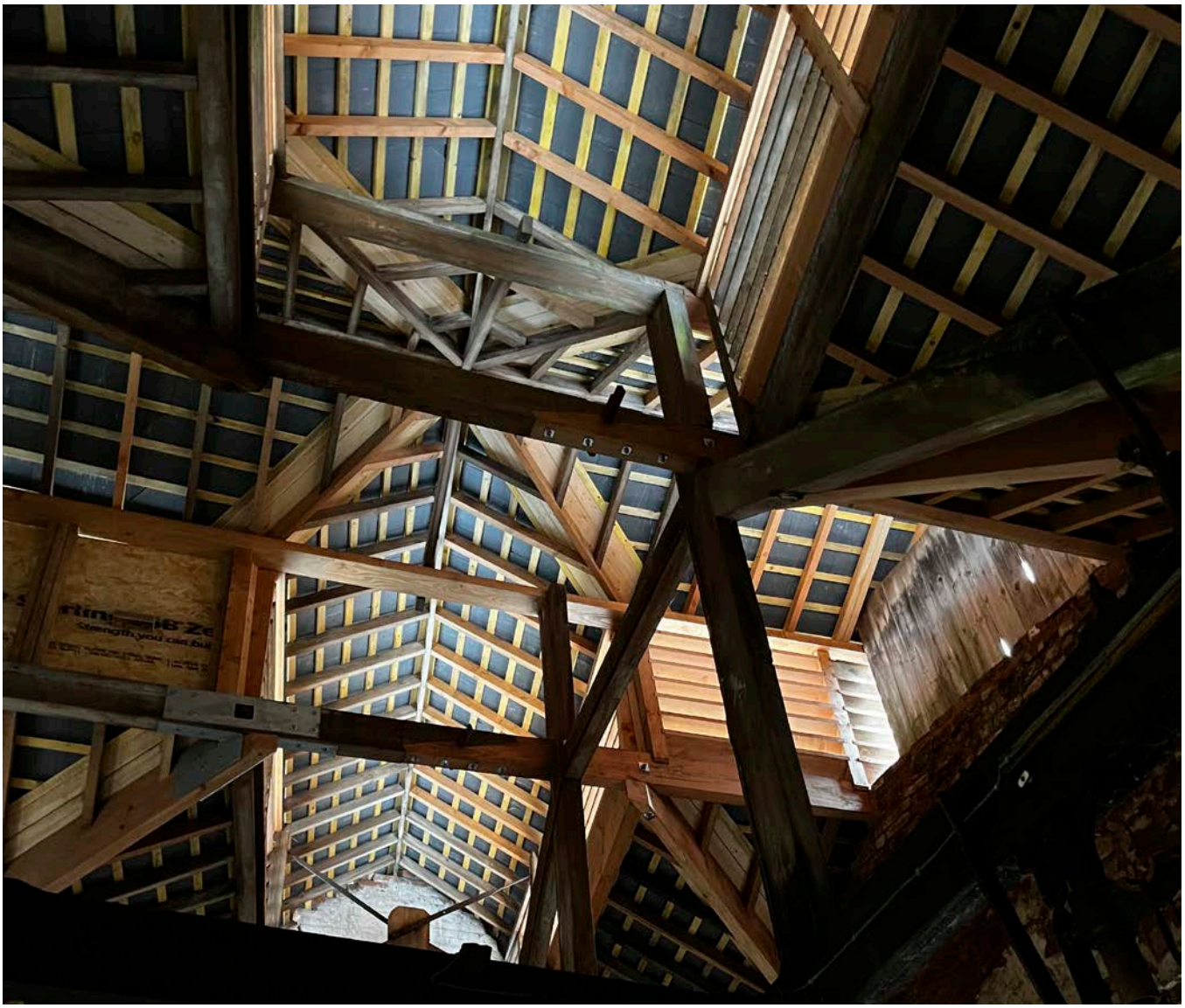
Historic England

# Tone Works

# Wellington, Somerset

## A Targeted Approach to Conservation Repairs to Save a Heritage At Risk Site - A Case Study



# Summary

Historic England's Technical Conservation team commissioned this case study to examine how a heritage at risk building could be put back into a viable use for the community and to ensure the continued use of a building with high embodied carbon.

Tone Works is a Grade II*-listed complex of buildings in Wellington, Somerset, placed on Historic England's Heritage at Risk register in 2008. It once formed the North Range of the cloth finishing and dyeing works, reservoirs and water systems that belonged to Fox Brothers & Co, known for its fine worsted and woollen cloths.

During January 2021 and December 2022 conservation works were undertaken to bring the building back into a state of repair.

The purpose of this document is to highlight the multiple challenges faced from flooding, conservation principles and team dynamics. Whilst also to record the successes enabled by their targeted approach. It has the potential to inform the way urgent conservation repairs are considered at other Heritage at Risk sites which are at risk of demolition, flooding and climate change.

The project at Tone Works is ongoing and depends on further funding to continue the conservation repairs still required.

This document has been prepared by Vanessa Ruhlig, on behalf of Thread for Historic England. This edition published by Historic England October 2024. All images © Historic England unless otherwise stated.

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**Front cover:** Structural timber repairs to historic wool dyeing buildings at Tone Works, 2022. © Claire Fear

# Contents

# 1. Glossary

For ease of reference, definitions of terms, abbreviations and names that are used in the text are included below:

**The Basins** are two connected water reservoirs, formerly used by Fox Brothers & Co to control and maintain water levels for the operation of their machinery at Tonedale. Today, they are an important natural habitat for birds and a popular green space for people to enjoy walking dogs, having picnics and fishing in Wellington, Somerset.

**The Council** refers to Somerset West & Taunton Council. It was formerly known as Taunton Deane Borough Council. As of 1 April 2023, it falls under Somerset Council, a new unitary authority for the county of Somerset.

**Decontamination** refers to the safe removal and/or encapsulation of asbestos-containing materials, following Health and Safety Executive guidelines and according to the Control of Asbestos Regulations 2012.

**Encapsulate** is the term used to describe the process of applying a protective coating to an item containing asbestos, to safely contain any asbestos fibres and protect the item from degradation. It is particularly relevant for the conservation of significant historic fabric.

**English Heritage 2007 report** represents the first comprehensive investigation of Tone Works. It includes detailed analysis of its buildings and machinery. Full document references can be found at the end of this document.

**EPSM licence** is a European protected species mitigation licence. It is required by law to carry out any work that may have an impact on European protected species, such as bats.

**Fulling mill** is a mill where woollen cloth was washed (scoured) and milled (felted or thickened) to create a tighter, often water-repellent finish.

**Greaseworks** were located across the road from Tone Works. Contaminated effluent from the finishing works was directed to the site, where it was treated to collect the grease (lanolin) removed from the cloth. It could then be reused commercially.

**Head and tail race** refers to the channels directing water into and from the waterwheel respectively.

**HSE** refers to the Health and Safety Executive, a national regulator for workplace health and safety.

**JCT** is the Joint Contracts Tribunal, a widely used provider of construction contracts in the UK.

**Line-shaft/line-shafting** refers to water or steam power-driven rotating metal shafts used to distribute power from a water wheel or steam engine to machinery, via clutches, pulleys and belts.

**Long ell** refers to a 24-yard (about 22m) length of serge.

**Milling** is a cloth finishing process that involves semi-dry, high-pressure rolling to increase the density of the fabric.

**North Range** is the Grade II* site known as Tone Works, listed by Historic England as 'Cloth Finishing Works at Tone Mills North Range including Dyehouse and Reservoirs'. List entry 1271246.

**Scouring** is a wet finishing process that involves washing woollen fabric in a soda solution to remove oil and dirt.

**Section 48** refers to the clause in the Planning (Listed Buildings and Conservation Areas) Act 1990 that allows for a local authority to serve a 'repairs notice' to the owner of a site. This specifies the repairs required for the preservation of a listed building. It is a necessary step before a local authority can proceed with the compulsory acquisition of a property under Section 47.

**Section 54** refers to the clause in the Planning (Listed Buildings and Conservation Areas) Act 1990 that allows for a local authority to execute any repairs that are urgently needed for the preservation of a listed building within their area. These are restricted to unoccupied parts of the building. Costs may be recovered from the owner by the local authority under Section 55.

**Section 106** refers to the clause in the Town and Country Planning Act 1990 that allows for a local authority to enter into an agreement or planning obligation with any person with an interest in a property, to restrict development or use of a property or to require a sum of money to be paid to the authority.

**Serge** is a type of woven fabric with diagonal lines.

**South Range** is the Grade II site to the south of the River Tone, listed by Historic England as 'Cloth Finishing Works at Tone Mills South Range'. List entry 1059866. The South Range once formed part of the wider cloth finishing works complex before the land was sold off.

**Spiral puttee** is a woollen length of cloth, designed to wrap around the lower leg to provide warmth and protection. It was patented by Fox Brothers & Co.

**Tentering** is a process of stretching out and drying wet-finished lengths of fabric to ensure they are straight and completed to the correct size.

**Tone Works** is the Grade II* site listed by Historic England as 'Cloth Finishing Works at Tone Mills North Range including Dyehouse and Reservoirs'. List entry 1271246.

**Trade Court** was the early headquarters of the Were family, and later Fox Brothers & Co, for its woollen enterprise in South Street, Wellington, Somerset.

**Worsted** is a smooth woollen fabric with no nap or rough surface.

For locations of lettered area names, for example Area V, refer to Figure 1.


**Figure 1:** Plan of Tone Works, not to scale.© Architectural Thread Ltd
Drawing compiled by Thread with reference to survey Plan of the Finishing Works (2007) by Nigel Fradgley and Mike Williams in Lucy Jessop, Tone Works, Wellington, Somerset: Survey and Analysis of Buildings, Power Systems and Machinery Volume Two: Appendices', English Heritage Research Department Report Series, 72/2007; and Site Location Plan and Key to Buildings (2016) by Harrison Brookes Architects.

# 2. Introduction

## Fox Brothers in Wellington

The Were family were involved in making serges in Wellington, Somerset, from about 1650. They ran a cottage industry that relied largely on weavers and other workers to complete their jobs at home, before delivering their finished goods to Trade Court, South Street, Wellington. From there, Were & Sons dyed and pressed the serges before distributing them for sale further afield.

