when the Centre reopens.

Address: Wirksworth Heritage Centre, 31 St John Street, Wirksworth, Derbyshire, DE4 4DS
Telephone: 03302 211085;
Email:info@wirksworthheritagecentre.org
Web: http://www.wirksworthheritagecentre.org

Fig.5.13 Memorial tablet to George Eliot's aunt and uncle, placed originally in Wirksworth's Bede Memorial Chapel. The chapel was demolished after a serious fire, but the tablet is preserved in the Centre (photograph: Ian Cooper; reproduced by courtesy of Wirksworth Heritage Centre)

References

[1] Derwent Valley Mills Partnership 2011 *The Derwent Valley Mills and their Communities.* Matlock: DVMP, 106
[2] Paintings of regional interest in collections across the UK may be viewed at http://artuk.org
[3] http://www.modes.org.uk
[4] Westwood, R and Rhodes, A 2013 *Enlightenment! Derbyshire Setting the Pace in the 18th Century.* Buxton: Derbyshire County Council
[5] Jones, B 2008 *Beyond the Copper Beech: George Eliot, D H Lawrence and other Literary Links with Wirksworth, Derbyshire.* Lulu.com; Mottram, S 1906
The True Story of George Eliot. Chicago: McClure

6. BIBLIOGRAPHY

References have been grouped thematically, with the aim of facilitating searches for information on particular subjects. Studies of Derbyshire and the Derwent Valley are listed first, followed by works relating specifically to the Derwent Valley textile industry and the major mill complexes. Later sections include general works on the Enlightenment and industrialisation, the British textile industry, global perspectives on industrialisation and the subject of landscape, environment and sustainable energy. For ease of reference, environmental studies relating wholly or partly to Derbyshire and the Derwent Valley are included in the last of the above sections. Finally, details are provided of other research frameworks and planning documents of particular relevance for World Heritage Site management. Occasionally, where their contents relate to several of the above themes, publications are listed in more than one section. Abbreviations, which for reasons of limited space are employed in the lists of references accompanying the Strategic Objective summaries (Chapter 4), are listed for convenience at the beginning of that chapter. The web address for the Historic England Archive, which is referred to occasionally, may be found in Chapter 7.8.

6.1 DERBYSHIRE AND THE DERWENT VALLEY

Details are provided in this introductory section of publications focusing upon Derbyshire, including the Derwent Valley. For ease of reference, works relating *specifically* to the Derwent Valley textile industry, mill complexes and associated industrial settlements are listed separately in Chapter 6.2.

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Austin, M R 2001 *A Stage or Two Beyond Christendom: A Social History of the Church of England in Derbyshire*. Cromford: Scarthin

Barnatt, J 2013 *Delving Ever Deeper: The Ecton Mines through Time*. Bakewell: Peak District National Park

Barnatt, J and Bannister, N 2009 *The Archaeology of a Great Estate: Chatsworth and Beyond*. Oxford: Windgather

Barnatt, J, Huston, K and Mallon, D *et al* 2013 'The Lead Legacy: An updated inventory of important metal and gangue mining sites in the Peak District'. *Mining History* **18** (6)

Barnatt, J and Penny, R 2004 *The Lead Legacy: The Prospects for the Peak District's Lead Mining Heritage*. Bakewell: Peak District National Park Authority

Barnatt, J and Smith, K 2004 *The Peak District*, 2 edn. Macclesfield: Windgather

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Bemrose and Sons 1867 *Bemrose's Penny Guide for Excursionists to Matlock Bath and Neighbourhood*. London: Bemrose and Sons

Bevan, B 2004 *The Upper Derwent: 10,000 Years in a Peak District Valley*. Stroud: Tempus

Bevan, B 2005 'Peaks Romana: The Peak District Romano-British rural upland settlement survey, 1998–2000'. *Derbyshire Archaeological Journal* **125**, 26–58

Bevan, B (ed) 2013 *Memories that Flow through Calver*. Calver Weir Restoration project

Billson, P 1996 *Derby and the Midland Railway*. Derby: Breedon Books

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Brightman, J and Waddington, C 2011 *Archaeology and Aggregates in Derbyshire and the Peak District*. Bakewell: Archaeological Research Services Ltd (http://archaeologydataservice.ac.uk/archives/view/derbyaggs_eh_2011/downloads.cfm)

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Brown, T 1794 *General View of the Agriculture of the County of Derby*. London: Board of Agriculture

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Chambers, J D 1957 *The Vale of Trent 1670–1800: A Regional Study of Economic Change*. Cambridge: Economic History Society

Cooper, B 1991 *Transformation of a Valley: The Derbyshire Derwent*. Cromford: Scarthin Books

