Shaping the future, preserving the past.

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How can adaptive re-use support regenerative architecture while navigating the conservation constraints of listed buildings?

Abstract

Adaptive re-use is increasingly being recognised as a strategy for reducing the environmental impact of the built environment; however, its potential to support regenerative architectural practice within the constraints of listed buildings remains underexplored. This dissertation investigates how adaptive re-use can contribute to regenerative design while navigating the regulatory, technical, and cultural limitations imposed by heritage conservation. Using a qualitative comparative case study methodology, the research examines two Grade I listed projects: the Shrewsbury Flax Mill and the Bath Abbey Footprint Project.

The findings demonstrate that strict conservation constraints, often perceived as barriers to change, can act as catalysts for innovation, shaping regenerative outcomes that respond to site-specific social, ecological, and cultural conditions. Despite requiring contrasting intervention strategies, ranging from light-touch conservation at Bath Abbey to more robust structural adaptation at Shrewsbury Flax Mill, both projects prioritised the retention of historic fabric, preservation of embodied carbon, and integration of contemporary systems to support new uses. In preserving the heritage buildings, the projects have provided opportunities for community involvement and education, following human centred design approaches and adding cultural and economic value to the sites.

The research concludes that adaptive re-use aligns strongly with regenerative principles and is particularly suited to heritage contexts, where existing buildings can inform net-positive, conservation-led architectural practice.

Declaration of work

This study was completed as part of the BA (Hons) Interior Architecture Degree at the University of the West of England. The work is my own. Where the work of others is used or drawn on, it is attributed to the relevant source.

Daisy Martin-Jones

Use of Articial Intelligence

Artificial intelligence tools were used in the planning stages of this dissertation to assist with organising ideas and structuring the document. The dissertation's content, research, and conclusions were produced independently by the author.

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Contents

...an urgent need to rethink conventional architectural practice...

Introduction

The built environment is increasingly recognised as a major contributor to environmental degradation, resource depletion, and carbon emissions. This, in conjunction with growing scarcity of developable land, prompts an urgent need to rethink conventional architectural practice (Plevoets and Van Cleempoel, 2019, pp. 1-23). Approaches framed simply as 'sustainable' are now often criticised for maintaining the status quo rather than actively improving ecological systems (Reed, 2007). In response, regenerative design has emerged as a more ambitious solution than its predecessors; one that seeks to restore, replenish and strengthen ecological and social systems rather than merely reducing harm.

Within this context, adaptive reuse has gained relevance. While often associated with the preservation of architectural heritage and cultural identity, adaptive reuse is now being reconsidered as a strategy capable of supporting regenerative outcomes (Plevoets and Van Cleempoel, 2019). By retaining existing structures, reducing demolition waste, and preserving embodied carbon, adaptive reuse offers potential environmental benefit, but also social and economic benefits that align with regenerative principles (Foster, 2020; Baker et al., 2021). However, the application of adaptive reuse is not always straightforward, particularly when working with listed buildings where conservation regulations may restrict the extent of alteration and reuse.

This dissertation seeks to examine how adaptive reuse can contribute to the regeneration of built environments, both socially and environmentally. By examining the potential intersection of adaptive reuse, regenerative architecture, and heritage conservation, this study provides insights into how historic buildings can be transformed to deliver ecological, social, and cultural benefits using case studies to explore practical applications of adaptive reuse and how they could contribute to regenerative architecture.

01 Literature Review

1.1 Regenerative Architecture

While sustainability has long been positioned as the guiding principle for environmentally responsible design, there is growing debate over its effectiveness in addressing the severity of the climate crisis. Sustainable design often focuses on minimising negative impact, yet in doing so it generally aims for a ‘neutral’ outcome: to do “less harm” rather than to repair harm already done (Reed, 2007). This has led some environmental campaigners to argue that sustainability risks becoming a performative or ideological practice, one that maintains the status quo rather than transforming it (Architects Declare, 2024, p. 8). Regenerative architecture challenges this limited approach. It contends that simply reducing damage is no longer sufficient and that the built environment must actively contribute to ecological and social renewal. Regenerative design therefore seeks to restore natural systems, enhance biodiversity and strengthen community resilience. As Josef Hargrave articulates, “regenerative design is about the pathway to a world where human and natural systems coexist and coevolve in harmony” (Arup, 2024). This shift from sustaining to regenerating reflects a broader recognition that the circumstances of our time require more than mitigation; they demand intentional, positive intervention.

A prime example of the principles of regenerative design in practise is the VanDusen Botanical Garden Visitor Centre in Vancouver. Inspired by the native White Bog Orchid, the building goes beyond biomorphic form, emulating the functioning of living systems and embedding itself within the landscape rather than imposing upon it. The design deliberately blurs the boundary between architecture and nature, with vegetated roof “petals” enabling habitat continuity, supporting native biodiversity and ecological connectivity (Living Future, n.d.), reinforcing Architects Declare’s regenerative principle of co-evolution between built and ecological systems (Architects Declare, 2024).