In 1772, Thomas Were's grandson, Thomas Fox, became a partner in the business. Were & Sons became Thomas Fox & Sons in 1811, and later Fox Brothers in 1826. By the end of the 18th century, Fox had purchased Town Mills (Tonedale) in Wellington and Coldharbour Mill near Uffculme. This expansion was largely due to increased trade with international markets, including the manufacture of large numbers of dyed long ells for the East India Company. In 1801, Fox 'set to work to convert these [flour] mills into an up-to-date woollen factory, which came to be known as Tonedale'.[1]

Between 1801 and 1803, the Basins between Wellington and Rockwell Green were excavated by the Fox Brothers to provide a constant source of water for the water wheels that ran the machinery at Tonedale. They were fed by the Westford Stream and Rockwell Green Stream, using a system of locks and weirs to control the flow of water.

Other Fox Brothers innovations included the process for dyeing cloth 'khaki' (to improve the camouflage of British soldiers in the dry open landscapes of South Africa during the Anglo-Boer War), and the renowned spiral puttee, which was an integral part of the British Army uniform in World War I. Fox Brothers also developed its own finishing techniques of milling and scouring, which ensured the company's international reputation for fine, high-quality woollen fabrics and flannels. The quantity and organisation of the machinery within the Finishing Works is evidence in itself of the emphasis Fox Brothers placed on finishing processes.

Social innovations included establishing a non-profit shop in Wellington in 1800 to provide food and essentials; introducing profit-sharing for Fox Brothers employees by 1863; and offering pension, accident, medical and maternity benefits by 1874, pre-dating state benefits in the UK by more than thirty years. By 1946/47, employees had access to a lunch canteen and recreation grounds at the Tonedale site, as well as a day nursery to assist working mothers. As a result, the textile works operated as a self-sufficient community, until processes began to be outsourced in the post-war period and production in Wellington ultimately declined.

Despite closing the doors of the Tonedale and Tone Works sites by 2000, Fox Brothers & Co still exists. It is now a producer of fine flannels and woollen fabrics, operating from a base in the Counting House at Tonedale Mill.

## Historical development of Tone Works

*The Woollen Manufacture at Wellington, Somerset* (1914) suggests that the Were family owned the fulling mills at Tone (now known as Tone Works) from at least the early 18th century.[2] This is echoed in a 2007 English Heritage report, which notes the presence of a reset plaque or date stone in the west gable of the dye works with the inscription 'Thomas & Eliza Were and Sons 1754'.[3]

Tone Works was ideally located to harness water power from the River Tone and was also well situated to benefit from the newly built Grand Western Canal. The canal provided direct transport links to Taunton and Tiverton for a brief period, from 1838 until it closed in 1868. (Traffic on the canal had reduced significantly after the Bristol and Exeter Railway reached Exeter in 1844.)[4]

Structures at Tone Works (marked as Tone) and Tonedale, and also Tonedale Wharf on the canal, appear on the tithe map of 1839. Those at Tone Works include the Wheel Chamber, North Dry House, and elements of the Dye Works (Areas T, V and X). The South Dry House, now part of the neighbouring property (listed by Historic England as 'Cloth Finishing Works at Tone Mills South Range'), was also shown on the south of the river at the same time.

Today, the Wheel Chamber consists of the remains of the early 19th-century water wheel and power system, situated on an earlier lower floor level before the Finishing Shed floor was built up around it. The water channels that run through (culverted below) the Finishing Shed floor are now silted up. However, they appear to have followed the arrangement shown on the tithe maps of 1839, feeding the breast-shot suspension wheel's buckets (no longer present). The end walls (in handmade red bricks) above the head and tail race date back to the early 19th century, while the side walls (of factory-made bricks) and flat roof were built later, when the Finishing Shed was constructed. The Wheel Chamber contains evidence of water and steam power transmission.

**Figure 2:** Wheel Chamber. © Claire Fear

The North Dry House is shown on the tithe map of 1839. According to the English Heritage 2007 report, it has undergone at least four phases of structural change since it was built.[5] A large portion of the extant structure is believed to pre-date 1839. A section of the first floor was taken out to accommodate the Krantz tentering machine in about 1928, but the attic above remains (currently inaccessible). The Krantz machine is large and takes up roughly a third of the floor area. It was driven by electric motors and used gas-powered heat to dry cloths on a system of rollers. This would have been a significant investment for Fox Brothers at the time. Rows of tentering hooks in the attic beams above were used for stretching and drying the cloth before the tentering machine was installed. Timber louvres on the north wall of the Dry House are still present. They could be the original openable louvres, but they may be replacements installed when the building was reroofed in the 19th century.

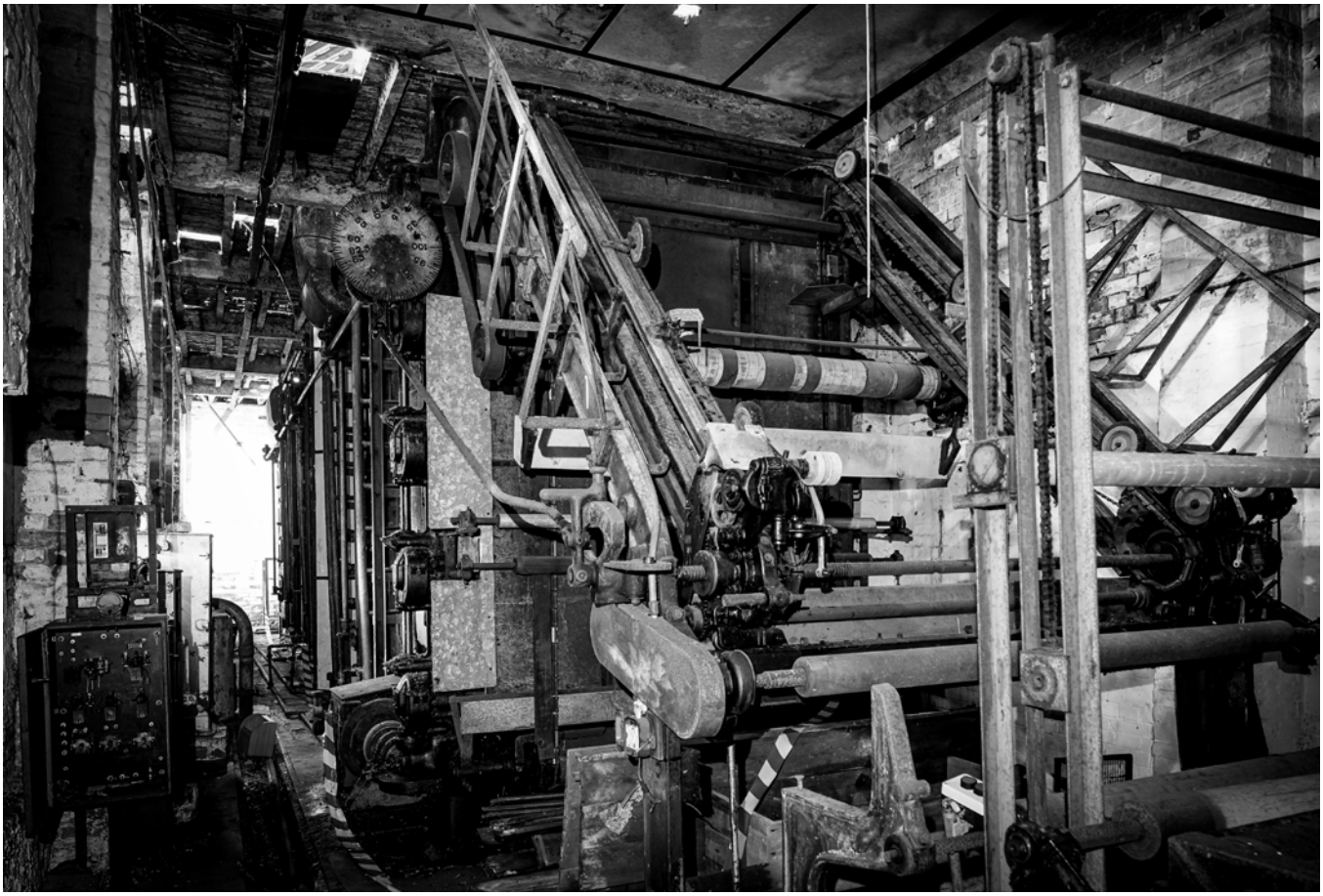

**Figure 3:** Krantz Tentering Machine in the North Dry House. © Claire Fear

The tithe map of 1839 also shows parts of what is known today as the Dye Works: marked as Areas T, V and X on Figure 1. Evidence of these early 19th-century structures remains.

The gable ends of Area T (last marked as a ‘store’) and Area W (‘toilet block’) seem to have been built as one continuous facade, in a similar arrangement to that shown on an 1892 letterhead image of the site in 1886. Area T’s gable end has a circular opening for what was once a prominent clock. The facade of Area W comprises a high-level round-headed window and doorway. The finishing of these elevations suggests that they were once more significant buildings than a store and toilet block, respectively.

Area T houses a large elevated cast-iron tank, supported by cast-iron columns and substantial timber beams. The ends of the beams can be seen on the other side of the wall in Area R. The English Heritage 2007 report notes that this tank was once used for storing treated water for the Dye Works, and was later used as an oil tank.[6] This was confirmed when the tank was drained in 2022 after testing the water in it for contaminants and a thick oily substance was found at the bottom. Areas of the wall between Areas T and R appear to be older than the main facade. Several phases of rebuilding are apparent in the wall fabric. It is possible that some of these sections relate to the early 1754 phase of the site, but this has not been confirmed.

**Figure 4:** Collapsed structure over cast-iron tank in Area T. © Vanessa Ruhlig

Parts of Area V (wool dyeing) pre-date the Dye Works shed (Area X). This is evidenced by its rubble masonry and substantial timber roof structure, which is physically and aesthetically distinct from the north(east)-light roof structure of the rest of the Dye Works. The roof of Area V comprises a series of perpendicular clerestories at high level, fitted with full-length timber louvres. The English Heritage 2007 report suggests these louvres indicate the building may have housed the complex's early dye vats, due to the need for adequate ventilation during the wet dyeing process.[7] Area V3 still contains two large circular dye vats and some evidence of a third (there is a circular gap in the floor finish). The longest of the clerestories appears to be in a similar location to a long structure indicated on the tithe map of 1839, thus suggesting it dates back to at least this time.

**Figure 5:** Photograph of Area V clerestory louvres, during repairs, 2022. © Claire Fear

The profit and loss ledgers of Fox Brothers & Co show that the Dye Works buildings, including parts of Area V, were built or extended in 1868, 1869, 1871, 1874 and 1884–5.[8] The many extensions indicate the importance and success of the dyeing process at the time.