Cooper, N (ed) 2006 *The Archaeology of the East Midlands: An Archaeological Resource Assessment and Agenda*. Leicester: University of Leicester Archaeology Monograph **13** (period chapters include discussion of Derbyshire)

Cootes, K 2014 'The organisation of late Bronze Age to early Iron Age society in the Peak District National Park' *in* Blinkhorn, P and Cumberpatch, C (eds) *The Chiming of Crack'd Bells: Recent Approaches to the Study of Artefacts in Archaeology.* Oxford: British Archaeology Reports International Series 2677, 105–17

Craven, M 2007a *An Illustrated History of Derby.* Derby: Breedon Books

Craven, M 2007b 'Surviving Georgian Derby'. *Derby Civic Society Newsletter* **85**, 36–9

Craven, M and Stanley, M 2001 *The Derbyshire Country House,* 3 edn. Ashbourne: Landmark

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6.2 THE DERWENT VALLEY MILLS

Attention is focused in this section upon works which focus on the mill complexes and associated industrial settlements of the Derwent Valley. Publications relating to the Derwent Valley as a whole are listed first, followed by works focusing upon specific mill complexes. The latter are arranged geographically, commencing with the Derby Silk Mill and travelling upstream towards Matlock Bath.

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6.7 REGIONAL AND THEMATIC RESEARCH FRAMEWORKS AND GUIDANCE DOCUMENTS

Details are provided below of other regional and thematic research frameworks with particular relevance to the Derwent Valley, together with guidance documents on research methodologies of particular relevance to the study of the industrial heritage. Many of these publications are available in digital format, and for ease of reference details of web links are provided below. It should be noted that the two published components of the *East Midlands Historic Environment Research Framework* (by Cooper [ed] 2006 and Knight *et al* 2012) are now combined as part of a single interactive digital resource (http://archaeologydataservice.ac.uk/researchframeworks/eastmidlands/wiki/Main) that is available for updating by members of the historic environment community.

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Cooper, N (ed) 2006 *The Archaeology of the East Midlands: An Archaeological Resource Assessment and Agenda*. Leicester: University of Leicester Archaeology Monograph 13; http://archaeologydataservice.ac.uk/researchframeworks/eastmidlands/wiki/Main

Dungworth, D 2015 *Archaeometallurgy: Guidelines for Best Practice*. Swindon: Historic England; https://historicengland.org.uk/images-books/publications/archaeometallurgy-guidelines-best-practice/

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English Heritage 2010a *A Thematic Research Strategy for the Historic Industrial Environment;* https://content.historicengland.org.uk/content/docs/research/industrial-research-strategy.pdf

English Heritage 2010b *A Thematic Research Strategy for the Urban Historic Environment;* https://content.historicengland.org.uk/content/docs/research/draft-urban-strategy.pdf

Gwyn, D and Palmer, M (eds) 2005 *Understanding the Workplace: A Research Framework for Industrial Archaeology in Britain. Industrial Archaeology Review* **27** (1). This includes an introductory chapter by M. Palmer, summarising the research framework (9–17)

Irving, A 2011 *A Research Framework for Post-Roman Ceramic Studies in Britain*. Medieval Pottery Research Group Occasional Paper **6**; http://www.mprgframework.info

Knight, D, Vyner, B and Allen, C 2012 *East Midlands Heritage. An Updated Research Agenda and Strategy for the Historic Environment of the East Midlands*. Nottingham: University of Nottingham and York Archaeological Trust http://archaeologydataservice.ac.uk/researchframeworks/eastmidlands

Newman, P (ed) 2016 *The Archaeology of Mining and Quarrying in England: A Research Framework for the Archaeology of Extractive Industries in England. Resource Assessment and Agenda*. Matlock Bath: National Association of Mining History Organisations; http://namho.org/research.php

Palmer, M 2005 'Understanding the workplace: A research framework for industrial archaeology in Britain. http://archaeologydataservice.ac.uk/researchframeworks/eastmidland. *Industrial Archaeology Review* **27** (1), 9–17; http://www.tandfonline.com/doi/pdf/10.1179/030907205X50441

Paynter, S and Dungworth, D 2011 *Archaeological Evidence for Glassworking: Guidelines for Best Practice*. Swindon: English Heritage. https://historicengland.org.uk/images-books/publications/glassworkingguidelines/

White, H, Paynter, S and Brown, D 2015 *Archaeological and Historic Pottery Production Sites: Guidelines for Best Practice*. Swindon: Historic England; https://historicengland.org.uk/images-books/publications/archaeological-and-historic-pottery-production-sites/