Figure 1: Illustration of Architects Declare’s core regenerative principles

Circular systems are central to the project; geothermal and photovoltaic technologies contribute to a net-positive energy performance, while rainwater is captured and reused for greywater needs and blackwater is treated on site and safely returned to the landscape, allowing the building to participate in natural water cycles rather than exporting waste (Pintos, 2021).

Materiality further supports a place-based regenerative approach. Rammed earth walls constructed from local soils connect visitors to the site's geology, while passive environmental strategies inspired by biological precedents, such as termite mounds, shape the building's form. A central oculus enables natural ventilation, reducing reliance on mechanical systems and encouraging the idea of biomimicry (Pintos, 2021).

Figure 2: Central Oculus of VanDusen Botanical Garden Visitor Centre

As a visitor centre, the building also serves an educational and transitional role, reinforcing its function as an integrated component of a living socio-ecological system (Living Future, n.d.).

However, regenerative design should not be limited to new construction; its principles can be effectively applied through the adaptive re-use of existing and heritage buildings.

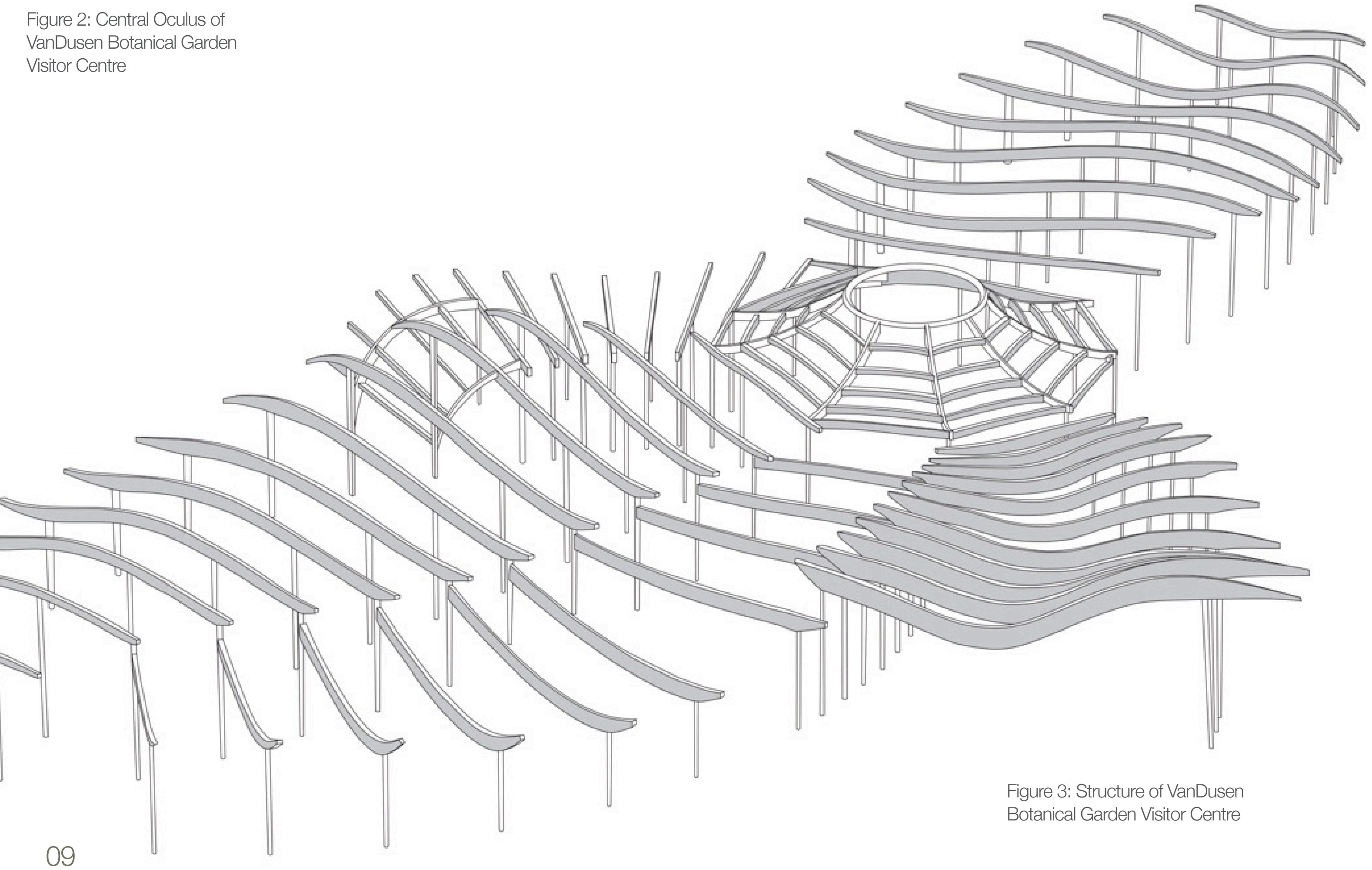

Figure 3: Structure of VanDusen Botanical Garden Visitor Centre

1.2 Adaptive Reuse

"The greenest building is the one that is already built."

