# The Tale of Three Cities: Strategies for Improving Accessibility and Reusability of Heritage Data

Alphaeus Lien-Talks, University of York, Historic England and Archaeology Data Service (ORCiD: https://orcid.org/0000-0001-7384-208X)

## Abstract

### Background

Heritage data management plays a vital role in understanding the past and shaping heritage regeneration strategies. This paper examines the management, impact, and legacy of heritage information gathered within the High Streets Heritage Action Zone (HSHAZ) programme, focusing on case studies from Northallerton, Kirkham, and Chester. The research explores three key areas: planning processes, community wellbeing initiatives, and heritage research projects.

### Methods

Through a mixed-methods approach, combining semi-structured interviews, questionnaires, and data audits, this study investigates the use of existing and newly created heritage datasets, methods of data sharing, and the long-term preservation of heritage information. The research reveals variation in data management practices across different HSHAZ projects and identifies challenges in ensuring the accessibility and reusability of heritage data.

### Results

Key findings highlight the widespread reuse of data across all strands of the HSHAZ, the low awareness and utilisation of Data Management Plans (DMPs), and the diverse approaches to sharing and preserving heritage information. The study also uncovers a tendency to prioritise ease of use, such as the PDF format, over accessibility and reusability of raw data.

### Discussion

The paper advocates for the early integration of data management strategies in heritage regeneration projects, the adoption of open data practices, greater community involvement in heritage data collection and sharing, and the development of cross-institutional collaborations.

27    It also stresses the importance of long-term digital preservation strategies to ensure the

28    longevity and accessibility of heritage information.

29    Recommendations include developing standardised data management guidelines for heritage

30    projects, creating of project archives, implementing training programmes on data management

31    best practices, establishing community heritage hubs, and fostering partnerships between

32    heritage projects and data repositories.

33    This research contributes to the ongoing discourse on heritage data management, offering

34    insights that can inform future urban regeneration initiatives and enhance the long-term value

35    and impact of heritage information.

## Introduction

Heritage data is critical for understanding the past and forecasting future trends, particularly in the context of the High Street. The traditional High Street has recently faced significant challenges (Carmona 2015), with the decline accelerated by factors such as online shopping, economic pressures, and the COVID-19 pandemic (nef 2010). To mitigate the impacts of the decline, The United Kingdom government created a range of initiatives to help increase footfall and visitors to the high street, by ensuring that it caters to wider social needs: providing places to meet, live and work - to spend time and not just money (Turley 2019; Lloyd-James *et al.* 2020).

## The High Streets HAZ

The High Streets Heritage Action Zone (HSHAZ) programme, funded by £95 million from the UK government and led by Historic England, aimed to revitalise 67 high streets across England (Historic England 2019). By combining investment in buildings and shopfronts with community engagement and cultural events, the initiative aimed to foster a sense of pride, strengthened community ties, and promoted economic growth (*ibid*). Local authorities, in partnership with Historic England, restored dilapidated buildings, transforming them into homes, shops, and community spaces, while enhancing the local historic character (Fylde Borough Council 2019; Hambleton District Council 2019; Cheshire West and Chester Council 2019). This initiative also encouraged communities to reconnect with their local high streets through a range of cultural activities, further solidifying the High Street's importance as a central space for social and economic interaction (Historic England 2024a).

The results of this impressive initiative are yet to be released, and as such, cannot be explored in this paper. One aspect which has yet to be explored is the role of data within these heritage regeneration projects, which is the focus of this paper.

## The three cities

The HSHAZ programme included a variety of case studies which demonstrated different approaches to revitalising High Street character. For this paper, focus will be given to Northallerton, Kirkham and Chester (Fig 1).
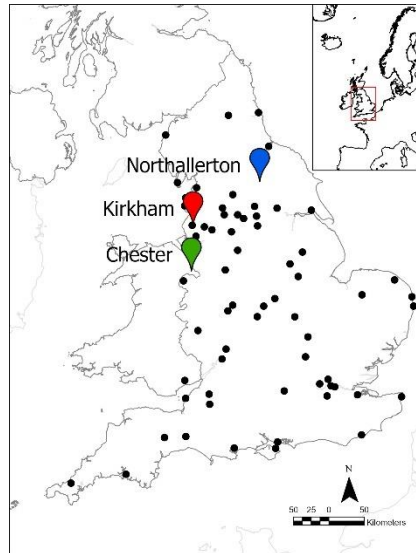
65

66    Fig *, a map of the HSHAZ locations, with emphasis on the three case studies (authors own).

67    In **Northallerton**, North Yorkshire, the focus was heritage dissemination and research through

68    community engagement through an innovative Augmented Reality Heritage Trail and a new

69    Heritage Hub, in order to engage the community and celebrate local history (Hambleton District

70    Council 2019). Northallerton also included projects on shopfront improvements and

71    repurposing underutilised spaces in historic buildings into affordable housing, places to work

72    and cultural spaces (*ibid*).