Williams, J 2009 *The Use of Science to Enhance Our Understanding of the Past: National Heritage Science Strategy Report 2*. London: Historic England https://historicengland.org.uk/images-books/publications/nhss-rep2-use-of-science-to-enhance-understanding-of-past/

6.8 KEY MANAGEMENT DOCUMENTS

Derwent Valley Mills Partnership, 2001 *Nomination of the Derwent Valley Mills for Inscription on the World Heritage List*. Matlock: Derwent Valley Mills Partnership

Derwent Valley Mills Partnership 2014 *Derwent Valley Mills World Heritage Site Management Plan 2014–2019*. Matlock: Derwent Valley Mills Partnership

Fig.7.1 Detail of oil painting of Hopping Mill Weir by Thomas Smith (1720–67). The Art UK website (http://artuk.org) provides ready access to a wealth of paintings in regional and national museums relating to the Derwent Valley and Derbyshire, including this memorable image of 18th century angling, boating and horse-riding at Hopping Mill, just upstream of the site of the Milford mills (© Derby Museums Trust)

7. KEY WEB RESOURCES

Website addresses were checked and updated on the 1st August 2016.

7.1 World Cultural Heritage

UNESCO World Heritage:
http://whc.unesco.org/
International Council on Monuments and Sites:
www.icomos.org
International Council on Monuments and Sites in the UK (ICOMOS UK):
www.icomos-uk.org
PROTection of European Cultural HEritage from GeO-Hazards:
http://www.prothego.eu

7.2 Derwent Valley Mills World Heritage Site and Principal Mill Complexes

Derwent Valley Mills World Heritage Site:
http://www.derwentvalleymills.org
For recent DVMWHS research documents see:
http://www.derwentvalleymills.org/derwent-valley-mills-history/derwent-valley-mills-research/
Belper Mills:
http://belpernorthmill.org/
Boar's Head Mills, Darley Abbey:
http://darleyabbeymills.com/
Cromford Mills:
http://cromfordmills.org.uk
Derby Silk Mill:
http://www.derbymuseums.org/thesilkmill/
Masson Mill:
http://www.massonmills.co.uk/
Milford Mills:
http://www.milford-makeney.org/
John Smedley's Mill, Lea Bridge:
http://www.derwentvalleymills.org/cromford/visit-lea-mills/

7.3 Regional Heritage, Conservation and Planning Services

Derbyshire County Council (including Historic Environment Record):
http://www.derbyshire.gov.uk/environment/conservation/
Derby City Council:
http://www.derby.gov.uk/environment-and-planning/
Peak District National Park:
http://www.peakdistrict.gov.uk

7.4 Archives, Museums and Heritage Centres

Details are provided below of organisations in Derbyshire and Derby City with archive collections, displays or other interpretative facilities of interest for understanding the Valley's cultural development and landscape resource. Further details of archive collections curated by these organisations are provided in Chapter 5. As noted in that chapter, it would be useful to expand this list to include archive repositories beyond the County, both nationally and internationally. This was not possible, unfortunately, within the time restraints of the current project, but this ambition is encapsulated in Strategic Objective 1A.

The Arkwright Society:
http://cromfordmills.org.uk/content/arkwright-society
Bakewell Old House Museum:
http://www.oldhousemuseum.org.uk
Belper Historical Society:
enquiries @belperhistory.org.uk (email enquiry only)
Belper North Mill:
http://belpernorthmill.org/
Buxton Museum and Art Gallery:
https://www.derbyshire.gov.uk/leisure/buxton_museum/
Chatsworth House Trust:
http://www.chatsworth.org
Chesterfield Museum and Art Gallery:
http://www.chesterfield.gov.uk/museum
Crich Tramway Village: National Tramway Museum:
http://www.tramway.co.uk/
Friends of the Cromford Canal:
http://www.cromfordcanal.info/
Darley Abbey Historical Group:
http://www.darleyabbey.com/amenities-and-businesses/darley-abbey-historical-group/
Derby Local Studies and Family History Library:
http://www.derby.gov.uk/leisure-and-culture/libraries/derby-libraries/local-studies-library/
Derby Museum and Art Gallery:
http://www.derbymuseums.org/museumartgallery/
Derby Silk Mill:
http://www.derbymuseums.org/thesilkmill/