Between 1871 and 1884, the river course was altered to alleviate flooding, install a weir and flood sluice, and reclaim an area of land to construct a new Finishing Shed. The ponds or reservoirs to the west of the Finishing Shed date back to 1892–3, and were used to provide a constant supply of softened water for finishing cloth. The material excavated from the ponds may have been used to build up the floor level of the new Finishing Shed.[9]

This building was constructed between 1890 and 1893 on the raised floor level between the new Dye Works building and the North Dry House. The Wheel Chamber remained *in situ*, but several other early structures were demolished around this time. The large space of the Finishing Shed allowed for better organisation of machinery, and the expanse of north-light roofing provided improved natural lighting. An image of the interior from 1912 shows the machines largely in the same positions as they are today.


**Figure 6 (top):** 1912 image of Finishing Shed interior, showing rows of machines. © Fox Brothers and Co. Image courtesy of Fox Brothers & Co archive [AA95/06574; also published in The Gentleman's' Journal, 1912], sourced from Mike Williams, 'Tone Works, Wellington, Somerset: Survey and Analysis of Buildings, Power Systems and Machinery Volume 1: Report', English Heritage Research Department Report Series, 72/2007.

**Figure 7 (bottom):** Finishing Shed interior in 2020/2021, showing rows of machines as in 1912. © Claire Fear

The roof structure comprises prefabricated elements that are typical of the time, including steel tie beams, cast-iron valley gutters and cast-iron columns. Timber beams and rafters were used to support lengths of fixed and openable roof lights. The arrangement was specifically designed to accommodate the line-shafting at high level and to provide open space for the machinery below. The layout of the two primary rows of machinery was, however, tied to the position of two drainage channels in the floor, which drained waste water or 'liquor' from the milling or scouring processes into the river to the east of the buildings. By 1882, the channels were connected to Greaseworks (no longer extant) across the road to the east of the site. This separated the contaminants and reduced pollution into the River Tone.

After the Finishing Shed was built, very few alterations were made to the existing buildings. Two large concrete water-softening towers on the edge of the reservoir were constructed in 1913–14 to help regulate the alkalinity of the water used across the site. Brick partition walls with segmental-headed windows were built after 1930 to separate the drier processes from the wet milling and scouring – the line-shafting can be seen running through these later constructions. Several modern internal partitions were also added to divide spaces in the Finishing Shed and the Dye Works.

By the 1950s, the number of Fox Brothers employees had reduced from over 5,000 to around 1,300, as many processes were outsourced. The oil crisis and high inflation of the 1970s contributed to the decline of the textile industry generally, and the supply of items such as dyes were affected by manufacturers going bankrupt. As a result, the dyeing process at Tone Works required new mixes to be formulated, which meant further loss of profit.[10] By the late 1990s, the discovery of large quantities of asbestos required many of the buildings at Tone Works and Tonedale to be sealed off to protect the health and safety of occupants.

The English Heritage 2007 report includes an aerial photograph of Tone Works, dated 1995, which shows the condition of the roofing at the time. Notably, the roof over Area T appears to be largely intact but shows signs of degradation. English Heritage reports that the site was still operational in 1995, when the Royal Commission on the Historic Monuments of England (RCHME) recorded the buildings.

By 2000, Fox Brothers had stopped work at Tone Works, and the premises were vacant. Many of the machines' rollers still contain cloth pieces as they were left.

**Figure 8 (top):** 1995 Aerial photograph of Tone Works, showing roof still over area T. © English Heritage/Historic England

**Figure 9 (right):** Cloth still loaded in machine rollers, 2021. © Claire Fear

## Summary of heritage significance

Tone Works remains the largest intact textile finishing works in the South West of England. It likely contains the last most complete set of historic textile finishing machinery in the country. The site yields extensive evidence of the past activity of Fox Brothers, one of the longest surviving family-run textile firms in the country. The company's history tells the story of the development of the woollen textile industry's dyeing and finishing processes – specifically the development of water, steam and electric power generation. The evolution of power generation and machinery at Tone Works illustrates the company's role in the industrial revolution of the South West, thus giving the site national and international significance.

The character of the buildings at Tone Works is defined by visible changes that illustrate the historic development of the site and a practical approach to repair and adaptation. The site is also defined by its machinery, drainage channels and line-shafting throughout, which contrasts with individual elements of aesthetic detailing in joinery and decorative work.

Tone Works serves as a reminder of Fox Brothers' specific role in the woollen textile industry, including as a supplier to the British Army. The company provided support and facilities for its employees, helped develop the local economy and defined much of Wellington's social history. Tone Works has the potential to feed into the town's collective memories of its past and to strengthen its identity. This makes it highly significant to the town and the region.

# 3. Objectives and potential

Tone Works was first placed on the National Heritage List for England in 2000. It was subsequently added to the Heritage at Risk Register in 2008 due to its rapid deterioration. The Council recognised the significance of Tone Works and negotiated with the former owner to try and instigate repairs to the site (*see* 4 Legal and Statutory Challenges). Repairs were not being undertaken at that time, leading to significant and increasing deterioration of the building fabric. In addition, extensive asbestos contamination made it almost impossible to fully survey some areas to understand the extent of the decay. After several years, it was found that the only feasible way of achieving its conservation would be for the Council to take ownership of the site.

> ***'With Heritage at Risk, you have to make brave decisions.'*** Dr Joanne O'Hara[11]

Ownership of Tone Works, along with Section 106 funds and a significant amount of funding from Historic England, enabled the Council to take action.

The objectives for the site were:

- Make it safely accessible
- Make it structurally safe
- Repair the building envelope to prevent further deterioration
- Save as much historic fabric as possible, while achieving the above
- Enable the reuse of existing buildings

Considering the site's social and historical significance within Wellington, the Council wanted to bring the buildings into community use. It investigated potential partners to enable this. The brief to the design team was, therefore, open-ended, to allow for a variety of future community uses.

The lack of access to parts of the buildings because of asbestos meant that information was limited to that provided by previous reports, which themselves lacked details on these restricted areas. For example, previous surveys showed some of the buildings as large open spaces on plan. In reality, they contained significant historic machinery and line-shafting, which restricted potential uses.

The standard approach of creating a concept or masterplan for the site was, therefore, not appropriate, because the buildings were not fully understood. Instead, the design team had to work together to observe the site closely and build up knowledge of its significance, structural issues, and design elements, as and when parts of the buildings became accessible.

Alongside the buildings' physical constraints, the risk of flooding meant that appropriate measures would be needed to limit the impact of flooding on future occupants.

Effectively, a guiding set of practical conservation principles of repair needed to be developed. The intention was to maximise the options for the sustainable reuse of the historic buildings by not restricting them to an assumed future use.

# 4. Legal and statutory challenges

## Recent legal history

After Tone Works closed in 2000, Fox Brothers & Co's estate was split up and sold off. Concerned stakeholders later established a trust, with the aim of creating a wool museum and returning the company's production to the site. The larger Tone Works cloth finishing site (which comprised the North Range and South Range) was sold to Wet Finishing Works and Mendip Estates in 2005 and 2006. These two companies were owned and controlled by Mr T Roper, who wanted to redevelop the land. In 2007, Mendip Estates submitted plans to the local authority to repair, refurbish, partially demolish and redevelop the buildings. The plans were amended later that year to reduce the extent of demolition proposed, in response to feedback from Historic England (at the time known as English Heritage).[12] Ultimately, the scheme was found to be unfeasible 'due to the western side of the road being "functional floodplain"'.[13] No works to repair, conserve or refurbish the site were undertaken in the period following its purchase, and the historically deteriorating buildings decayed further through lack of use and protection.

The Council served an urgent works notice to both Wet Finishing Works and Mendip Estates in 2009, under Section 54 of the Planning (Listed Buildings and Conservation Areas) Act 1990. This enabled the Council to make urgent temporary repairs or protections to help safeguard the buildings at Tone Works from further deterioration. The costs of these works were never recovered by the Council.

A condition report by Harrison Brookes Architects in 2015 (*see* below) noted that the urgent works at Tone Works in 2009 included temporary protections, which were not intended to last longer than a year, and also more permanent roofing repairs and propping. The temporary works were found to have been lost by 2015, with no evidence of subsequent attempts by the owner to rectify them.[14]

In 2011, Mendip Estates submitted an application for redevelopment and demolition works to Tone Works, which was approved with conditions in 2012.[15] The company had also purchased the former Greaseworks site across the road from Tone Works in 2007.[16] An application for full planning permission was made in 2011 by Mendip Estates and Strongvox Homes to develop the former Greaseworks site into 84 dwellings 'as enabling development

in connection with the repair and restoration of listed buildings at Tone Mill, Milverton Road, Tonedale, Wellington'.[17] This was also approved with conditions in 2012, and subject to a Section 106 agreement.

The Section 106 agreement (dated 30 March 2012) required the developer of the Greaseworks site, Strongvox, to pay a heritage asset contribution to the Council before commencing the proposed residential development – to contribute 'towards the cost of the preservation, maintenance and bringing into beneficial use of the Heritage Land' (Tone Works).[18] The "Heritage Landowner" or owner of Tone Works (Mendip Estates and Wet Finishing Works) was required not to commence the proposed development and demolition on the Tone Works site until the heritage asset contribution had been paid to the Council by Strongvox. In addition, Mendip Estates and Wet Finishing Works were required to complete the work within 12 months of consent being granted for the redevelopment and demolition works at Tone Works.[19] Failure to complete the heritage works at Tone Works would give the Council the right to carry out the works themselves, using any unspent part of the heritage asset contribution, subject to giving notice to the owners of their intention to do so.[20]

The Section 106 agreement also required the 'heritage landowners' (Mendip Estates and Wet Finishing Works) to invest £800,000 of their own money in the redevelopment of Tone Works. This money was never forthcoming.

Mendip Estates sold the South Range in 2013.[21] The sale of the South Range included the connecting bridge across the river, which provided the only vehicular access to the central courtyard of Tone Works. It was sold with no rights reserved for access, effectively landlocking the North Range Tone Works site, which is largely surrounded by water (the River Tone and associated reservoirs). The other main entrance to Tone Works abuts Highways England land, further limiting access to the site. Mendip Estates also sold the former Greaseworks site to Strongvox Homes in 2013.[22]

In July 2015, the Council commissioned Harrison Brookes Architects to complete a condition survey 'to determine the extent of works carried out by the owner to mitigate further damage and deterioration of the build both in relation to the Urgent Works and other areas of the complex' and 'to determine the extent and nature of further damage and decay of the complex' since 2009.[23] This enabled a schedule of repairs to be compiled, which formed part of a repairs notice under Section 48 of the Planning (Listed Buildings and Conservation Areas) Act 1990.