(Carl Elefante, 2007)

Adaptive Reuse has no clear set definition and is a concept that is open to interpretation; Some define it simply as "the process of repairing and restoring existing buildings for new or continued use" (Plevoets and Van Cleempoel, 2019). However, it would be naive to assume its role is as simple as restoring a building. It is clear that adaptive reuse as it develops doesn't just delve into physical reuse, but instead a more human-centred design approach, transforming a space based on the community surrounding it, placing ethics and heritage foremost to ensure that a building maintains its rich history and culture as well as ensuring sustainability. Adaptive reuse of heritage architecture is a key mechanism for shifting towards a circular economy, centring on human experience and social sustainability. (Girard, 2020) The Tate Modern is widely recognised as a pioneering global example of adaptive reuse, representing a triumph in the architectural reimagining of industrial heritage (Davidts, 2006). The transformation of the disused Bankside Power Station into an internationally renowned art museum exemplifies how obsolete infrastructure can be given new cultural significance. The design retained key industrial elements, including the Turbine Hall and Boiler House, preserving the building's historic integrity while minimising demolition waste and conserving embodied carbon (Royal Academy of Engineering, 2000). Its environmental strategy was guided by a commitment to energy efficiency, with Mark Nutley, a partner in the environmental engineering team, noting that the heating and cooling systems were designed to reduce energy consumption "to as low a level as realistically feasible" (Cibse Journal, 2016). Beyond its environmental achievements, the project also catalysed the social and economic revitalisation of the South Bank, demonstrating the power of adaptive reuse as a driver of urban regeneration and cultural renewal (Shin, 2024).

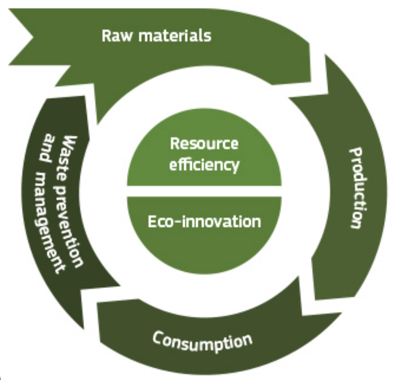

Figure 4: 4 key steps towards a circular economy

1.3 Interlink between adaptive reuse and regenerative architecture

Both regenerative design and adaptive reuse emphasise the importance of creating a positive and lasting impact on the built and social environment. Regenerative design provides the broader theoretical framework, advocating for architectural practices that restore and enhance ecological and community systems rather than merely sustaining current conditions (Ichioka and Pawlyn, 2021). Adaptive reuse can be understood as one of the practical strategies through which regenerative principles are realised. By redeveloping existing buildings, adaptive reuse seeks to improve social, cultural, economic and environmental outcomes within the communities they serve (Girard, 2020).

> "regeneration is about doing things with communities, whereas development is often seen as doing things for communities."
>
> Rich, 2025

Environmentally, adaptive reuse aligns with regenerative goals by reducing the carbon footprint associated with new construction and by retaining the embodied energy stored within existing building materials (Foster, 2020). This contributes to a more circular approach to resource use and supports the idea of achieving a net-positive impact rather than simply minimising harm (Architects Declare, 2024). However, the regenerative potential of adaptive reuse extends beyond environmental concerns. The role of community involvement is essential, as demonstrated by the development of the Mzuzu University Health Centre in Malawi. Its design process centred on working collaboratively with the local community to understand their values, skills and needs, creating a low impact modular self-build (Rich, 2025). Geoff Rich suggests that "regeneration is about doing things with communities, whereas development is often seen as doing things for communities" (Rich, 2025). This highlights that regenerative design is grounded in empathy, co-creation and respect for local knowledge.

Figure 5: Community working together in Mzuzu to build the timber frame of the modular system

1.4 Listing and conservation constraints

The UK building listing system was established in the aftermath of the Second World War through the Town and Country Planning Acts of 1944 and 1947, with the primary objective of safeguarding buildings deemed to be of special architectural or historic significance (Native Architect, 2020). Today, over 370,000 buildings are listed under this framework, categorised into three grades: Grade I, denoting buildings of exceptional interest; Grade II*, indicating more than special interest; and Grade II, identifying those of special interest. Notably, Grade II listings constitute approximately 91.7% of all protected buildings in the UK (Historic England, 2025).

While this framework is essential for the preservation of cultural heritage, it can also present challenges when adapting historic buildings to meet the evolving demands of regenerative and sustainable design. The case studies chosen for this research are grade I listed and as such faced many conservation constraints, however these restrictions prompted innovative approaches, enabling heritage conservation and regenerative principles to co-exist, illustrating how listed buildings can evolve to contribute positively to both cultural continuity and environmental resilience.