73    **Kirkham**, Lancashire, with its rich Roman, WWII, and railway heritage, centred its project on a

74    Heritage, Health and Wellbeing Programme, bringing archival material into the hands of the

75    local community to create spaces in which to explore Kirkham's heritage (Fylde Borough

76    Council 2019). Kirkham's HSHAZ also had projects to improve the built environment, market

77    square and the conservation of its heritage assets, as well as a Cultural Consortium to foster

78    community involvement (*ibid*).

79    **Chester**, Cheshire West and Chester, a city known for its Roman walls, amphitheatre, and

80    iconic Rows, was bidding for UNESCO World Heritage status (Cheshire West and Chester

81    Council 2019). The focus of this HSHAZ was the "Revive and Renew" initiative, aiming to restore

82    the historic character of the Rows, and leveraging the NPPF to tackle the challenges of empty

83    shops and antisocial behaviour (*ibid*). The other initiatives, Rows Engagement and Rows

84    Rebranded programmes, focused on embracing and sharing the heritage of the local

85    shopkeepers and community (Cheshire West and Chester Council 2019).

86    To achieve these aims, heritage data was an integral aspect of the initiative, spanning topics of

87    heritage dissemination, community wellbeing, and the National Planning Policy Framework

88    (NPPF). However, the increasing diversity of datasets—ranging from point clouds and GIS to

89    public contributions—create significant challenges in accessibility and interoperability of

90    heritage datasets (Meyer et al. 2007). This paper argues that data captured through heritage

91    regeneration projects should become as available to reuse as possible. By making datasets

92    open to reuse, it will unlock the potential of heritage data, offering new insights into the

93    revitalisation of the high street.

## Materials and methods

### Aims and objectives

96    The key aim of the paper is to comprehensively understand the management, impact, and

97    legacy of heritage information gathered within the HSHAZ, and to provide informed

98    recommendations for heritage regeneration projects, planning processes, heritage

99    dissemination, and heritage and wellbeing initiatives. To be able to achieve this research aim,

100   the following objectives were set.

101   Investigate the use of new and existing heritage information:

102   - Examine the source, file type and emerging trends of data reuse.
103   - Examine the current data practices of data creation within heritage regeneration
104     projects.

105   Investigate the Archiving and sharing of heritage information:

106   - Identify and evaluate the various storage solutions and repositories for keeping heritage
107     information.

108   Establish the legacy of new information:

109   - Determine the long-term impact and legacy of newly acquired or generated heritage
110     information, including its contribution to historical records, community engagement,
111     and future research.

112   Advise on approaches for projects similar to the High Streets Heritage Action Zone (HAZ):

113   - Ideate recommendations and best practices for managing heritage information in
114     projects similar to the High Streets HAZ, based on insights gained from the investigation
115     and analysis.

## Methodology

To be able to achieve the aims and objectives, methodologies of semi-structured interviews, questionnaires and data audits were used.

*Semi-Structured Interviews*

Semi-structured interviews were conducted throughout the HSHAZ from 2021-2024 to gather in-depth, qualitative insights from stakeholders involved in the programme. Participants included Historic England employees (HAZ Project Officers), local council members (HAZ Project Leads, Built Environment Officers), heritage professionals (architects and HAZ tenders), and community groups. Most interviews were conducted in person on a one-to-one basis, though due to travel constraints, the majority of Chester's interviews and those with HAZ Project Officers were carried out via Microsoft Teams or Zoom.

Semi-structured interviews were selected as they allowed pre-determined questions to guide the conversation while enabling flexibility for open discussions (Cridland et al., 2015; Whiting, 2008). This approach ensured the research questions were addressed but also facilitated incidental discoveries from multiple viewpoints regarding data management. The interview guide is detailed in Appendix 1.

Following Denzin and Lincoln (2011) and Kallio et al. (2016), several steps were undertaken:

1. Self-Reflection: The researcher reflected on biases, experiences, and values to understand how these may influence outcomes (Cleary et al., 2014; Salmon, 2013).

2. Theoretical Framework: A constructivist-interpretive approach was adopted to focus on participants' perspectives.

3. Designing the Interview Guide: Open-ended questions explored heritage project effectiveness, challenges, and community engagement.

4. Pilot Testing: A pilot test refined questions for clarity.

5. Conducting Interviews: Interviews were recorded using an iPhone and stored on Google Drive, then transcribed with Descript. The data were grouped by case study and project.

6. Data Analysis: Systematic coding identified themes and patterns within the qualitative data using inductive reasoning to extract significant insights related to HSHAZ.