The survey found that vegetation had been left to grow unmanaged and was invading the building fabric across the site. A lack of security, particularly on the north edge of the site, was enabling trespassing and vandalism.[24]

In November 2015, the Council served a repairs notice in respect of the North Range, with the ultimate intention of enforcing the notice via a compulsory purchase order and then transferring the site on a back-to-back basis to a national regeneration charity. The notice was not complied with, and the compulsory purchase order was not pursued.

Developer Strongvox Homes submitted an application in October 2015 for variations to the previously approved plans (2012 planning application 43/11/0080). It related to the residential development on the former Greaseworks site, with the intention of building an additional six dwellings.[25] At this time, works relating to the original planning application (43/11/0080) had started. However, Strongvox had not paid the heritage asset contribution to the Council, nor had Mendip Estates shown intention to follow through with repairs and development on the Tone Works site. Mr Roper of Mendip Estates commented on the application, noting that the Section 106 agreement should be adjusted to increase the heritage asset contribution to be paid by Strongvox for the restoration of Tone Works.[26]

Strongvox's application was first approved on 11 November 2016 with conditions, and subject to an updated Section 106 agreement. The case officer's report and recommendation for the approval noted that the applicant (Strongvox) had requested a deferral of the payment of the heritage asset contribution for a further 12 months. It noted that this was considered reasonable, as there was no longer a valid listed building consent in place for any works to Tone Works. The case officer, therefore, recommended that a new Section 106 agreement be drafted to allow the Council, rather than the owner of Tone Works, to manage the heritage asset contribution.[27]

The updated Section 106 agreement, dated 11 November 2016, was drawn up between Strongvox and the Council only, requiring Strongvox to make a 'heritage protection contribution' or 'a financial contribution in the sum of £780,000 towards the cost of preserving, maintaining or improving one or both of the Heritage Assets', being the Dye Works and the Wet Finishing Works.[28] This amended version required the payment to be made directly to the Council within a year of the planning variation permission being granted. In turn, the Council was required to return any part of this heritage protection contribution that remained unspent after five years.

Mr Roper challenged the amendments to the Section 106 agreement on the basis that he was not consulted as an interested party as the owner of Tone Works. Planning permission for application 43/15/0128 was quashed in September 2017 after a successful judicial review challenge by Mr Roper.[29] The case is known as *Wet Finishing Works Ltd, R (on the application of) v Taunton Deane Borough Council (2017)*.[30] The Court found that the variation to the Section 106 agreement without consulting Mr Roper was a breach of the Council's duty of procedural fairness. It required the Council to re-determine the planning application and give Mr Roper a fair opportunity to comment on the terms of the Section 106 agreement.

Mr Roper was duly given the opportunity to do this, at which point he again confirmed readiness to carry out the repair works to Tone Works, upon payment of the heritage asset contribution by Strongvox.[31]

In February 2017, ownership of the North Range was transferred from Wet Finishing Works to Acorn Property Trading for £1.00. The latter company was also owned and controlled by Mr Roper. The strip of open land immediately to the north of the North Range was retained by Mendip Estates.

In July 2018, the Council served a further urgent works notice. It required the erection of secure perimeter fencing, blocking up window openings, repairs to the gate and other works. The Council undertook these works but the cost was not recouped.

By August 2018, Strongvox had still not paid the heritage asset contribution, nor had the owner of Tone Works effected any repairs. Harrison Brookes Architects carried out subsequent surveys in December 2018 to assess any repairs or further deterioration since the 2015 survey.

None of the 2015 survey recommendations had been actioned, and progressive deterioration of the buildings was noted, including significant deterioration of the north-light roof to Area Q, failure of the roof to Area R, decay and saturation of the structural timbers to Area V, and partial collapse of the roof in Area V. The importance of making the buildings watertight was reiterated in the condition report.

Although fly-tipping had been reduced by adding an earth bund alongside the main road, vegetation growth remained out of control, and theft and vandalism, including arson, had increased due to continued trespassing.[32]

Harrison Brookes Architects also identified asbestos decontamination as a priority, to prevent contamination of adjacent property and further risk to public health and safety.[33] An updated schedule of work accompanied the 2018 condition report. The repairs notice was never served to the owner, but it was used as a tool for negotiation.

The Section 106 agreement was updated in July 2019 to include a fixed deadline (18 October 2019) for Strongvox to pay the heritage protection contribution to the Council, as a condition of the approval of application 43/15/0128 on 19 July 2019. The agreement was also revised to state that the use of the heritage protection contribution by the Council was dependent on this being paid to ‘a third party with control of the heritage assets’.[34] This implied the owner of Tone Works, but did not specifically name Mr Roper or his companies.

The Council continued to liaise weekly with Mr Roper to come to an agreement. This ultimately led to a voluntary disposal of the Tone Works site (including both the North Range and the strip of open land to the north). On 22 June 2020, ownership was transferred to Somerset West & Taunton Council for a sum of £70,000.

Strongvox paid the Council the heritage protection contribution of £780,000 on 17 October 2019. This triggered the Council's contractual obligation to spend the money on the preservation, maintenance or improvement of Tone Works within five years.

# 5. Physical complexity of the site

The conservation repairs at Tone Works presented numerous physical challenges, many of which were interconnected. Although by no means justifiable, it is not surprising that the former owner found it difficult to commence repairs.

## Asbestos contamination

Casa Environmental Services compiled an asbestos refurbishment report after surveying the entire site on 26 August 2020. A total of 339 samples of suspected asbestos-containing materials were taken and analysed.[35] The poor condition of the buildings had led to the deterioration of most of the asbestos insulation and lagging to pipework. This was found in the form of loose debris across the floors, ledges and high-level surfaces. It was presumed to be in low-level culverts and machinery as well. The report recommended restricted access to the areas that contained asbestos and the immediate removal of all debris. The spread of debris and extensive number of samples meant that the recommendation applied to all the buildings on the site.

**Figure 10:** Example of asbestos pipe lagging and insulation, 2021. © Claire Fear

Due to the severe risk to human health within these contaminated areas, no works could be undertaken on the site until the identified items had been removed or encapsulated by a licensed asbestos contractor, in accordance with HSE regulations and the Control of Asbestos Regulations 2012.

It was clear that the decontamination of the buildings was key to enabling any other repairs across the site.

## Access

When Mendip Estates sold the South Range and access bridge, access to Tone Works was compromised significantly. Without access rights to the bridge from the South Range, only a narrow strip of land to the east of the buildings provided a potential route for contractors from the busy B3187 road. Access to this land had previously been restricted by earth bunds to prevent fly-tipping.[36] Although not ideal – being on a blind bend on a fast section of road – this strip of land was the best location for the contractor's site facilities and access route. After removing extensive vegetation and clearing the bunds, a secure compound was built to prevent trespassing.

Access to the bridge over the river was still necessary at times, to deliver or remove materials that could not be brought through the east entrance, such as large skips and scaffold. The Council and the contractors had to negotiate carefully with the owner of the South Range and provide detailed information of their requirements. Access was ultimately granted in exchange for a monthly fee. While this arrangement may not be sustainable for the ongoing use of the site, it provided crucial access for the conservation repairs.

The Tone Works site is almost surrounded by water, bounded by the River Tone to the south, east and north-east of the buildings, and by the 1892–3 water-softening reservoirs to the south-west. Both bodies of water abut the buildings, meaning that any access to their exteriors requires specialist access scaffolding.

For repairs to Area V in 2022, a projecting cantilevered scaffold structure and access bridge was built over the river to provide safe high-level access to the masonry and roof. This was designed by a specialist scaffold firm, Optima Scaffold Designs. The company had already designed emergency propping to provide internal structural support in areas identified by the structural engineer in 2021 and was, therefore, familiar with Area V.

To provide access to all roof areas, the scaffolding had to span floors that had several voids, below-ground tanks and uneven subsiding floor surfaces. A 'birdcage' scaffold structure was developed to provide an extensive grid of standards on baseplates, to spread the load over the floor area. It also accommodated the existing temporary propping, so this did not need to be removed until repairs were completed. The 'birdcage' supported a series of cantilevered beams taken out through existing window openings to support a narrow

external access scaffold, which ran along the edge of Area V above the river. In this way, none of the scaffold touched the river or river bed, in line with Environment Agency requirements. The external access scaffold also provided netted protection to stop any waste or loose materials falling into the river. This was an important consideration because of the risk of contaminating the river.

The Environment Agency was concerned about the timing of the work, due to the potential risks of flooding and activities that may disrupt the salmon breeding season. The scaffold needed a collaborative approach between the client team, contractor, scaffold designer and Environment Agency to ensure that all health, safety and environmental requirements were met. For example, a site visit with the Environment Agency helped them understand that the impact of the proposed scaffolding was minimal, compared to the harm a structural collapse would cause to the river if repairs were not carried out. It provided the opportunity to demonstrate to the Environment Agency the various complexities of the site, and it led to them accepting the proposals.

**Figure 11:** Cantilevered scaffold and bridge over river, 2022. © Claire Fear

In addition to the external access issues, internal access was severely limited by the presence of asbestos contamination throughout.

## Open water and flood risk

As noted above, the Tone Works site is almost entirely surrounded by open water. This not only limits access options, but also plays a large role in the flood risk attached to the site. In 2020, Integral Engineering Design mapped the flood risk levels, showing the constraints these would have on any future proposals for the site. Only Area Q sits above the flood level, where the floor was built up in 1890–3 to form the new Finishing Shed. Consequently, any potential repairs at the site had to consider the possibility of flooding and how this could be mitigated by using robust materials and fixings. Most of the urgent repairs were, however, found to be at high level – to prevent additional water ingress from rain.

Any future internal alterations had to be considered carefully. The aim was to make the buildings resilient and recoverable in the event of flooding, and also to avoid interventions that would block the flow of water through the buildings. The latter was important because of the open and concealed water channels, which further increase the chance of water within the buildings during periods of high rainfall. Ground penetrating radar (GPR) scan surveys of the structures across the site showed a vast network of pits, channels and culverts, many of which connect to the surrounding water courses.

The presence of these channels had a direct impact on the design and positioning of the structural propping and access scaffolding needed for repairs.

## Floor voids

It was found that floor areas that appeared to be solid were, in many cases, concealing voids or culverts below. Many of these are connected to the known water channels, but GPR surveys have not confirmed this in all instances.

The possibility of unknown floor voids had to be considered at all times in terms of site safety, particularly when calculating loading or establishing delivery and access routes for contractors and materials. Scaffolding, for example, had to be self-supporting, and therefore relied on a stable floor surface free of floor voids.