Derbyshire Archaeological Society:
http://www.derbyshireas.org.uk
Derbyshire County Council Historic Environment Record:
http://www.derbyshire.gov.uk/environment/conservation/archaeology/
Derbyshire Record Office:
https://www.derbyshire.gov.uk/leisure/record_office/
Heights of Abraham, Matlock Bath:
http://www.heightsofabraham.com/
Little Chester Heritage Centre:
http://littlechesterhistoryderby.btck.co.uk
Sir Richard Arkwright's Masson Mills Working Textile Museum:
http://www.massonmills.co.uk/
Midland Railway Trust:
http://www.midlandrailway-butterley.co.uk/home/
National Stone Centre, Wirksworth:
http://www.nationalstonecentre.org.uk
Peak District Lead Mining Museum, Matlock Bath:
http://www.peakdistrictleadminingmuseum.co.uk/
Pickford's House Museum, Derby:
http://www.derbymuseums.org/pickfords-house/
John Smedley Archive:
email enquiry only (archive@johnsmedley.com)
Wirksworth Heritage Centre:
http://www.wirksworthheritagecentre.org

7.5 Regional and Local Societies with Derwent Valley Interests

Allestree Local Study Group:
http://allestreelocalstudygroup.org.uk/
The Arkwright Society:
http://cromfordmills.org.uk/content/arkwright-society
Bakewell and District Historical Society:
http://www.oldhousemuseum.org.uk/history-society
Belper Civic Forum:
http://www.belpercivicforum.org.uk/about/
Belper Historical Society:
enquiries@belperhistory.org.uk (email enquiry only)
Friends of Belper Parks:
http://www.belperparks.info/
Friends of Belper River Gardens:
http://friendsbrg.btck.co.uk/
The Belper Strutts Society:
http://strutts.org.uk/user_bss.shtml
Bonsall Field Barn Project:
http://www.bonsallfieldbarnproject.org
Friends of the Cromford Canal:
http://www.cromfordcanal.info/
Darley Abbey Historical Group:
http://www.darleyabbey.com/amenities-and-businesses/darley-abbey-historical-group/
Friends of Darley Open Spaces:
http://friendsofdarleyopenspaces.org.uk/
Derby Civic Society:
http://derbycivicsociety.co.uk
Derby Heritage Forum:
http://www.derbyheritageforum.co.uk/index.htm
Derbyshire Archaeological Society:
http://www.derbyshireas.org.uk
Derbyshire Family History Society:
http://www.dfhs.org.uk/
Derbyshire Record Society:
http://www.derbyshirerecordsociety.org
Friends of the Derwent Valley Line:
http://www.fdvl.org.uk
Hunter Archaeological Society:
https://sites.google.com/site/hunterarchaeologicalsociety/
Little Chester Local History Group:
http://littlechesterhistoryderby.btck.co.uk
Midland Railway Trust:
http://www.midlandrailway-butterley.co.uk/home/
Midland Wind and Water Mills Group:
http://www.midlandmills.org.uk
Milford and Makeney Community Group:
http://www.milford-makeney.org/
Peak District Mines Historical Society:
http://www.pdmhs.com/
Six Streets Derby:
http://www.sixstreetsderby.org.uk
South Yorkshire Industrial History Society:
http://www.topforge.co.uk/SYIHS.htm
Transition Belper:
http://www.transitionbelper.org/

7.6 Other Regional Organisations with Derwent Valley Interests

Council for British Archaeology, East Midlands region:
http://www.archaeologyuk.org/cbaem/
Derbyshire Historic Buildings Trust:
http://www.derbyshirehistoricbuildings.org.uk/
Derbyshire Wildlife Trust:
http://www.derbyshirewildlifetrust.org.uk/
Derwent Catchment Partnership:
http://www.derbyshirewildlifetrust.org.uk/what-we-do/projects/derbyshire-derwent-catchment-partnership
Derwent Hydro:
http://www.derwent-hydro.co.uk
DerwentWise Partnership:
http://www.derwentwise.com/
Trent Rivers Trust:
http://www.trentriverstrust.org/site/