This approach allowed detailed, reflective responses, enriching the understanding of heritage project effectiveness and community engagement.

146     *Questionnaire Design and Analysis*

147     Questionnaire responses were collected throughout the HSHAZ from 2021-2024. The

148     questionnaires were used to gather general trends from stakeholders involved in the HSHAZ.

149     The respondents of the questionnaires were data users/creators of the HSHAZ, including

150     Historic England employees (HAZ Project Officers), local council members (HAZ Project Leads)

151     and heritage professionals (architects and HAZ tenders). The questionnaires were tailored to

152     the intended participants, with six separate questionnaires (one each for the HAZ Project

153     Officers, HAZ Project Leads, architects in each of the case studies and the cultural programme

154     of Northallerton). The questionnaire was built on Qualtrics, using a University of York license,

155     and was disseminated using Yet Another Mail Merge extension to Google Sheets to enable the

156     emails to be personalised to the receiver. The results were then cleaned using Excel to remove

157     additional fields and personal data and filtered to those that completed greater than 40% of the

158     survey, yielding 29 results.

159     The questionnaire surveys were conducted as they allowed general trends of the data

160     management and interaction to be seen from multiple stakeholders (Finstad, 2010). The

161     questions were designed to capture predominantly quantitative data as it allows trends to be

162     evaluated using statistics, giving precise answers to complex research questions (Gay *et al*.

163     2009). The majority of the questions used a 7-Point Likert scale as they allowed the respondent

164     to capture nuanced opinions and perceptions, whilst not providing too many options that trends

165     were masked (Finstad, 2010; Dawes, 2008). Qualitative questions were also included to

166     elucidate why specific values may have been given to the Likert scale questions to allow

167     experiences and conceptual elements to support the numeric values (Mertler, 2016; Fraenkel *et*

168     *al*., 2012; Creswell, 2005). The questionnaire of the Project Leads is in Appendix 2, with the

169     results in Appendix 3.

170     *Data Audits*

171     Data audits were conducted towards the end of the HSHAZ, between August 2023- September

172     2024. The data audits were carried out on the  Planning Portals of Northallerton, Kirkham and

173     Chester, as well as on the shared project Google Drive of Northallerton's cultural programme. By

174     investigating these collections' materials, it was possible to ascertain which materials were

175     shared and deposited, and if so, in what data type (e.g., photographs, 3D models), and file

176     format (e.g., PDF, JPEG, DOCX), and where and how they were shared or deposited. The results

177     are in Appendix 4 and 5.

178     Steps:

179   **Data Selection:** A representative subset of datasets from each case study (Northallerton,

180   Kirkham, Chester) was identified to ensure comprehensive analysis. These were all applications

181   made during 01 January 2020 to 31 March 2024, and from the "High Street" (High Street for

182   Northallerton, conservation zone for Kirkham and the Rows for Chester).

183   **Data Evaluation:** Datasets were compared against established guidelines to assess their

184   quality and accessibility. This included evaluating the completeness, accuracy, and usability of

185   the data.

186   **Gap Analysis:** Discrepancies and gaps between current data practices and best practices were

187   identified. This analysis was used to propose recommendations for improving data accessibility

188   and interoperability.

189 ## Results

190   The tables in Appendix 3 and 4 summarises the datasets identified from various High Streets

191   Heritage Action Zone (HSHAZ) locations, categorising the data by its source, format, and

192   method of sharing, including both reused and newly created materials. The analysis of this data

193   reveals key trends in the handling and dissemination of heritage information within each of the

194   three projects (planning, wellbeing and research).

195 ## Reused Datasets

196   In terms of the planning process, several datasets are related to requirements of the National

197   Planning Policy Framework (Ministry of Housing, Communities & Local Government 2023).

198   These include historic maps (to create map regressions), previous applications (to illustrate

199   accumulative impact of previous developments) and historic photographs and entries in the

200   National List for England records (to help identify heritage significance).

201   Within the wellbeing strand, archival material of historic photographs was used to provide

202   hands-on activities to boost community health. Much of this material was sourced from local

203   archives and these physical copies allowed tactile interaction with the past. The participants

204   supplied further material themselves, providing an opportunity to talk about their memories,

205   further increasing their wellbeing.

206   The heritage research strand in Northallerton also reused datasets, and included materials from

207   local archives, community groups and the local population. Further information was sourced

208   from the North Yorkshire County Records Office, including archival materials such as historic

209   maps and a sanitation document. To include locally sourced information within the heritage

210　research project, community research groups provided valuable datasets in the form of reports.