## Structural instability

The lack of maintenance at Tone Works over the previous two decades had led to significant loss of roofing materials. In turn, this had allowed repeated water ingress. There were, therefore, multiple areas of structural degradation, seen in steel corrosion and timber decay.

The structural engineer identified areas that required propping to make them safe enough for asbestos works to be carried out. It was not possible for some of the scaffold items to be erected until a bat licence had been approved, which caused further programming restraints.

## Dense vegetation

The lack of maintenance in the past had led to dense vegetation growing on the exterior of the buildings, and inside areas where roofing had failed. The extent of ivy and brambles meant that visibility in some areas was severely lacking. This affected the surveys because not all areas could be fully accessed or viewed, and the condition of the building fabric behind the vegetation could not be fully assessed.

**Figure 12:** Overgrown vegetation in Area T concealing voids and failed structure, 2021. © Claire Fear

## Ecologically protected species

The inaccessibility of the site, the dense vegetation, the proximity of the river and the disused state of the buildings provided the ideal opportunity for various species to inhabit Tone Works. JH Ecology confirmed the presence of eight species of bat, the potential for bird-nesting opportunities along the river corridor, the presence of dormice in surrounding hedgerows and scrub, and evidence of otters on the site.[37] This had a direct impact on decision-making

and programming, due to the specific legal constraints in place to protect these species. At the same time, recognising the fact that the site provides important natural habitats for these species greatly influenced the project team's approach. Decisions were made to maintain the areas that had become most suitable for wildlife, rather than attempting to clear the whole site. While this limited the access and repair possibilities, it also instilled in the team a sense of care and duty that went beyond their legal ecological obligations.

## Historically significant fabric and evidence

As previously mentioned, the buildings contain extensive evidence of the finishing and dyeing processes that took place at Tone Works, as well as evidence of all three phases of power that enabled them. This is in the form of machinery – both loose and fixed – overhead line-shafting, gears, clutches and mounting brackets. Many of the items reflect traditional cloth finishing methods, and they form a rare collection of industrial artefacts that tell the story of Fox Brothers. Although historically significant, these items present a challenge for contractors because they impede access routes and fixing points for scaffolding and propping.

Asbestos decontamination projects typically remove contaminated lagged pipework and intricate machinery to eliminate all asbestos from the site. This was not possible at Tone Works because of the historic significance of the machinery and artefacts. The contractor had to work around these items to conserve the historic fabric. Ultimately, all accessible asbestos was either carefully removed, where this did not damage historic items, or encapsulated *in situ* to seal and protect it.

**Figure 13:** Example of overhead line-shafting, belt drive and oil trays, 2021. © Vanessa Ruhlig

# 6. Timing

Meticulous timing was required at the site. Works had to progress rapidly to prevent further deterioration of the historically significant fabric and to meet funding deadlines. They also had to be timed to align with ecology restrictions.

## Rapid decay

The degradation of the buildings at Tone Works had reached the stage where any further delays to repairs would cause an exponential increase in deterioration. For example, in Area T, a photograph dated 1995 shows the roof and clock still in place.[38] Some 20 years later, the Harrison Brookes Architects condition surveys note that although little was left of the roof in Area T, the trusses were still in place, in both 2015 and 2018.[39] By 2021, only three years later, these trusses had collapsed into the vegetation below. Decision-making to facilitate repairs, therefore, had to be swift to help save the rest of the buildings. The Heritage at Risk project team at the Council played an essential role in enabling these decisions to be implemented.

**Figure 14:** 1995 photograph of Area T gable, showing clock still in place. © English Heritage/Historic England

**Figure 15:** 2021 photograph of Area T gable, showing severe deterioration, loss of clock. © Vanessa Ruhlig

## Funding constraints

In December 2020, the Council was awarded grant funding from Historic England under its Repair Grants for Heritage at Risk scheme, funded by the Department for Digital, Culture, Media and Sport (DCMS) Cultural Recovery Fund. The majority of the grant had to be spent by the end of March 2021, leaving only three months for procurement, site set-up and works to be completed.

Asbestos decontamination had been identified as the key priority for the site, as enabling works for all other repairs. However, the programme of asbestos decontamination works had to be adjusted to accommodate ecology and EPSM licence requirements, further limiting the contractor's window of opportunity. Historic England confirmed that partial practical completion by the end of March 2021 would be acceptable for the purposes of the grant.[40] Targeted propping of roof structures and an exposed gable wall to ruined Area T, and joinery repairs to help secure the site, would also form part of this work.

The success of the asbestos decontamination works allowed for the remaining grant to be spent on emergency structural repairs to the East Wall of Area Q, to prevent its collapse and loss of the significant roof structure.

The team spent the required amount to be able to draw down the DCMS Cultural Recovery Fund grant. This enabled a second phase of repairs in 2022. These repairs had been identified as being crucial to prevent the structure known as Area V collapsing into the River Tone. The grant was managed by Historic England, who set out the programme requirements for the payment of claims. A similarly tight period was available for the procurement and completion of works. The requirements set out by the grant meant that the Council had to claim the full amount by the end of March 2022.

With knowledge of these deadlines, the Council appointed Corbel Conservation at the Council's own financial risk, before the grant offer from Historic England had been finalised. A pre-construction services agreement (PCSA) was put in place to help minimise the financial risk, and to allow for design development work to progress before the grant was secured. The grant guidelines were, however, not set up for such agreements, meaning that the development and repair stages had to overlap on paper.[41] There was an anxious period, during which Thread (architect and contract administrator), PGP (quantity surveyor), Corbel and the Council had to liaise closely with Historic England to work out cash-flow forecasts. This task was made more difficult by delays to material supply chains. As the project continued, it was confirmed that any grant amount not claimed by the end of June 2022 would have to be paid back to the Treasury by the Council. Although the project missed this deadline, the Council did not have to pay the grant back.

Weekly and open communication with Historic England was key to maintaining its trust in the project team and programme.

## Ecology requirements

JH Ecology undertook an inspection, or scoping survey, of the buildings in October 2020. At this time, no asbestos decontamination had taken place, and access to many areas was not considered safe – nor possible.

The survey found that the Tone Works site housed a day roost of common pipistrelle with minor potential for hibernation in Area F, night roosts of brown long-eared and whiskered bats, an occasional day roost of greater horseshoe bats, a day roost with potential for a small maternity colony of lesser horseshoe bats in Building P, and night roosts and assumed minor hibernation roosts of greater horseshoe and lesser horseshoe bats in Building Q.

While some of the minor works for the asbestos decontamination could be completed without a bat licence, the remainder required an EPSM licence from Natural England. The majority of the funding for the asbestos removal had to be spent by the end of March 2021, imposing a particularly tight deadline on the works affected by ecology requirements.

In JH Ecology's method statement, which supported the licence application, it was noted that bat emergence or re-entry surveys had not been possible because they can only be carried out between April and September. The mitigation strategy was, therefore, based on the scoping survey and historical data collected previously. JH Ecology considered this to be appropriate due to the urgent nature of the asbestos works and the overall benefit the works would have on public health and safety.

The mitigation strategy (outlined in the licence method statement) proposed that:

- The asbestos would be removed at a time when the bats would be least impacted
- The licensed bat ecologist and asbestos contractor would carry out a pre-site setup inspection to identify all bat roosts and access points
- No works would be undertaken within the underground channels or pits, which had been identified as day and night roosts in several locations
- Bat access points would not be blocked, and protective screening would be erected to minimise disturbances in these areas
- The area of the site with the potential for a small maternity colony of bats (Building P) would be tackled first, so as not to disrupt the bats' active/breeding period
- A contractors would be briefed before any works commenced

JH Ecology also had to provide Natural England with detailed information on the specific asbestos removal locations throughout the site. Thread assisted by interpreting CASA Environmental Services' extensive asbestos refurbishment survey report (which comprised 374 pages) and summarising it into an 18-page table, identifying asbestos-containing items according to the incident references in the original report. However, descriptions were limited to the material type and quantity, such as the length of pipe lagging affected. The table was set out according to building areas for ease of reference for anyone not familiar with the site.[42]

Although this was a time-intensive exercise, it enabled the ecologist to liaise with Natural England, using clear and simplified information to explain the nuances of the project. The mitigation licence was, therefore, approved without the need for bat emergence or re-entry surveys, which would have delayed the asbestos removal significantly. Natural England issued the licence on 4 March 2021.

The design team actively worked with the asbestos contractor to identify loose items that could be removed and decontaminated while the bat licence was being determined. They also discussed a change of work sequence, which would not impact the bats. Although there would be a slight doubling-up of work for the contractor, who would have to complete the decontamination once the licence was in place, at least work could continue.[43]

Preserving the bat flight paths and access points into the buildings presented an unusual conundrum for the asbestos contractor. This was because there were already numerous physical constraints imposed by existing pipework and line-shafting at high level, as well as below-ground channels at floor level. There was also the legal requirement of reducing the spread of asbestos from the asbestos work areas.

Generally, decontamination requires full enclosure of all work areas, utilising simply shaped structures that are easy to construct and clean. For Tone Works, the contractor had to adapt the shapes and locations of these enclosures to accommodate the bat access points, as identified by JH Ecology. The contractor created funnels to maintain access to below-ground channels for crevice-dwelling bats. They were carefully configured to protect the bats from disturbance from adjacent work areas.

> ***'None of these challenges were new to us, but having to work on a site which presented all of these combined made it uniquely difficult.'*** Rob Miotla, Shield[44]

**Figure 16:** Bespoke asbestos enclosure to accommodate historic fixtures and bat paths. © Claire Fear

# 7. Methodology

## RIBA Plan of Work (typical)

The Royal Institute of British Architects (RIBA) Plan of Work organises the processes of briefing, designing, constructing and operating building projects, based on feedback from the construction industry.[45] It was designed to work with most construction projects across the UK.

The Plan of Work comprises eight stages: Stage 0 (Strategic definition), Stage 1 (Preparation and briefing), Stage 2 (Concept design), Stage 3 (Spatial coordination), Stage 4 (Technical design), Stage 5 (Manufacturing and construction), Stage 6 (Handover) and Stage 7 (Use). Conservation work is highlighted under the conservation strategies for each stage within the plan.

Thread generally uses the Plan of Work as a framework for projects, and for setting out a programme of outcomes for its clients, adapting it to accommodate the bespoke needs of each project. Many of the earlier stages tend to overlap.

If Thread had been able to apply a typical Plan of Work to Tone Works, the project would have been progressed in a linear manner, as shown in Figure 17.