7.7 National Heritage and Environmental Organisations

Archaeology Data Service:
http://archaeologydataservice.ac.uk
Association for Environmental Archaeology:
http://envarch.net
Association for Industrial Archaeology:
http://www.industrial-archaeology.org.uk
Association of Local Government Archaeological Officers:
http://www.algao.org.uk
Association for Studies in the Conservation of Buildings:
http://www.aschb.org.uk
British Agricultural History Society:
http://www.bahs.org.uk/index.html
British Archaeological Association:
http://thebaa.org/
British Association for Local History:
http://www.balh.org.uk/
British Geological Survey:
http://www.bgs.ac.uk
Canal River Trust:
https://canalrivertrust.org.uk/
Chartered Institute for Archaeologists:
www.archaeologists.net
Council for British Archaeology:
http://new.archaeologyuk.org/
Derby Porcelain International Society:
http://www.derbyporcelain.org.uk
English Heritage:
http://www.english-heritage.org.uk
Environment Agency:
www.environment-agency.gov.uk
Garden History Society:
http://www.gardenhistorysociety.org
Georgian Group:
http://www.georgiangroup.org.uk
Heritage Alliance:
http://www.theheritagealliance.org.uk
Heritage Lottery Fund:
www.hlf.org.uk
Historic England:
https://historicengland.org.uk
Historic Chapels Trust:
http://www.hct.org.uk
Historic Gardens Foundation:
http://www.historicgardens.org
Historic Houses Association:
www.hha.org.uk
Institute of Historic Building Conservation:
http://www.ihbc.org.uk
Landmark Trust:
http://www.landmarktrust.org.uk
Mills Archive:
https://millsarchive.org
National Association of Mining History Organisations:
http://www.namho.org
National Churches Trust:
www.nationalchurchestrust.org
National Trust:
https://www.nationaltrust.org.uk
Natural England:
https://www.gov.uk/government/organisations/natural-england
Portable Antiquities Scheme:
https://finds.org.uk
Royal Archaeological Institute:
http://www.royalarchinst.org
Society of Antiquaries of London:
https://www.sal.org.uk
Society for Church Archaeology:
http://www.archaeologyuk.org/socchurcharchaeol/
Society for Post-Medieval Archaeology:
http://www.spma.org.uk
Society for Protection of Ancient Buildings:
http://www.spab.org.uk
Transition Network:
https://www.transitionnetwork.org
Twentieth Century Society:
http://www.c20society.org.uk
UK Mills:
http://ukmills.co.uk/index.htm
Vernacular Architecture Group:
http://www.vag.org.uk
Victorian Society:
http://www.victoriansociety.org.uk
Woodland Trust:
http://www.woodlandtrust.org.uk

7.8 Other Useful Sources of Information

The Andrews Pages:
http://www.andrewsgen.com/matlock/ (extensive information on Matlock, Matlock Bath and other Derwent Valley subjects)
Art UK:
http://artuk.org (includes paintings in Derbyshire and national art collections)
Belper Historical and Genealogical Records:
http://www.belper-research.com/
British Library:
http://www.bl.uk
British Library, English Short Title Catalogue - history:
http://www.bl.uk/reshelp/findhelprestype/catblhold/estchistory/estchistory.html
British Library, Collection Guides, Topographical Views:
http://www.bl.uk/collection-guides/topographical-views
Butterley Gang Road Project:
http://www.butterleygangroad.co.uk/bgproject.html
Derbyshire Extensive Urban Survey:
http://archaeologydataservice.ac.uk/archives/view/derbyshire_eus_2009/
DerwentWISE Heritage at Risk project:
https://www.derwentwisehar.org
Enlightenment! Derbyshire Setting the Pace in the 18th

Century:
https://enlightenmentderbyshire.wordpress.com
Global Cotton Connections: East meets West in the Derbyshire Peak District:
https://globalcottonconnections.wordpress.com/
Heritage Gateway:
http://www.heritagegateway.org.uk
Historic England Archive:
https://www.historicengland.org.uk/images-books/archive
Library and Museum of Freemasonry:
http://www.freemasonry.london.museum/
Multi-Agency Geographic Information for the Countryside (MAGIC):
http://www.magic.gov.uk
National Archives:
http://www.nationalarchives.gov.uk
Nottingham University Manuscripts and Special Collections:
https://www.nottingham.ac.uk/manuscriptsandspecialcollections/index.aspx
Old Derby Photos:
http://www.oldderbyphotos.co.uk
Online Access to the Index of Archaeological Sites:
http://oasis.ac.uk/pages/wiki/Main
Picture the Past:
http://www.picturethepast.org.uk
Slave Trade Legacies:
https://slavetradelegacies.wordpress.com/
Stories of Change:
http://storiesofchange.ac.uk
Stories of Change Future Works project:
https://storiesfutureworks.wordpress.com
Strutts Community Project:
http://www.strutts.org.uk
University College London, Legacies of British Slave-ownership:
http://www.ucl.ac.uk/lbs/
Victoria County History (Derbyshire):
http://www.victoriacountyhistory.ac.uk/counties/derbyshire
Wirksworth Parish Records 1600–1900:
http://www.wirksworth.org.uk