211　Further grassroot information, as found in the wellbeing strand, were sourced from personal

212　archives of photographs and ephemera (e.g., reciepts, books and physical items (Fig 2)). These

213　personal items were brought to the Heritage Hub to be digitised and/or housed within the

214　Heritage Hub.

215



216　*Figure 1, 19th century bills relating to George Inn given by Suzie Valentine, who runs a local business.*

217　Overall, the data reuse used a two-fold strategy: leveraging readily available resources and

218　integrating community-driven datasets.

## 219　Created Datasets

220　The planning process also produced a range of documents that are classed as meeting NPPF

221　requirements including plans, elevations and photographs (to show proposed and existing

222　fabric in order to enable informed decisions), maps (to indicate the proposed site), heritage

223　statements (to show the significance and implications of proposed works) and instances of

224　archaeological reports (where archaeological investigations are required). Supplementing the

225　NPPF documents were 3D models (used to help showcase proposed works (Fig 2), and

226　condition surveys aided by drone photography (to help conserve the unique Rows).

227



*Figure 2, a 3D model made for applicationaplication 21-04050-LBC (Potts 2021).*

228

229 Within the wellbeing strand, Helen Shearn and Sue Flowers worked co-creatively and

230 collaboratively with the local community to produce a range of outputs from wellbeing

231 workshops (such as a physical map (Fig 3) and scrapbook of their collated research and

232 artworks inspired by the local heritage) and Oral Histories (in MP3 format) capturing individual's

233 stories and memories (Fig 4).

234



235　　　*Figure 3 and 4, the map created by the community (authors own), and  a leaflet about the Voices project (Kirkham*
236　　　　　　　　　　　　　　　　　　　　　　　　　　　　*Futures n.d.).*

237　　The heritage research strand also generated new datasets, including detailed oral histories (in
238　　WAV format) alongside testimonies and 3D models and soundscapes which were included in an
239　　Augmented Reality Heritage Trail. Community research was also included as part of the project,
240　　allowing individuals to research elements of history that interested them.

241　　## Method of Sharing and Longevity

242　　For the built heritage strand, Planning Portals and public consultations provided the best
243　　opportunities for sharing the information with the public and external stakeholders. These
244　　methods of sharing have varied longevities with Planning Portals being indefinite, and public
245　　consultations being momentary (Fig 5). The majority of the data uploaded to the Planning Portal
246　　was in the format of PDFs and included thumbnails of images within the heritage statement of
247　　modern and historic maps, photography and 3D models. Subsidiary to the heritage statements
248　　were PDFs of plans and elevations. For internal stakeholders, company servers will host the
249　　information for a period of seven years.

250

251 *Figure 5, public consultation with Paul Hogarth company engaged in the Public Realm strand on proposed alterations*

252 *to Market Square (FBC 2021).*

253 For the wellbeing aspect, most methods of sharing were through individual events and heritage

254 days. These methods of data sharing do not provide a longevity. Websites were created to share

255 information with the public and contained collated material from the wellbeing programme. The

256 website had an intermediate longevity, depending on maintenance and funding.

257 Facebook groups were used by the wellbeing and heritage research projects and were also

258 instrumental in providing a platform for the sharing of community heritage, giving opportunities

259 for individuals to share their stories, research and interests. Facebook is not an archive, and as

260 such is reliant on the company META remaining operational and that their company policies

261 allow for the continued storage of community posted comments.

262 The heritage research initiative shared its datasets in a variety of different ways. The first method

263 was by the creation of a Heritage Hub, a community centre in which interactive tablets,

264 artefacts and paper copies of documents were accessible. The Heritage Hub required and still

265 requires council backing and financial support to remain open. Furthermore, the creation of a

266 Web Application Augmented Reality (AR) provided an interactive method for sharing the heritage

267 research. Using a web application instead of a native Augmented Reality platform offered

268 greater legacy; however, this requires maintenance and funding. Likewise, a website was

269 created which housed the Oral Histories and digitised community material. These materials

270 were also deposited in the Local County Records Office, offering a greater legacy.

## General data practices

Alongside investigating the individual practices of the stakeholders, it was important to investigate the overall data management within the HSHAZ.

One aspect of data management strategy was the creation of Data Management Plans (DMPs). From the responses gathered by the questionnaire (see Appendix 2), it was shown that over 50% of respondents did not know what a DMP was, and when the participant knew of a DMP, 22.2˙% used DMPs within the HSHAZ (Table 1). Furthermore, most of the respondents did not archive their data (80%) (Table 2). When data was deposited, the respondents used the file formats of PDF and DOCX, both of which are predominantly text file formats, supplemented by more specialised file formats such as JPEG, Audio files and paper copies (Table 3).

| | | Did you use a DMP in the HSHAZ? | |
|---|---|---|---|
| | | No | Yes |
| Have you heard of a DMP? | Maybe | 3 | |
| | No | 14 | |
| | Yes | 9 | 2 |
| | **Total** | **26** | **2** |