The Plan of Work naturally limits the input from contractors to Stage 5. Depending on the procurement route selected, their design contribution may come in at the end of Stage 4. Where a client has a clear brief and expected outcome for the project, this workflow (leaning heavily on the design team's expertise) limits risk to the client, as most decisions can be made before work starts. In this way, unexpected costs can be better controlled.

**Stage 0 (Strategic Definition)**
Confirming the best means of achieving the Client's Requirements - working with various legal and financial advisers the Council would determine project risks, budget, and make strategic decisions to make a business case for taking the project forward. Gathering information on the site, such as previous asbestos surveys and condition reports would be needed. This is generally the client's activity before a design team is appointed.

**Stage 1 (Preparation and Briefing)**
Confirming the Client's Project Brief - this may require the completion of feasibility studies by the design team to compare suitable options for the site, confirming spatial requirements (such as accomadation needs) and setting this out in relation to the Client's intended project outcomes and budget. At this point site surveys and other relevant information would be required to progress. Understanding the site's listed status and significance is required. Appointment of a Principal Designer for undertaking CDM 2015 duties would also be needed at this point to have their input at an early stage of design.

**Stage 2 (Concept Design)**
Confirming a Concept Design which meets the Client's brief - this would typically entail understanding the historic development of the site through research and the compilation of historic development drawings to help inform concept drawings as they progress. Design reviews to discuss how the designs meet spatial requirements and other project needs would take place with the client and project stakeholders. The Principal Designer would identify any significant health and safety hazards and begin recording appropriate measures to be followed in the pre-construction information pack.

**Stage 3 (Spatial Coordination)**
Coordinating architectural and structural/engineering information and testing the concept - product suppliers and specialist subcontractors may be consulted to test whether proposals can be practically delivered and to determine lead times. A building regulations review would generally be undertaken to assess how the proposals and requirements need to work within the context of a listed building. At the end of this stage an application for planning and/or listed building consent would typically be submitted.

**Stage 4 (Technical Design)**
Completing all design information and details, including specifications, to enable the construction of the project. This stage is influenced by the procurement strategy for the project, for example, whether a traditional contract route is selected, or a multi-stage tender such as a Pre-Construction Services Agreement is chosen. This determines the level of information required for issue to tenderers, and how much input they have on the project design. During Stage 4 sufficient information is needed to submit a building regulations application, for approval prior to the commencement of construction. Information to discharge any pre-commencement planning conditions would also need to be prepared at this point. A pre-tender cost estimate is produced based on the above information.

**Stage 5 (Manufacturing and Construction)**
Construction of the project is completed during this stage, based on an agreed programme and within the framework of the chosen contract used in the procurement process. Contract administration, responding to site queries and inspecting the works for quality and adherance to the design specifications forms part of the stage until the project is practically complete. The Principal Designer would liaise with the main contractor to ensure that their Construction Phase Plan meets all health and safety requirements and suitably mitigates against all identified risks.

**Stage 6 (Handover)**
The completed building is handed over to the client and any residual defects are rectified by the contractor within the agreed rectification period before final completion is certified. Any historical records or surveys should be compiled as part of the building manual to be handed over to the client, as well as any information on maintenance requirements to continue the conservation of the building in the future - this may form part of an updated conservation management plan.

**Stage 6 (Use)**
The building is used, operated and maintained as intended in the project brief and the client's desired outcomes - the design team is not generally involved in this stage.

**Figure 17:** RIBA Plan of Work (typical flow of work example). © Architectural Thread Ltd

## Targeted approach (bespoke)

At Tone Works, the client did not have a clear brief or proposed end use for the buildings. Furthermore, the site's rapid rate of deterioration since the last condition survey report in 2018 meant that the full extent of conservation repairs required was unknown. Lack of access due to the extensive asbestos contamination throughout the buildings prevented a full assessment. A more targeted approach had to be adopted to enable task-by-task problem-solving, as access to the site became possible and more information was gathered.

The RIBA Plan of Work could not be followed in a linear fashion because of the urgency of some of the repairs. Many of the stages had to overlap due to the complex and interlinked site constraints. The priority of repairs informed the stages of work and process.

In addition to the site's physical challenges, the COVID-19 pandemic in 2020–1 had a direct impact on how work could progress. All employers had to follow government and Health and Safety Executive (HSE) guidance, which changed rapidly throughout this period. For example, in April 2020, when Thread commenced Stage 1 research and historical analysis of the site, all work had to be done from home.[46] Desktop-based research was later supplemented by site visits and surveys, which greatly enhanced understanding of the existing fabric and contents of the buildings. Similarly, although asbestos decontamination works were permitted under government guidelines, social distancing and other risk mitigation measures had to be strictly followed in 2021. The nature of the decontamination work meant that full PPE (personal protective equipment, as defined by the HSE) and face-fitted masks had to be worn on site.

The asbestos decontamination works enabled safe and controlled access for surveys and further historical analysis of the building fabric and machinery. A site-wide assessment of the conservation repairs needed also became possible, from which priority repairs were identified.

Corbel's work on the East Wall consolidation repairs confirmed the firm's competence and ability to collaborate with others within a tight programme and within the context of the site's many risks and constraints.

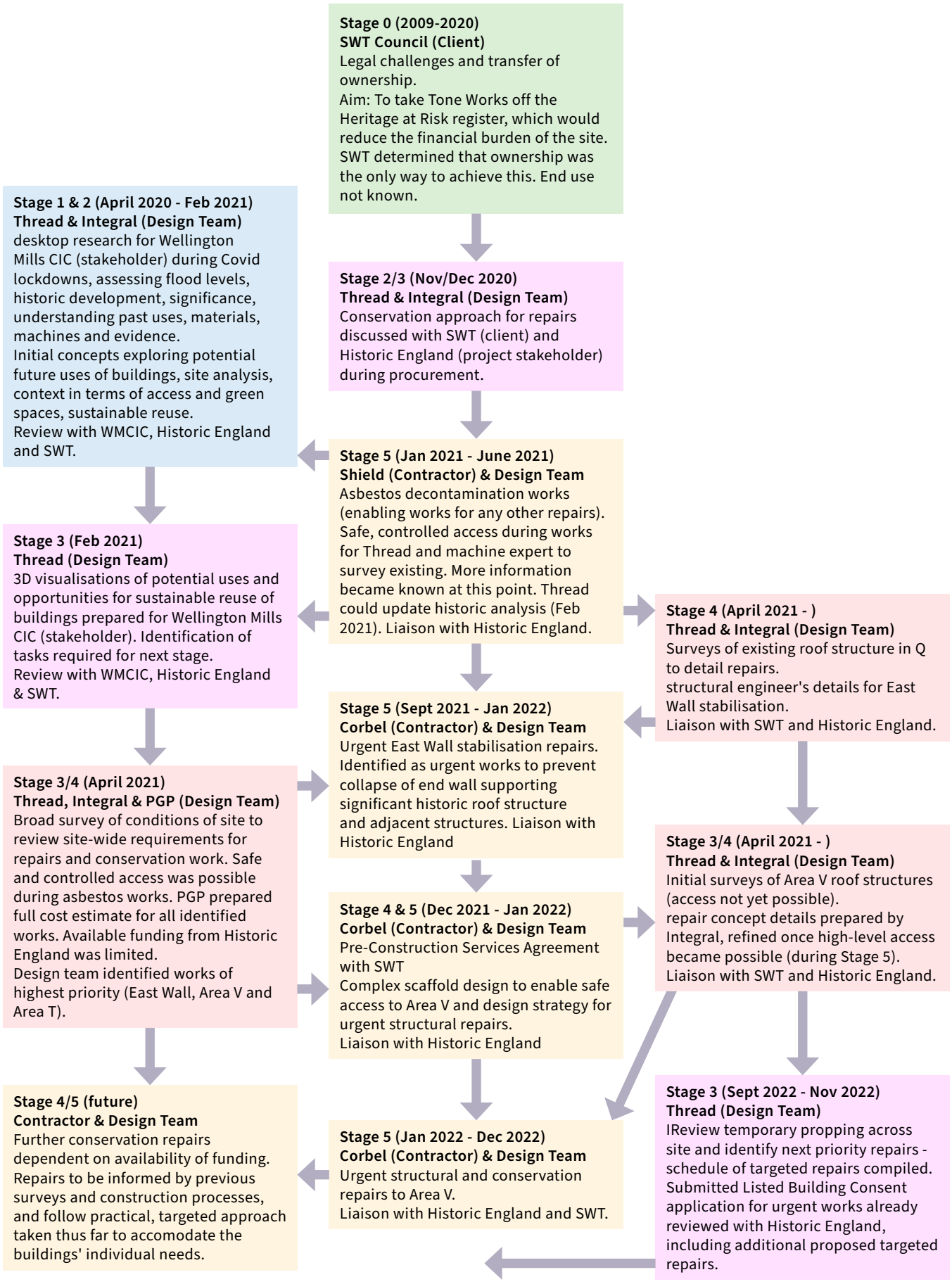


**Figure 18:** Targeted approach (bespoke flow of work at Tone Works). © Architectural Thread Ltd

## Procurement: Asbestos decontamination

With Tone Works now owned by the Council and a deadline in place to effect repairs and conservation work, the Council proceeded with procurement of the most urgent work: a programme of asbestos decontamination. Asbestos had been identified in 2018 as being a significant risk to public health and property.

The 2020 report by CASA Environmental Services showed the extent of asbestos contamination across the site (*see* 5 Physical complexity of the site). It was found in the form of paper and textile flash guards to electric switch boxes, gaskets in machinery and pipework, brake shoes on machinery, thermal pipe insulation, rope seals, insulating boards, cement roof slates, thermal pipe insulation debris, and dust on floors and high-level surfaces. Some items were identified as high priority. However, the report recommended that intact items, such as asbestos cement roof slates, were removed only if affected by refurbishment works.

Removing the asbestos would not be straightforward. It was found on intricate historic pipework, line-shafting and significant machinery, which all forms an integral part of the Grade II*-listed structures.

Due to the extent and complexity of the task, the Council did not have a suitable procurement framework in place to ensure a sufficient number of tender returns. The procurement team carried out market research and sent out requests for expressions of interest to nine potential specialist contractors. Of these, five confirmed their interest and were invited to tender on 2 December 2020. Three tenders were returned.

A site visit during the tender period allowed the potential contractors to confirm the decontamination requirements and see the complexity of the buildings in person. This visit led to comprehensive pre-tender clarifications, which were built into the resulting contract.