7.9 Relevant Regional and Thematic Research Frameworks

East Midlands Historic Environment Research Framework:
http://archaeologydataservice.ac.uk/researchframeworks/eastmidlands/wiki/Main
Association for Industrial Archaeology Research Framework:
http://www.tandfonline.com/doi/abs/10.1179/030907205X50441
Historic England Thematic Research Strategy for the Historic Industrial Environment:
https://content.historicengland.org.uk/content/docs/research/industrial-research-strategy.pdf
Historic England Thematic Research Strategy for the Urban Historic Environment:
https://content.historicengland.org.uk/content/docs/research/draft-urban-strategy.pdf
Historic England National Heritage Science Strategy (Use of Science to Enhance our Understanding of the Past):
https://historicengland.org.uk/images-books/publications/nhss-rep2-use-of-science-to-enhance-understanding-of-past/
Medieval Pottery Research Group Research Framework for Post-Roman Ceramic Studies in Britain:
http://www.mprgframework.info
National Association of Mining History Organisations Research Framework for the Archaeology of Extractive Industries in England (Resource Assessment and Agenda):
http://namho.org/research.php

Fig.7.2 Global perspectives: the Derwent Valley Mills has been selected as one of four European World Heritage Sites that will serve as case studies for assessment of the impact upon cultural heritage assets of natural hazards such as landslip and flooding, with particular consideration of the possible effects of climate change. Information on the progress of this project, which is scheduled to run from 2016 to 2018, may be obtained from http://www.prothego.eu

8. GLOSSARY OF TERMS USED IN THE TEXT

Alluvium: geologically, this term can apply to any sediment transported by rivers, but within the archaeological and geological communities its use is usually restricted (as here) to overbank fine-grained silts and clays deposited on floodplains.

Cluster house: a discrete block of four houses, formed of two adjoining pairs of back-to-back dwellings (eg Cluster Buildings, Belper).[1]

Colluvium: collective term for eroded soil and other sediment moved downslope by a combination of processes, including the forces of gravity and hillwash.

Framework knitter: manufacturer of stockings and other clothing using a manually operated knitting frame.

Fulling mill: mill where cloth is shrunk or compacted by vigorous pounding in combination with water and a fulling agent such as human urine.

HER: Historic Environment Record (Chapter 5.14).

Jenny: manually operated multiple-spindle spinning machine, invented by James Hargreaves in the 1760s and ideally suited for cottage and workshop production.

Leat: an artificial channel commonly associated with the delivery of water to a mill wheel or with its discharge from the wheelpit.

Lidar: an acronym of **li**ght **d**etection **a**nd **r**anging, this describes the method of measuring three-dimensional data points by airborne or ground-based laser scanning (permitting, for example, detailed plotting from the air of the spatial pattern of palaeochannels and earthworks indicative of human activity).

Meander core: area bounded by a highly sinuous river channel.

Mule: spinning machine combining the drafting rollers of the water frame with the moving carriage of the spinning jenny, invented by Samuel Crompton in the 1770s.

Nailshop: workshop for the manual manufacture of nails from iron bars.

Palaeochannel: abandoned former river channel, often infilled by fine-grained sediments, including peat. They may survive as linear depressions of varying depth that may sometimes contain standing water; commonly marked by hedgelines, modern drainage ditches, bands of woodland or parish boundaries.

Pigcote: small and permanent house for the rearing of pigs, incorporating a shelter and an exercise yard with feeding troughs.

Ridge and swale: topography of multiple **scroll bars** (low curving ridges of sand and gravel that represent former meander cores, separated by sinuous channels that carry floodwaters during periods of high river flow). They provide evidence for rivers migrating laterally across their floodplains.

Sough: artificial underground channel for the drainage of water from lead mines.

Water frame: the water-powered frame developed by Arkwright for spinning cotton.

Reference

[1] Menuge, A 1993 'The cotton mills of the Derbyshire Derwent and its tributaries'. *Industrial Archaeology Review* **15** (1) 59. fig.9

Fig.8.1 Swift's Hollow, Cromford: feeding troughs in outer exercise yard of pigcote, constructed in the late 18th or early 19th century (Derwent Valley Mills Partnership 2011. The Derwent Valley Mills and their Communities, *Matlock: DVMP, 40; see also Fig.4.46; photograph: David Knight © Trent & Peak Archaeology)*

9. ACKNOWLEDGEMENTS

Thanks are extended to Historic England for funding this research framework, which has been guided throughout its development by a management team comprising Mark Suggitt of the Derwent Valley Mills World Heritage Site, Dave Barrett (Derbyshire County Council), David Knight (Trent & Peak Archaeology, York Archaeological Trust) and Paddy O'Hara (Historic England). The management team would like to extend thanks to Tim Allen, Kath Buxton and Dan Miles of Historic England for help with setting up and executing this project, Gwen Wilson (DVMWHS) for administrative and logistical support, and to the other members of the World Heritage Site team, Adrian Farmer and Sukie Khaira, for their help and support during compilation of this framework.