*Table 1, the number of stakeholders who knew of Data Management Plans and stakeholders that used Data Management Plans as part of the HSHAZ.*

| Did you deposit your data? | |
|---|---|
| Yes | 5 |
| No | 20 |

*Table 2, the number of individual HSHAZ locations which deposited their data.*

| | Created file formats | Archived file formats |
|---|---|---|
| PDF | 29 | 3 |
| Word document (.doc/.docx) | 27 | 3 |
| JPEG | 25 | 2 |
| Excel (.xlsx) | 22 | |
| Spreadsheet | 16 | |
| Paper | 15 | 2 |
| PNG | 9 | 2 |
| Audio file (.mp3) | 8 | 2 |

| | | |
|---|---|---|
| Audio file (.wav) | 3 | 2 |
| TIFF | 2 | |
| Other | 2 | 2 |

285

286

*Figure 3, file formats that were created and archived.*

287  When asked if there was the potential for losing valuable datasets over half (51%) of the

288  respondents stated that they agreed (4% strongly, 17% agree, and 30% somewhat agree) and

289  only 4% disagreed (strongly) (Table 4). When asked the potential causes for data loss the largest

290  contributing factors were identified as no requirement to publish (20%) or archive (19%) data,

291  and thus data was not archived (19%) (Table 5).

| To what extent do you agree that valuable datasets are being lost? | |
|---|---|
| Strongly agree | 1 |
| Agree | 5 |
| Somewhat agree | 8 |
| Neither agree nor disagree | 10 |
| Strongly disagree | 1 |

292

*Table 4, to what extent stakeholders thought data was being lost.*

| Reasons for Data Loss | |
| --- | --- |
| There is no requirement to publish data | 14 |
| There is no requirement to archive data | 13 |
| There is no requirement to make data publicly accessible | 11 |
| Data is not archived | 11 |
| Data is not published | 7 |
| Data is not made publicly accessible | 6 |
| Other | 3 |

293 *Table 5, the causes for this loss.*

## Discussion

295 The clearest result from the research was that data management was not a component of the
296 High Streets HAZ, leading to a range of implications for data legacy. The number of stakeholders
297 using DMPs was alarmingly low, yet, given the evidence that it was not a requirement of the
298 HSHAZ, alongside the lack of awareness of these data management tools (see Table 2), this
299 finding was not surprising. Nonetheless, data was an integral part of HSHAZ, and, as such, the
300 current data practices need to be investigated.

## Use of new and existing heritage information

302 The stakeholders of the built heritage initiative used datasets to meet planning regulations, as
303 well as to aid their conservation efforts. The prevalence of data reuse was high within the
304 HSHAZ, yet the range and amount of material used by these projects was limited. Given the
305 heritage significance of the Rows, and the quantity of large-scale research projects centring on
306 this heritage asset (e.g., Brown 1999 and Clarke 2011), it would have been expected that more
307 existing information was used. Upon further investigation, it was apparent that the datasets
308 used were from easily accessible sources (e.g., Heritage Gateway or Search Engine Results (Fig
309 6 and 7)).
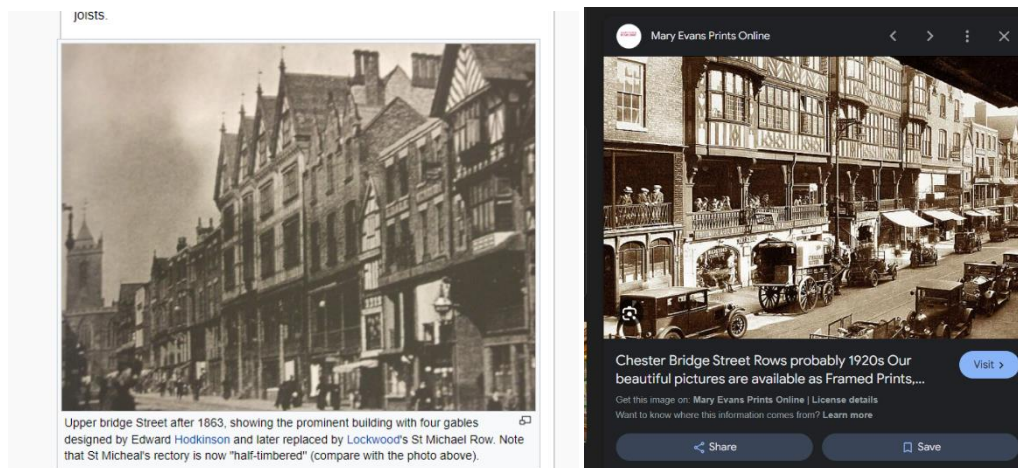
310