...focussing on architectural interventions, conservation responses, sustainability strategies, and community outcomes...

Methodology

This dissertation adopts a qualitative research approach to explore how adaptive reuse might be implemented within a regenerative architecture framework. This research aims to decipher design principles, heritage constraints, the practical application of regenerative principles and how these can contribute to a regenerative design strategy. To address the research question, a comparative case study strategy is adopted, allowing for a thorough examination of architectural interventions within real heritage contexts where listing requirements influence design outcomes. However, the use of qualitative research introduces an element of subjectivity, as the interpretation of findings is influenced by the researcher's analytical perspective.

Two UK-based listed buildings were selected as case studies. Both examples are listed buildings with heritage value, therefore conservation requirements will have had an influence on design decisions. Each project also incorporates elements of adaptive reuse along with an intention to integrate sustainability or regenerative architectural strategies. Analysing listed buildings offers insight into how adaptive reuse and conservation must operate interdependently, with heritage values shaping and directing design interventions.

The first case study, the Shrewsbury Flax Mill, is a Grade I listed industrial building often referred to as the 'grandparent of skyscrapers' due to its pioneering iron-frame construction (Pintos, 2023). The second case study, Bath Abbey's Footprint Project, is situated within the UNESCO World Heritage Site of Bath and demonstrates how highly protected structures can accommodate innovation, accessibility improvements, and sustainability measures despite strict heritage regulations.

These case studies were chosen because together they illustrate the symbiotic relationship between adaptive reuse and conservation strategies. Both projects demonstrate that heritage significance can be preserved while enabling contemporary functionality and environmental performance. The analysis in this dissertation focuses on architectural interventions, conservation responses, sustainability strategies, and community outcomes.

The research relies primarily on secondary sources, which may limit the scope of the findings. However, both case studies represent prominent examples of regenerative interventions and are therefore accompanied by extensive documentation, providing detailed information for an in-depth evaluation of the strategies. Furthermore, the subject area of adaptive reuse in the context of heritage buildings and a regenerative framework can be effectively examined using secondary data, if design decisions are thoroughly documented.

02 Shrewsbury Flax Mill

Figure 6: Exterior image of Shrewsbury Flax Mill

2.1 Context and history of the site

The Shrewsbury Flax Mill Maltings is a pioneering industrial complex located in Ditherington, Shrewsbury. Widely acknowledged as 'The grandparent of skyscrapers' (Pintos, 2023), it was the world's first multi-storey iron-framed building, its innovative structure fundamentally influencing modern architectural engineering.

Figure 7: Shrewsbury Flaxmill Maltings in the late 19th century.

In the late 18th Century, Shrewsbury was a thriving centre for textile production, particularly wool. Thomas and Benjamin Benyon, in partnership with John Marshall, sought to diversify into flax spinning for linen production. Acutely aware of the fire risks associated with flax processing and traditional timber-framed mills, they enlisted Charles Bage in collaboration with a network of Shropshire engineers, industrialists, and intellectuals to design an innovative iron-framed building. Completed in 1797, the Flax Mill became one of Shrewsbury's largest employers, and its early success led to further development of the site (Historic England, 2019).

The decline of the textile industry a century later resulted in the mill's closure and conversion into barley maltings in 1897, a transformation that required significant alterations to the building's fabric, including windows being blocked up and the installation of shutters to regulate environmental conditions essential for malting. Throughout its history, the function of the complex continued to evolve; it's spacious malting floors and drying rooms were repurposed as military barracks during WWII (English Heritage, 2018).

Advances in malting technology and the rise of purpose-built facilities eventually rendered the Maltings obsolete, leading to its final closure in 1987. Following a prolonged period of dereliction, the site was acquired by Historic England in 2005 who, working alongside multiple partners has engaged in the careful restoration and adaptive reuse of the Flax Mill, transforming it into a vibrant business and visitor hub (English Heritage, 2018).

Figure 8: Timeline of the history of the flax mill

2.2 Conditions before intervention

As a result of decades of dormancy, the building was subject to neglect and vandalism and was placed on the 'heritage at risk' register (Shropshire Council, 2022). Timber was rotting, walls were split in two and there was tensile cracking in the majority of the cast-iron beams, (Feilden Clegg Bradley Studios, 2020) making the adaptive reuse of the building a challenge. Emergency propping was required to prevent further collapse before permanent repairs could be introduced (Feilden Clegg Bradley Studios, 2020).

Beyond the structural challenges, social cohesion in the surrounding area was also in need of repair. Comments made in an interview conducted by Historic England included "doesn't it look awful...blighting that neighbourhood" (Historic England, 2023, p. 23) suggesting that the building was adding to the sense of deprivation in the area. As a result of this, the community initially wanted the building to be demolished (Historic England, 2023, p. 24).