Thanks are also due to Steering Group members for their advice and support, including Tim Allen, John Beswarick, Pauline Beswick, Sarah Chubb, Stephen Daniels, Paul Elliott, Adrian Farmer, Barry Joyce, Marilyn Palmer, Mary Smedley, Ken Smith, John Walker, Jonathan Wallis, Ros Westwood and Chris Wrigley. In addition, valuable information and advice has been provided by members of the project's Specialist Panel; this comprised Steve Baker, John Barnatt, Paul Beattie, John Beckett, Louise Brennan, Garry Campion, Stanley Chapman, Christopher Charlton, David Crossley, Joan D'Arcy, Heather Eaton, Bob Faithorn, Celina Fox, Hannah Fox, Trevor Griffin, Rachael Hall, Clive Hart, Bernard Holden, David Hool, Chris King, Adam Menuge, Jane Middleton-Smith, Jason Mordan, Mike Nevell, Hugh Potter, Neil Robertson, Clare Rose, Roger Shelley, Patrick Strange, Angus Watson, Jim Williams, Ed Wilson and Audrey Winkler.

Work on the research framework commenced with several meetings of the World Heritage Site's Research and Publications Panel,[1] chaired by John Beswarick and including in its membership Paul Beattie, Christopher Charlton, Sarah Chubb, Heather Eaton, Paul Elliott, Bob Faithorn, Adrian Farmer, Bernard Holden, David Hool, Roger Shelley, Mary Smedley, Mark Suggitt and Angus Watson. Discussion of the priorities for future research generated a draft research agenda which was circulated to consultees prior to the Agenda Workshop that was convened in July 2013. Management team members wish to extend their thanks to the staff of Cromford Mills for their help in organising this event, and to the following for their participation: Jane Adams, Tim Allen, Joan Armitage, Steve Baker, Christine Ball, John Barnatt, Joe Battye, John Beswarick, Pauline Beswick, Sarah Chubb, Dawn Churchill, Stephen Daniels, Joan D'Arcy, Gordon Dexter, Neil Dye, Heather Eaton, Lee Elliott, Paul Elliott, Adrian Farmer, Celina Fox, John Gabb, Mark Hall, Clive Hart, Stephen Heathcote, Robin Holgate, Ian Jackson, Rick Jillings, Howard Jones, Barry Joyce, Sukie Khaira, Chris King, Suzanne Lilley, Joan Link, Kevin Mann, Adam Menuge, Jane Middleton-Smith, Dan Miles, Jason Mordan, Patrick Morriss, John Morrissey, Ian Neal, Mike Nevell, Jim Oribine, Matthew Pitt, Chris Pook, George Revill, Anna Rhodes, Philip Riden, Neil Robertson, John Rogers, Clare Rose, Sarah Skinner, Mary Smedley, Ken Smith, Patrick Strange, John Walker, Jonathan Wallis, Josie Walter, Ros Westwood, Jim Williams, Gwen Wilson, Audrey Winkler and Chris Wrigley.

It was agreed during the Agenda Workshop that topics relating specifically to the World Heritage Site's built environment resource should be brought together under a single theme. A meeting of stakeholders with specialist knowledge of the Site's built environment was arranged soon after the Workshop, with the specific aim of collating comments received at that event and generating a series of specific built environment topics. Thanks are due to Barry Joyce for arranging this meeting and to Doreen Buxton, Joan and John D'Arcy, Heather Eaton, Bernard Holden, David Hool, Adam Menuge and Patrick Strange for their contributions to this and subsequent discussions on this theme.

The Research Agenda derived from stakeholder liaison was circulated to all consultees for further comment, together with an invitation to four Strategy Workshops aimed at defining measures by which understanding of the Agenda Topics identified in the Agenda Workshop might be advanced. These were held at the Derby Silk Mill (Themes 1–3), Masson Mills (Themes 4–6), the University of Derby (Themes 7–9) and the Strutts Business and Community Centre in Belper (Themes 10–11) between March and May 2014. Thanks are extended to all of these organisations for help in organising the workshops, which benefited from the participation of Tim Allen, John Armitage, Rachel Atherton, Steve Baker, Dave Barrett, John Beswarick, Pauline Beswick, Boris Ceranic, Maxwell Craven, Dawn Churchill, Joan D'Arcy, Gordon Dexter, Heather Eaton, Paul Elliott, Julian Ellis, Georgina Endfield, Adrian Farmer, Hannah Fox, Maria Gibson, Robin Holgate, Andy Howard, Ian Jackson, Howard Jones, Barry Joyce, Carry van Lieshout, David Ling, Angela Mayson, Jane Middleton-Smith, Dan Miles, Phil Morris, John Morrissey, Mike Nevell, Paddy O'Hara, Marilyn Palmer, Martin Repton, John Rogers, Susanne Seymour, Mary Smedley, Joe Smith, Patrick Strange, Mark Suggitt, Renata Tyszczuk, Julia Udall, Lucy Veale, Jonathan Wallis, Ros Westwood, Nicola Whyte, Jim Williams, Gwen Wilson and Chris Wrigley.