313 The prevalence of the use of these easily obtainable resources indicated three key lessons for
314 the management of heritage datasets: firstly, datasets which are easily accessible are routinely
315 reused; secondly, those resources which are less accessible are not used; and thirdly, the need
316 to make these material as open to reuse as possible. Nonetheless, when investigating the
317 current practices of the newly created datasets within the HSHAZ, it becomes clear that data is
318 not currently being made fully open to reuse, further limiting future research projects. The
319 prevalent use of PDF formats alongside the lack of deposition of raw datasets limits the reuse
320 potentials. As such, future planning applications or heritage research projects cannot easily
321 reuse the extensive quantities of newly created datasets. There are several reasons as to why
322 PDF format is highly prevalent: its unalterable contents ensuring parties agree on the same
323 version of documents, and the capacity to protect the Intellectual Property of the commercial
324 companies (Daniel Nickson, pers. comms. 28 February 2024). Nonetheless, given the fact that
325 the HSHAZ used substantial government funds, it should be recommended that datasets are
326 made readily available for public good (Ministry of Housing, Communities & Local Government,
327 2023).

328 Within the wellbeing strand, it became clear that the hands-on interactivity with the physical
329 archival material brought opportunities to increase public awareness and pride in the local
330 heritage. The use of locally available materials (either from local archives or from the
331 participants themselves) ensured that the community was able to use resources freely
332 available to them, increasing the chance of further interactions with the materials in the future.
333 As such, these findings support current initiatives of Historic England and UK government to
334 democratise heritage research (e.g., through Missing Pieces Project (Historic England 2024b)
335 and increasing support for Historic Environment Records (Historic England 2024c)) and

336   illustrates the potential community interest and value in making datasets freely accessible. The

337   recording of Oral Histories and creation of heritage outputs provides a grassroots heritage

338   opportunity, not only furthering the wellbeing of the community but also the sense of place,

339   inclusivity and pride, and as such community collaborations are recommended for future

340   research projects.

341   The Heritage Research initiative also used and created datasets to reach their objectives. Within

342   this strand, community knowledge and archives were captured through Oral Histories and the

343   digitising of their collections. Within Northallerton's HSHAZ, Virginia Arrowsmith's knowledge of

344   archival and Oral History practices ensured that these materials were captured, managed and

345   then deposited following best practices. Further datasets were used by tenders of the AR

346   Heritage Trail to ensure that the 3D models and soundscapes were representative of the local

347   historic character, and included local archival materials of a sanitation document and local

348   history research papers. It was clear that throughout the Heritage Research strand, local

349   knowledge was pivotal to meet project aims. As such, it would be recommended that local

350   community archives are made as accessible for future research projects as possible.

## 351   Sharing and legacy of heritage information

352   Within the built heritage context, the majority of datasets were uploaded to the Planning Portal.

353   The routine storage of information within a council repository is likely to ensure that these

354   datasets are available indefinitely. Nonetheless, storing data within the  Planning Portals also

355   increases siloing of information as each council maintains their own repository (e.g., Chester:

356   https://pa.cheshirewestandchester.gov.uk/online-applications/, Northallerton:

357   https://planning.hambleton.gov.uk/online-applications/ and Kirkham: https://pa.fylde.gov.uk/).

358   As such, datasets are preserved yet, without interlinking these datasets, there is a chance this

359   practice will lead to the fragmentation, and thus loss, of wider initiative datasets. Another

360   intriguing difference indicated by the built heritage strand of the HSHAZ was the difference

361   between above and below ground archaeology. Archaeological investigations below ground

362   consist of a standard workflow of logging excavations on OASIS and the uploading of field work

363   reports and datasets to the Archaeology Data Service Library. Conversely, above ground

364   archaeology does not follow this workflow, despite encouragement to do so. As such, the below

365   ground archaeology is more systematically preserved. In turn, this preservation system raises

366   questions about the differences in interpretations of loss of unrepeatable datasets between the

367   retrofitting and removal of standing building fabric from an unlisted historic building and the

368   excavations below ground.

369    Within the wellbeing context, heritage information sharing is ephemeral. The wellbeing
370    programme incorporated events and workshops to engage the local community with the local
371    heritage, and these events had the benefit of reaching a wide audience in short momentary
372    activities.