The contract included asbestos decontamination and installing structural scaffolding to safeguard the buildings and their contents. The contractor was required to provide digital photographic records of the site before and after removal. The contractor was also required to collaborate with the design team to identify items of historical significance that would need to be protected and kept in place, including all line-shafting and machinery elements, many of which were scattered across the floor.

Pricing by the potential contractors was based on the schedule of asbestos removal in CASA's asbestos refurbishment survey report. Assessment of this was given a weighting of 65 per cent. The remaining 35 per cent focused on the quality of the contractor's proposed methodology, particularly in relation to the historic fabric and ecological constraints.

Criteria used to assess the quality of the tender included assessing the contractor's primary method statement and their proposed programme of works. Both were considered above other criteria, such as team experience and project management, collaboration, risk management and consideration of the local environment.

The complexity of the asbestos decontamination works meant it was not possible to know the precise cost, but the Council was able to gauge prices against historic quotations obtained by the former owner of the site, with the help of the Council's asbestos specialist.

The successful contractor was Shield Environmental Services, whose price was significantly lower than the Council's estimate for the work. Shield's selection was, however, based on the high quality of its method statements and its understanding of the complex requirements of the site, in particular the historic machinery that would remain *in situ*. The firm's tender documents showed a clear understanding of the following:

- The need to decontaminate and retain historic items found across the site, using encapsulation where appropriate
- The hazards of voids and hidden services
- The requirement to liaise with the ecologist on ecological restraints
- The site's significance to members of the Wellington community, whom they might encounter around the site during the works

The asbestos decontamination was successfully completed under a JCT Measured Term Contract, with only minor contract variations. This form of contract allowed individual areas of work to be completed to a certain minimum value, according to the tight deadlines set out by the grant funding requirements.

**Figure 19:** Asbestos decontamination works in progress, 2021. © Vanessa Ruhlig

## Procurement: Joinery repairs

Shield temporarily secured the site during the asbestos decontamination, but access to the buildings also needed to be controlled after the work was completed. Many of the existing external doors to the buildings were identified as being in a poor condition, potentially providing easy access for trespassers.

Thread compiled a schedule of existing doors and their proposed repairs, to enable pricing of joinery repairs. This included the temporary works required to secure the doorways during the repairs, and preparing for and finishing with new paint. A request for quotations was issued to a targeted list of three potential contractors on 4 January 2021. These three contractors had been identified as having the skills and experience to work on specialist joinery works within the context of a Heritage at Risk site. During the tender period, the potential contractors were invited to clarify the project requirements during a site visit, which helped reduce unknowns in the contract.

Three quotations were received and assessed on pricing (70 per cent) and quality (30 per cent). The successful contractor, Ellis & Co, was the highest rated on both. The firm was appointed without a contract, but on the implied principles of a standard JCT Minor Works Building Contract. Careful coordination between Ellis and Shield was required throughout.

## Procurement: East Wall repairs

During the asbestos decontamination works in April 2021, safe and controlled access allowed the design team to review the need for repairs across the site. They noted that the East Wall supporting the north-light roof structure of Area Q had shifted away and detached from the roof structure. There was no lateral restraint to prevent its collapse and the loss of historically significant fabric. Reattaching the roof structure to the wall was deemed urgent.

Five potential contractors were identified for this work, and an invitation to tender was issued on 20 July 2021. They were invited on the basis of having the relevant skills and experience to complete this specialist conservation repair. The contract was based on the specification and schedule of works prepared by the structural engineers, Integral. A site visit allowed for potential contractors to clarify the repair requirements.

Three tenders were returned. They were assessed on price (70 per cent) and quality (30 per cent). Corbel Conservation was deemed to be the best contractor on both aspects, showing experience in repairs to historic listed buildings and an appropriate methodology for the works. The firm was appointed to complete this phase of work on the basis of a JCT Minor Works Building Contract.

## Procurement: Structural and fabric conservation works

Integral had identified that structural repairs were urgently required to the areas known as Area V and Area T, due to ongoing deterioration and water ingress. Partial failure of the roof structure in Area V meant that critical lateral support to the eastern walls abutting the river was at risk. Loss of restraint to these walls would result in catastrophic loss of historic fabric, river contamination and potential flood risk. Repairs to this area were, therefore, identified as emergency works as a matter of public safety.[47]

Due to the complex access to Area V and the type of conservation repairs required, it was felt that procurement needed to secure an experienced specialist contractor to assist in the design of the works as well as the actual conservation repairs.

No suitable framework existed for this type of procurement package. An advertisement was, therefore, placed on the national Contract Finder and regional Supplying the Southwest portals on 1 October 2021.

The contract needed to provide the Council with a sufficiently flexible solution to accommodate the complexity of the site and Historic England funding constraints. The intention was also to build up a relationship with a technically competent contractor, whose growing knowledge of the site could potentially enable their continued involvement in conservation repairs. On a complex site like Tone Works, this type of embedded knowledge would be invaluable.

The procurement initially included Package 1 for structural and roofing works to Areas V and T, and Package 2 for structural roofing works to Building Q. Funding was only available for Package 1 at the time of the tender. However, including a schedule of rates for Package 2 meant that this work, or similar roofing repairs, could be costed and potentially addressed at a later stage.

At the time of the tender, full access to the high-level roof structure of Area V was not possible. This would require complex scaffolding because the building is located at the river's edge. The full scope of repairs could, therefore, not be determined. An open day was held so that tenderers could clarify the requirements and understand the difficulties of the site.

It was felt that a two-stage approach would be appropriate, which allowed for the initial award of a fixed price Pre-Construction Services Agreement (PCSA). This was essential to enable the contractor to collaborate initially on the design and construction methodology of the structural repairs, to then deliver them within the available budget. A bespoke schedule of expectations, services, and technical and commercial outcomes was developed to form the PCSA, based on a JCT form of contract. This would allow the Council to end the contractual relationship early if the contractor did not perform according to the agreed schedule.

Three tenders were returned. The PCSA agreement was entered into with Corbel, allowing for collaborative discussions on structural propping, scaffold design and subcontracting, refining costs, and programme priorities. The funding from Historic England had to be spent by the end of March 2022, so these discussions took place over a short period (between December 2021 and January 2022), before the grant offer was finalised. Corbel was then awarded a JCT Intermediate Contract with Contractor's Design on 12 January 2022 for works in Package 1 (structural and roofing repairs to Area V).

The work was successfully completed in December 2022, only marginally above budget.

A subsequent contract was awarded to Corbel in December 2022 to complete structural repairs to Area T and accompanying targeted works and security measures. It was based on a priced schedule of works and initial sketch proposals by the structural engineer. At the time of writing, the project is currently in progress. It is following the same principles of collaborative working to find practical solutions to a highly challenging element of structural repair and stabilisation in one of the site's most deteriorated areas.

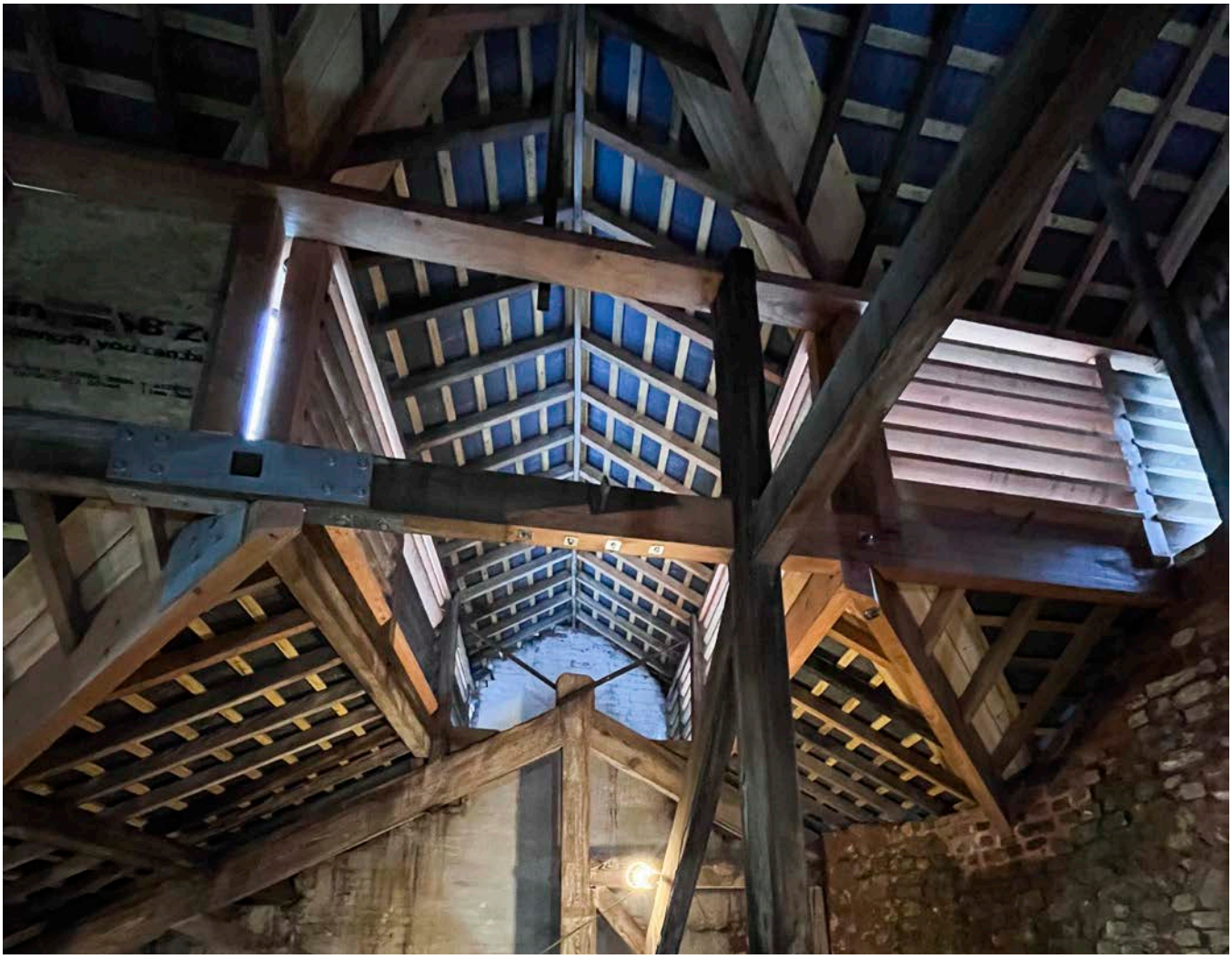

**Figure 20:** Completed structural, roofing and louvre repairs to Area V, 2022. © Claire Fear

# 8. Observations on the collaborative process

The practical nature of the decisions that had to be made as part of the targeted approach to conservation repairs forced the process to become more collaborative. While the roles of architect, structural engineer and contract administrator did not differ from those in a typical RIBA Plan of Work, the notion of 'design team' expanded to include the construction team at a very early stage. This did not change any contractual relationships, and risks to the client and contractor remained protected by robust forms of contract. It did, however, enhance team relationships, facilitating discussion and sharing of ideas.