The workshop discussions generated a research strategy comprising 55 Strategic Objectives, and special thanks are due to the following for devoting time to the writing of these: Jane Adams, Tim Allen, Pauline Beswick, Garry Campion, Stanley Chapman, Sarah Chubb, Paul Elliott, Georgina Endfield, Adrian Farmer, Trevor Griffin, Sherryllynne Haggerty, Rachael Hall, Robin Holgate, Andy Howard, Pat Hudson, Ian Jackson, Lowri Jones, Barry Joyce, Chris King, Ruth Larsen, Suzanne Lilley, Carry van Lieshout, Jane Middleton-Smith, Mike Nevell, Marilyn Palmer, George Revill, Susanne Seymour, Mary Smedley, Joe Smith, Patrick Strange, David Strange-Walker, Mark Suggitt, Renata Tyszczuk, Julia Udall, Lucy Veale, Jonathan Wallis, Ros Westwood, Jim Williams, Nicola Whyte and Chris Wrigley.[2] Each of the Strategic Objective texts was circulated for comments from members of the Research and Publications Panel, Steering Group, project management team and theme reviewers. The last of these were selected on the basis of their appropriate specialist knowledge, and included Stephen Daniels (Agenda Theme 1); Tim Allen and Dave Barrett (Theme 2); Celina Fox (Theme 3); Patrick Strange (Theme 4); Marilyn Palmer (Theme 5); Stanley Chapman and Mark Suggitt (Theme 6); Adrian Farmer (Theme 7); Mike Nevell (Theme 8); Louise Brennan, Adam Menuge and Eilis Scott (Theme 9); Tim Allen and Jim Williams (Theme 10); and Chris Wrigley (Theme 11). Thanks are expressed to all of the above for composing and reviewing these texts and for assisting the editor during compilation of the chapter focusing upon the proposed research strategy.

Discussions at the Strategy Workshops highlighted the importance of disseminating widely information on accessible archive sources, and it was agreed by the Steering Group that it would be useful to summarise these in a separate chapter. A preliminary meeting was arranged to discuss the format and content of this chapter, and thanks are extended to Pauline Beswick, Sarah Chubb, Daniel Martin, Jane Middleton-Smith, Ros Westwood and Mark Young for their contributions to that discussion. It was decided to request short contributions from curators, archivists and others familiar with the contents of Derbyshire archives containing material of Derwent Valley interest. Thanks are due to Rosemary Annable, Robert Aram, Maria Barnes, Alan Bradwell, George Challenger, Sarah Chubb, Joan D'Arcy, Chris Deeth, Barbara Foster, Lucy Godfrey, Mark Higginson, Nichola Manning, Ray Marjoram, Daniel Martin, Jane Middleton-Smith, Hugh Potter, Laura Smith, Anita Spencer, James Towe, Laura Waters, Ros Westwood and Mark Young for their valuable contributions to that chapter.

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Fig.9.1 Promoting public interest and understanding: 'open house' at Long Row, Belper, during one of the World Heritage Site 'Discovery Days' (photograph: Sukie Khaira; © Derwent Valley Mills Partnership)

Thanks are extended finally to the many volunteers who have given freely of their time in events designed to encourage public participation and to develop understanding of the cultural heritage of the World Heritage Site. These contributions have enhanced significantly public understanding of the Site, which is a key overarching aim of the research strategy that is proposed in this document.

Notes

[1] Since 2016, the Learning and Research Panel: Fig.1.8

[2] See Chapter 4.1 for details of authorship

Fig.9.2 The five-storey building at Cromford Mills, built between 1785 and 1790, provides a dramatic background for this projection of the history of the Derwent Valley Mills: one of many public events that, by enhancing public understanding and encouraging involvement, addresses directly the Vision, Mission and Aims of the World Heritage Site and one of the overarching aims of this research framework (Chapter 1.2; photograph © Derwent Valley Mills Partnership)

Inscriptions on UNESCO's prestigious World Heritage List are based on detailed research into the sites' evolution and histories. The role of research does not end with the presentation of the nomination or indeed the inscription itself, which is first and foremost a starting point. UNESCO believes that continuing research is also central to the preservation and interpretation of all such sites. I therefore wholeheartedly welcome the publication of this document, which will act as a springboard for future investigation.

Dr Mechtild Rössler, Director of the UNESCO Division for Heritage and the UNESCO World Heritage Centre

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