373    The heritage research strand used a multipronged approach to sharing and archiving heritage
374    information. The first approach was the creation of an AR Heritage Trail (Fig 8). This interactive
375    method of dissemination has the potential to reach broad audiences and immerse viewers in
376    the heritage whilst still being in the high street. As such, it used the full potential of AR to create
377    activities, bringing tourists to the town. One negative aspect of the AR, was the need to maintain
378    the platform. In the case of Northallerton, this platform was a Web Application and, as such,
379    requires less intervention and updating; nonetheless, the continued promotion and
380    maintenance of the platform requires active participation from skilled individuals. It is expected
381    that post the HSHAZ, the platform will no longer be accessible. Websites were also created
382    within the heritage research strand, enabling further heritage dissemination to non-locals or
383    those unable to access the city centre. As with the AR Heritage Trail, this requires maintenance
384    and funding to keep live. In this case the website had domain registry for 5 years from 2020, and
385    as such, is unlikely to be no longer be accessible post HSHAZ. Further approaches of heritage
386    dissemination included the creation of a Heritage Hub. Here, members of the community could
387    share their heritage within a designated space. The space was valuable to more isolated
388    members of the community and met an essential need whilst providing heritage information
389    (Arrowsmith, pers. comms. 20 January 2023). Nonetheless, the Heritage Hub requires funding
390    to remain open, which in turn requires persistent support from the local council. The tenure of
391    the building will be reviewed on a 2-year basis post HSHAZ, and, as such, has an uncertain
392    future. Within the Heritage Hub, Oral Histories were captured, alongside the digitisation of
393    community members' personal archives, allowing individuals to explore their own intangible
394    heritage. These were recorded and archived within the North Yorkshire County Records Office
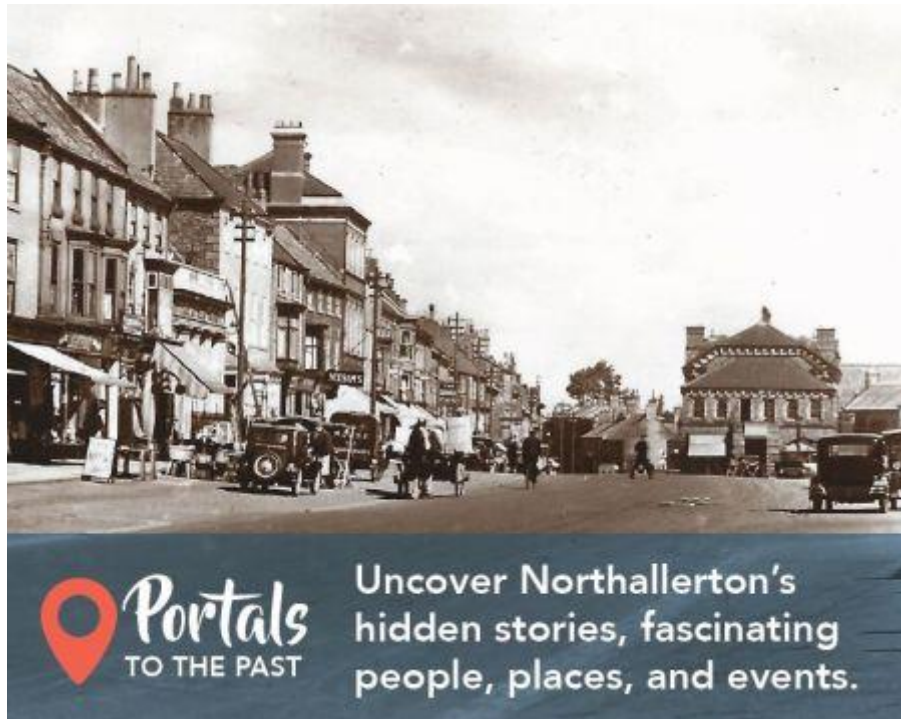395    thus preserving unrepeatable datasets.

396

397      Figure 8, the AR heritage trail advertising (Northallerton Heritage Hub n.d.)

398      There is a partial legacy of the data generated from the HSHAZ; nonetheless, there is a definite

399      need to consider heritage data management in future heritage regeneration projects.

400 ## Future strategies

401      To ensure effective management of heritage information in projects similar to the High Streets

402      Heritage Action Zone (HSHAZ), it is important to adopt best practices to address the challenges

403      and opportunities identified through this paper. These recommendations provide a structured

404      approach to standardisation, sustainability, community engagement, innovative heritage

405      interpretation, collaboration, longevity, funding, and evaluation.

406      One of the most significant ways in which heritage management could become more

407      systematic in heritage regeneration programs would be the introduction of heritage information

408      management from a project's conceptualisation. If the precedent for data management is set

409      early, sufficient funding, support, training, retention policies and requirements could be met (for

410      example, sustainable digital infrastructure could be established). Heritage data must be stored

411      on secure, long-term platforms that ensure preservation. By developing a centralised project

412      digital archive, projects could maintain a single source of truth for all data, with cloud-based

413      backups ensuring additional security. This project archive could then be archived within a Core

414      Trust Seal repository such as the Archaeology Data Service, ensuring longevity of this material.

415   A key area for improvement in heritage management is the encouragement to deposit raw data

416   in open formats and structures. To enhance consistency and ensure future accessibility,

417   projects should adopt widely accepted formats for heritage data, such as PDF/A for documents,

418   alongside providing the raw datasets. As such, this would open new possibilities for reuse.