Rob Miotla of Shield noted that the open-mindedness of the client and design team allowed for them to work together to find solutions. Shield's methodology had to be flexible, and it was adapted significantly to suit the constraints of the historic fabric and ecology requirements on site.[48]

Regular communication, between the client, design team and contractors, was essential. Within the contractor teams, site managers and operatives communicated daily, rather than weekly. This ensured that items of historic significance, such as loose artefacts related to the machines, were retained for recording and not accidentally discarded, for example.

Clear emails, schedules and diagrams, as well as phone calls, enabled questions to be answered quickly. Often, solutions were found fastest on site, drawing on the contractors' practical knowledge. At times, this meant that Thread and Integral were on site more than once a week, to look at issues first-hand and review options with Corbel.

Weekly informal team meetings, including the client and Historic England, allowed for particularly challenging design issues to be discussed in detail, with follow-up actions agreed. Generally, these discussions were led by the contractor, to obtain feedback and to consider options with the design team. This differs from many standard projects, where the design team would typically lead the conversation.

Although some aspects of project communication were not radically different, it was felt that the specific challenges and timing of each stage of work – combined with the willingness of each team member to accommodate any difficulties – did make this collaboration uniquely successful.

# 9. Lessons learnt

Towards the end of repairs to Area V, the team realised that the process thus far had been an overwhelmingly positive experience, despite the many challenges.

Claire Fear at Thread had joked that a symposium or conference to share the experience would be an ideal way to show others what the team had learnt and what it had made possible, so that the project's collaborative nature could be celebrated and shared. The Council took this suggestion seriously, and within weeks a symposium was being organised by the Council's Heritage at Risk project manager, Amy Kemmish.

The event – Tone Works: Heritage at Risk in Action – comprised of two elements and took place over two days in November 2022.

The first part was a series of site tours, each led by members of the project team who shared their comments and views with visitors. This allowed the team to give a broad outline of the historical aspects of the site, and describe the physical challenges and technical aspects of the conservation project. The benefit of this was that it highlighted the considerable health and safety issues that impacted the project and the sheer volume of repairs that are still needed. At the same time, visitors could see and touch the conservation repairs, as the access scaffolding remained in place. Due to the health and safety concerns on the site throughout the project, this was the first opportunity to offer this experience to those not involved in the work.

A mobile elevating work platform was hired to give the visitors (and team members) a unique bird's eye view of the rooftops across the site. This further highlighted the extent of the work still needed, and clearly demonstrated the significant achievement of the roof repairs to Area V as an example of what the project had achieved.

The second part of the symposium was an afternoon of talks and discussions at the Museum of Somerset in Taunton. Vanessa Ruhlig of Thread presented the historical development of Tone Works and its significance within the context of Wellington. Dr Joanne O'Hara discussed some of the challenges faced by the Council in enabling the project, briefly touching on the aspects covered in this text. Claire Fear of Thread talked about the physical condition of the site and the difficulties it presented in terms of access, health and safety, and asbestos. She also described the richness of historical evidence found across the site, which informed the conservation philosophy for the work.

After the presentations, two panel discussions were held to open up the conversation with the audience. The panel for 'Setting up the bespoke approach' comprised the project's lead designer and director of Thread, the Heritage at Risk programme manager from the Council, the Council's procurement officer, the project quantity surveyor from Peter Gunning & Partners, the operations director from Corbel, and the principal designer and safety advisor from C2 Safety. This discussion broadly covered:

- the procurement strategy
- the involvement of the contractor in design decisions
- managing price risk and securing materials within the tight funding deadlines
- the benefits of the project's collaborative approach, from the contractor's perspective

Corbel highlighted the challenges faced by the industry in terms of the gap in traditional skills. They explained how they are addressing this as an organisation, for example by employing apprentice carpenters for the timber repairs at Tone Works.

> ***'Skills like these will soon be very hard to come by so it gives me a sense of great pride to know we are helping to keep them alive.'*** Corbel[49]

The panel for 'Conservation philosophy and Tone Works' included the project's lead designer and AABC-accredited architect from Thread; Historic England's Heritage at Risk architect; Integral's director and CARE engineer, and the engineer who detailed the repairs to Area V; and Corbel's site manager and head carpenter. Their discussion covered the various design decisions that had to be made, taking engineering requirements, loss of historic fabric and aesthetics into consideration. The contractor reiterated the difficulties of access and safety, and how these were overcome to effect the conservation repairs. Corbel's head carpenter talked about how specific repairs to timbers were identified, discussed with the project team and executed. Integral noted the practical adjustments that were needed to design the repairs, such as load testing scarf joints.

The comments and questions from the audience during these discussions illustrated a genuine public interest in seeing the conservation repairs in action. They highlighted how well received the site visits had been and demonstrated the value of such tours in engaging with the public and local community to raise awareness of the site's ongoing need for conservation. Given that site access had previously been tightly controlled and limited to those directly involved with the conservation repairs (to minimise risk of injury), the team had felt that community engagement had been lacking throughout the process. Offering similar organised site visits or tours in the future would address this in a meaningful way.

The collaborative approach demonstrated by the team during the symposium was commended by those present. It also helped to reinforce the project team's own belief in its value.

**Figure 20:** A scarf joint is load- tested on site to test actual strength. © Phil Shannon

# 10. Conclusion

This case study has described and set out the priorities that were identified for Tone Works, a Grade II* Heritage at Risk site in Wellington, Somerset. The priorities were to make it safely accessible and structurally safe, to repair the building envelope to prevent further deterioration, to save as much historic fabric as possible, and to enable the reuse of the existing buildings.

The legal and statutory challenges, physical complexity of the site and funding constraints attached to the project influenced the team's methodology. These factors led to a bespoke targeted approach to conservation repairs, which was able to flexibly accommodate the diverse challenges of the site. Key to this approach was a collaborative relationship between all members of the team. This enabled practical solutions and design decisions to be made based on the specialist knowledge or practical experience contributed by team members, as access and understanding of the site was made possible. A combination of formal and informal communication allowed for prompt decisions to be made within the constraints of the project's funding deadlines, which corresponded with the urgency of the repairs required.

The symposium and associated site tours provided the first opportunity to demonstrate this targeted approach to a broader group of people. They were able to see first-hand the conservation repairs in action and the extent of the challenges on the site. This highlighted the potential that future visits could have, in terms of broadening community engagement and wider support for further repairs.

Reflection since the positive feedback of the symposium has identified the need for further exploration of opportunities for sustainable future uses of the site. Repairs at Tone Works will be futile if the buildings remain unoccupied and unmaintained. All the urgent works completed to date have involved high-level roof and structural repairs. Due to the site's flood risk, robust and resilient low-level repairs and interventions will need to be considered to make this a useable and sustainable heritage asset for Wellington.

The works completed to date will soon enable safe access to the public, allowing the project to begin to look towards its prospective users and occupants. Since the symposium, important new links have been forged between the Council, Somerset Education Business Partnership, local schools, and Bridgwater and Taunton College. These will bring opportunities to engage young people (the craftspeople of the future) with this heritage and the traditional skills it can foster.

The approach taken on this project does not offer a template for similar Heritage at Risk projects. However, it provides insight into the need for collaborative thinking and a flexible design process to accommodate the unique and difficult constraints of such a site. It shows how this approach can be used to inform the way urgent conservation repairs are achieved at Heritage at Risk sites.

# 11. Acknowledgements

Thanks are due to Joanne Williams at Historic England for encouraging Thread to write about the challenges and conservation approach taken at Tone Works.

The project could not have progressed without the dedicated efforts of the entire project team. This comprised the client team at Somerset West & Taunton Council; the main funder and stakeholder, Historic England; the design team and consultants; and importantly, the contractors. They are not listed in order of importance. Each one played a significant role in working towards a successful and collaborative project.

## Project team

Client: Somerset West & Taunton Council

- Dr Joanne O'Hara: Heritage at Risk Programme Manager
- Amy Kemmish: Heritage at Risk Project Manager
- David Carpenter: Procurement Case Manager
- Martin Evans: Planning Solicitor
- Jack Johnston: Development and Place Project Officer
- Christine Stafford: Assets Surveyor
- Karen Wray: Development Management Team Leader

Main funder: Historic England

- Annie Evans: Heritage at Risk Architect
- John Ette: Partnerships Team Leader
- Rhiannon Rhys: Inspector of Historic Buildings and Areas

Project architect/heritage consultant/contract administrator: Thread

- Claire Fear: AABC-accredited Architect and Director
- Vanessa Ruhlig: Heritage Researcher
- Jenny Boddington: Architect

Quantity surveyor: Peter Gunning & Partners

- James Paradise: Quantity Surveyor and Partner
- Tom Phipps: Quantity Surveyor

Structural/civil engineers: Integral Engineering Design

- Margaret Cooke: Conservation Accredited Engineer and Director

- Chris Gross: Conservation Accredited Engineer
- Nick Winn: Engineer

Principal designer: C2 Safety
- Anna Maxwell: Principal Designer and Safety Advisor

Ecologist: JH Ecology
- Jenette Howard: Licensed Ecologist and Director

Asbestos contractor (2021): Shield
- Rob Miotla: Operations Director
- The team on site

Contractor (2021 to present): Corbel Conservation
- Phil Shannon: Site Manager
- Chris Foster: Operations Director
- Oskar Niewadzi: Commercial Manager
- Tim Hayes: Head Carpenter
- The team of skilled carpenters and craftspeople

Leadwork sub-contractor (2022): Ben Bruce Leadwork

Joinery contractor (2021): Ellis & Co

Scaffolding:
- Optima Scaffold Designs
- Wellington Scaffolding

## Other consultants or stakeholders

Approved inspector building control: Act Building Control
Environment Agency
CASA Environmental Services
Machine conservation specialist: Wallis Conservation t/a Dorothea Restorations
Measured building surveyor: Levett Surveying
Natural England
South West Heritage Trust
Wellington Mills Community Interest Company (WMCIC)
Wellington Town Council

This list fails to mention every individual who has been involved in helping to conserve Tone Works. Any omission of acknowledgement is unintentional.

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