Figure 9: Flax Mill before retrofit

2.3 Sustainability

Fielden Clegg, the appointed architects for the project are renowned for their sustainable practice; Their founding principle is to 'move architecture forwards in a changing world', their website stating that they have been pushing boundaries in sustainable democratic and socially responsible design for over 40 years (Feilden Clegg Bradley Studios, n.d.).

Sustainability played a major role in the methods and materials used. Hygrothermal modelling allowed determination of the suitability of the solid masonry walls to be upgraded thermally. Wood fibre insulation was applied to the internal walls to reduce the cost of heating such a vast building whilst avoiding damage to the iron-frame structure, a key aspect of the Grade I listing (Williams, 2023). Together with the installation of a ground source heat pump, they're estimated to reduce carbon emissions by 23 to 45 tonnes per annum, (Historic England, 2023, p.19) with 3 quarters of the heating of the main mill being provided by the ground source heat pump (Boakye, 2025). A natural ventilation system was implemented that worked well with the site's large windows, high ceilings and good airflow pathways (Historic England, 2023, p. 20).

Figure 10: Illustrative sectional diagram of ventilation

Improved biodiversity and restoring the natural beauty of the site were other key aspects of the sustainable design, ensuring that the built environment works in harmony with ecological systems. Middlemarch Environmental monitored the area to assess the project's impact on species such as swifts, badgers and bats and, while the early construction did not have a positive effect on the wildlife, their habitats were safely moved, and subsequently reintroduced (Historic England, 2023, p. 21).

The materials for the project were locally sourced; Welsh slate was used for the roofing and repairs to metalwork was carried out in Shrewsbury and Wolverhampton. Locally sourced materials are not only sympathetic to the existing structure, conforming to listings requirements, but also reduce the carbon footprint of delivery. Traditional, sustainable materials such as lime mortar were used to repair masonry to ensure the fabric of the building was not damaged further. The whole project has minimised operational and embodied energy at every stage (Historic England, 2023, p. 20).

The project also provided an educational platform, allowing the community to understand and learn from the renovation. Through the Andrew Lloyd Webber foundation, they delivered work placements, site tours and training days, helping to increase community engagement (Feilden Clegg Bradley Studios, n.d.).

2.4 Adaptive Reuse

The Shrewsbury Flax Mill is an exceptional example of adaptive reuse. FCBS carbon calculation tools have estimated that due to 80% of the existing fabric being retained, the embodied carbon cost of the restoration would be 53 kgCO2e/m2, less than a tenth of the carbon cost of a new build of similar use (Pintos, 2023).

Ensuring the building was structurally sound required an innovative engineering solution, "knitting together" the masonry around the fragile cast iron beams to provide robustness and additional capacity, providing strength but also retaining the pioneering cast-iron structure (Feilden Clegg Bradley Studios, 2020). Reinstating the 110 previously blocked windows not only allowed natural light to flood the interior but also provided original Flax-era tiles which were used for the sills, reusing materials that reflect the building's industrial heritage (Historic England, 2023, p. 20).

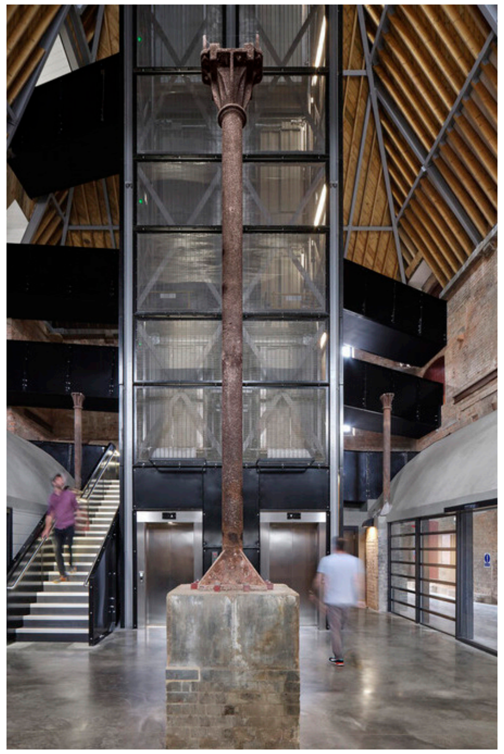

Figure 11: Interior of the flax mill after regeneration, displaying the cast iron column

2.5 Heritage constraints

The Flax Mill sits within a designated conservation area, forming part of a sensitive heritage cluster of eight listed buildings ranging from Grade I to Grade II (Historic England, 2023, pp. 1-9). Many of these were in a severe state of disrepair and formally identified on the Heritage at Risk Register. These factors meant that any redevelopment required an exceptionally careful conservation-led design approach. Working with a Grade I listed structure is particularly challenging as every intervention requires close consultation with Historic England, specialised conservation craftsmanship, and methods capable of stabilising fragile historic fabric. This inevitably made the process slower and more expensive (Historic England, 2023, pp. 9-15).