419   Further research is needed to investigate the extent to which valuable data is only being stored

420   within the Planning Portal; however, the results from this study indicate these trends to be

421   prevalent in HSHAZ datasets within Kirkham, Northallerton and Chester. Thus, stakeholders are

422   able to grant planning permissions by being as informed as possible, streamlining the process,

423   and saving time, money and effort.

424   Engaging local communities in heritage projects brings immense value. To facilitate

425   participation, projects should encourage community contributions while ensuring that the

426   materials the community provide meets digital preservation standards. Local heritage hubs

427   could serve as collection points for physical artefacts and oral histories. Clear guidelines and

428   training needs to be offered to communities to help them digitise and contribute their data; this

429   community driven approach was shown to be successful in Northallerton. Community

430   involvement enhances the richness of heritage documentation and fosters a sense of

431   ownership. A feedback loop could be established, ensuring that community members can

432   engage with the datasets they contribute, thus promoting further participation and enrichment

433   of heritage materials.

434   Collaboration across institutions is essential for the success of heritage projects. Cross-

435   disciplinary teams comprising experts from archaeology, architecture, history, and digital

436   humanities should be established to ensure a holistic approach to heritage management.

437   Partnerships with national institutions, like Historic England and local authorities, can

438   strengthen data integration efforts and promote resource sharing. Cross-institutional

439   collaboration allows projects to tap into a wealth of expertise, ensuring that both tangible and

440   intangible heritage datasets are valued and preserved. Sharing methodologies between similar

441   projects can also foster the development of best practices across different case studies,

442   allowing for continuous improvement.

443   Ensuring the longevity and accessibility of heritage information is crucial for future generations.

444   Heritage projects should invest in long-term digital preservation strategies, ensuring datasets

445   are stored in secure, reputable repositories. Regular audits and compliance with international

446   archival standards can help ensure that data remains relevant and accessible. Wherever

447   possible, open-access policies should be adopted, enabling the public, researchers, and

448    policymakers to freely engage with the datasets. Creating a user-friendly public interface for

449    heritage information, complete with visualisation tools and search functionality, can further

450    enhance public engagement.

451    By focusing on these core areas— early intervention, sustainability, community involvement,

452    collaboration and longevity—projects similar to the High Streets HAZ can ensure that heritage

453    data is managed effectively, preserved over the long term, made accessible to the public, and

454    reusable for local councils and heritage researchers alike. These approaches not only help to

455    safeguard the heritage of local communities but also create lasting value for the broader

456    heritage sector.

## Conclusion
457

458    This study provides key insights into managing heritage information within the High Streets

459    Heritage Action Zone (HSHAZ) programme. It highlights both the potential and challenges of

460    heritage data reuse across built heritage, wellbeing, and research strands, emphasising the

461    need for better Data Management Plans (DMPs). Current practices often prioritise ease of use

462    over long-term accessibility. The study recommends early integration of data management,

463    open data practices, community involvement, and cross-institutional collaboration. Long-term

464    preservation strategies and secure digital archives are essential for ensuring the longevity of

465    heritage data. Improved practices will maximise the legacy of heritage information in urban

466    regeneration.

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## Conflict of interest disclosure

The author of this paper declares no conflict of interest related to the content presented in this research. The study, data analysis, and conclusions have been conducted independently and without any financial, personal, or professional affiliations that could potentially influence the objectivity or integrity of the information provided. There are no associations or financial arrangements with any organisations or individuals that could be perceived as having a vested interest in the outcomes or findings of this article.

In the event of any potential conflicts of interest arising in the future, the author will promptly disclose them and take appropriate actions to ensure transparency and maintain the highest level of integrity in the research process. The author is committed to upholding ethical practices in scientific inquiry and reporting to maintain the credibility and credibility of the research findings.

## Data and supplementary information availability

The data and supplementary information for this paper is accessible at Zenodo at:
https://zenodo.org/records/13850567?preview=1&token=eyJhbGciOiJIUzUxMiJ9.eyJpZCI6IjkxNThjMjczLTc3OWYtNDUzYS04ZGFkLWRkMWY3MDcwZGQ5ZCIsImRhdGEiOnt9LCJyYW5kb20iOiI2ODliMWNjYWU2ZDY4ZjYxMTQwMTIxMTJhMmMxYjg4ZCJ9.foV5tAfqw0T58BUKhxlOYOqi_AnHy-Z5Gxv7rucgZ_hJ5K7YIVqIcS-YE-Q8YdYTVsOD5NaqoWAeWZX2UmHdSg

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