However, evaluation of the project shows that the heritage constraints ultimately strengthened the outcome. Stakeholders consistently highlighted that the overriding aim of the redevelopment was simply to save the derelict site (Historic England, 2023, p. 15), whose loss would have been a cultural disaster at both national and international level (Shropshire Council, 2022, p. 9). Its redevelopment shows that heritage legislation, though often challenging and resource-intensive, does not prevent a building from being upgraded to modern environmental standards. Instead, the project illustrates how innovative sustainability measures can be woven into the historic fabric without diminishing its architectural or cultural significance.

2.6 Outcomes and impacts

The Shrewsbury Flax Mill stands as a benchmark for heritage-led adaptive reuse, demonstrating how historic sites can be sensitively regenerated while meeting the demands of contemporary practice. The restoration work has been widely commended, receiving the Diaphoros Prize at the Georgian Group Architectural Awards in 2022 for outstanding conservation work (Flory, 2022).

Environmentally, the conservation work has delivered a high standard of best-practice restoration, saving approximately 900 tonnes of embodied carbon (Historic England, 2023, p.19).

The restoration has also generated substantial public benefits; Socially, the Flaxmill has provided new opportunities for skills development (Historic England, 2023, pp. 25-26).

Community pride has also increased, with early evidence indicating improvements in perceptions of safety and place, with a reduced crime rate (42%) and increased civic pride (Historic England, 2023, pp. 26-27), reinforcing the idea that people-based design, led by communities, forms an important part of good regenerative design practice (Rich, 2025).

Economically, the project has acted as a catalyst for growth: although £29m of public funding was required to secure the site, it is projected to generate around £64 million in economic value for the UK. The creation of new workspace, jobs, housing, and a major visitor attraction further strengthens the local economy (Historic England, 2023).

The project won the Europa Nostra award in 2024 for conservation and adaptive reuse, comments from the Jury included “Beyond its architectural significance, the project had a profound community impact, fostering engagement and skill development while creating employment opportunities. By carefully preserving original features and repurposing the building’s original materials where possible, its historical integrity was honoured. It sets a pioneering example for future projects of its kind” (European Heritage Europa Nostra Awards, 2024).

While the project did face challenges, including delays, high costs, and the complexities of Grade I, listed restoration (BBC News, 2014), these do not detract from its value. Rather, they highlight the need for continued investment in heritage-led regeneration and demonstrate that such projects, once delivered successfully, can make future schemes more feasible by providing a clear precedent and in time proving their long-term benefits. The scheme stands as “an exemplar of the quality that can be retrofitted into a Grade I listed building” (Boakye, 2025).

In combination these outcomes indicate that, while a successful example of adaptive re-use, the project clearly demonstrates many of the key features of regenerative design practice.

Figure 12: Exterior of the flax mill after regeneration.

Figure 13: Populated exterior image of the flax mill.

03 Bath Abbey Footprints

3.1 Context and history of the site

Figure 14: Service of worship in Bath Abbey in 1788

Bath Abbey occupies a site with nearly 2000 years of Christian heritage; its origins are traceable to 675 AD (Bath Abbey, 2023). The medieval complex evolved significantly over subsequent centuries, notably in 1088 when John of Tours, Bishop of Wells, commissioned a vast new Norman cathedral to replace the Anglo-Saxon abbey, fragments of which survive today (Bath Abbey, 2023). Construction of the present church began in 1499, following the cathedral's fall into ruin in the late 15th century, only to face another period of abandonment following Henry VIII's dissolution of the monasteries in 1539. It was restored once again in 1620 to be used as Bath's parish church and continued to adapt to the shifting religious, social, and architectural conditions of the city (Bath Abbey, n.d.).

Nineteenth-century interventions were particularly influential with George Phillips Manners reshaping the external character of the building through redesigned towers and new flying buttresses, while also reconfiguring the interior with additional seating and galleries (Bath Abbey, n.d.). Further alterations in 1863, included the installation of uniform pews, relocation of the organ, and most prominently the replacement of the nave's timber ceiling with the stone fan vaulting that now defines the Abbey's visual identity. The creation of the Gethsemane Chapel and Memorial Cloister in 1919 in memory of those who fought in the First World War as well as the extensive repairs post-World War II due to the bombing of Bath have also added to the building's chequered history (Bath Abbey, n.d.).

Figure 15: Stone fan vaulted ceiling

Despite the significant architectural changes to Bath Abbey over the centuries, the most ambitious recent intervention is the Footprints Project which was announced in 2010 and completed in 2023. The project addressed the unstable medieval floor, filling thousands of burial voids, combined with an innovative sustainable heating system and the creation of new educational facilities, culminating in the opening of the Discovery Centre (Heritage Fund, 2016).

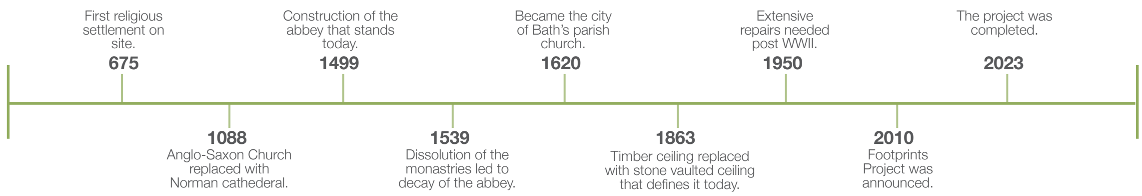

Figure 16: Timeline of the changes made to Bath Abbey

3.2 Conditions before intervention

Prior to the 2010 Footprints project, the abbey faced critical physical and environmental challenges that put it at risk. The most urgent issue to be addressed was the subsidence under the ledger stones caused by the decomposition of an estimated 7,000 bodies once buried under the floor, causing the ledger stones to be uneven and unstable (Regional Awards Jury, 2024). Also in need of regeneration was the existing heating system which was unable to efficiently heat the building, leaving congregants uncomfortable, soaring heating costs and risk of damp and decay (Bath Abbey, 2021). The building was also in need of adaptation to support community-based activities and contemporary liturgical practise.

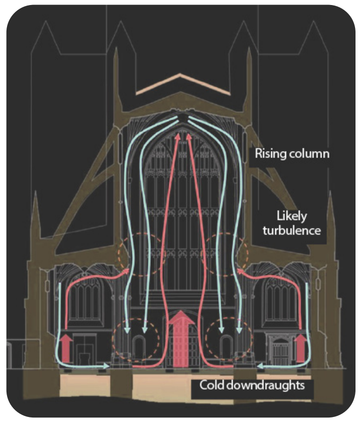

Figure 17: Sectional Diagram showing air circulation within the abbey prior to the footprints project.

Beneath the grade I listed structure, the cellars, originally created as accommodation for 17th century visitors, had also been decaying for many years. They were filled in with rubble when the nearby Kingston buildings, each with their own cellars, were built however, in the early 1830's these buildings were demolished to make way for a moat to be built around the abbey, leaving their cellar spaces neglected with no viable function (Cotswold Archaeology, 2017).

Not only were the physical aspects of the abbey in disarray, but also the educational facilities and interpretation were insufficient for a building of such significant religious heritage (Williams, 2022). Collectively, these conditions compromised the Abbey's structural resilience, operational efficiency, and role as a civic and cultural centre, making comprehensive renewal essential.

Figure 18: A 3D scan of the cellars under the Kingston Parade

3.3 Sustainability

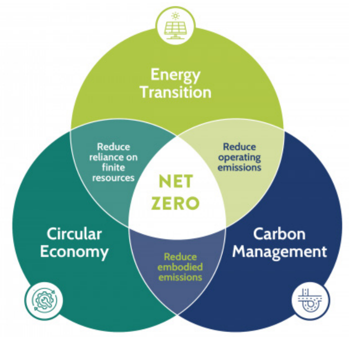

Figure 19: Diagram demonstrating how net zero can be met

The decay of the medieval floor paved the way for the architects and engineers to develop a new innovative low-carbon hydrothermal heating system, using Bath's natural thermal springs and heat exchangers to capture and transfer the heat to create a more efficient, controllable system that delivered up to 200 kW of energy. This innovative system in turn should help the Church of England reach its environmental goal of achieving net zero by 2030 (Regional Awards Jury, 2024).

3.4 Adaptive reuse

Bath Abbey has undergone numerous transformations throughout its long history, yet the recent Footprint Project represents its most significant contemporary renewal. The required lifting of nearly 900 historic ledger stones created an exceptional opportunity to integrate a new low-carbon heating system and to examine the long-neglected spaces below the pavements of the Kingston Parade. These previously infilled and damp cellars, were comprehensively analysed and subsequently utilised by the footprints project, becoming valuable new facilities, including a song school, education rooms, and a discovery centre (Williams, 2022).

The project extended beyond physical intervention, fostering a deeper connection

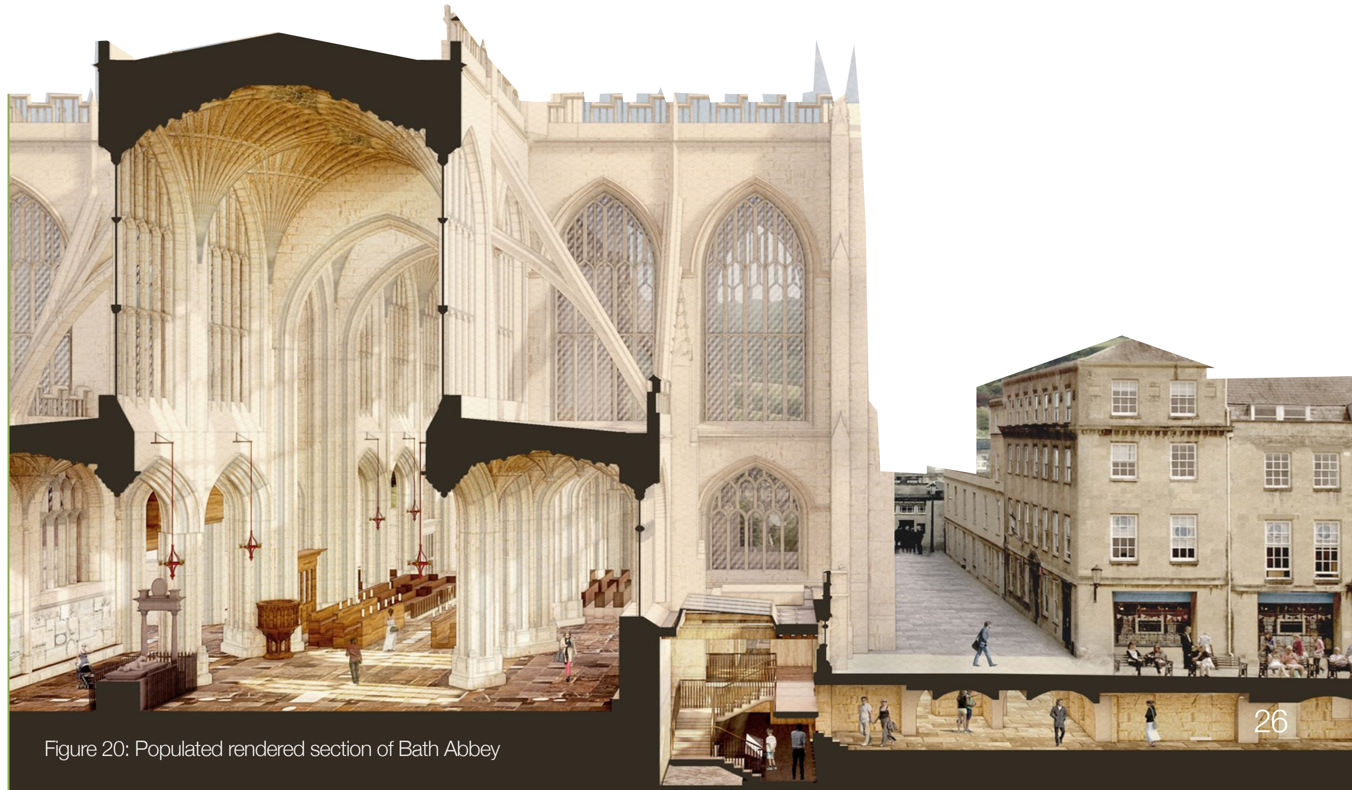

Figure 20: Populated rendered section of Bath Abbey

between the Abbey and the community it serves. The removal of the fixed Victorian pews enabled full scrutiny and conservation of the 891 memorial stones, revealing the names of roughly 1,500 individuals and uncovering around 56,000 artefacts (Feilden Clegg Bradley Studios, 2021). This work restored an essential chapter of Bath's social and religious narrative, sympathetically reintegrating the stories of those buried beneath the Abbey between 1625 and 1845. Such acts of careful restoration exemplify how adaptive reuse can reinforce cultural identity, enhance public engagement, and honour the historic fabric while enabling contemporary functionality.

Figure 21: Ledger stones relayed, reinstating a piece of Bath's history.

Charles Curnock, Director of the Footprint Project:

"Bath Abbey belongs to all the people of the city, and we hope very much that local residents will want to leave their own footprint here for hundreds of years to come."

(Heritage Fund, 2016a).

3.5 Heritage constraints

Bath is a city of exceptional historic significance, designated a UNESCO World Heritage Site in 1987 (City of Bath World Heritage Site, n.d.), with Bath Abbey playing a central role in this status. The Abbey's Grade I listing and prominent position within the city imposed substantial heritage constraints on the Footprint Project, limiting the extent of physical alteration and requiring an exceptionally sensitive approach to regeneration (Morris, 2021). In response, Feilden Clegg Bradley Studios adopted a conservation-led strategy of "protecting the past whilst preparing for the future" , 2021), demonstrating that adaptive reuse within highly protected heritage contexts is achievable through inventive, carefully considered and largely reversible interventions. Rather than imposing new architectural forms, the project worked with existing materials, crafts and hidden spaces, allowing contemporary systems such as the low-carbon heating and new community facilities to be integrated without compromising historic significance (Regional Awards Jury, 2024).

"protecting the past whilst preparing for the future"
Feilden Clegg Bradley Studios

In addition to physical constraints, the Abbey's continuous role as an active place of worship and major tourist destination within the World Heritage Site meant that prolonged closure was not a viable option. This directly influenced the project's timeline, with the floor reparations scheduled in three carefully planned phases to allow the Abbey to remain open throughout the ten-year programme (Regional Awards Jury, 2024). This approach not only minimised disruption to worship and tourism but also reinforced community engagement and public support for the project.

The presence of thousands of historic burials beneath the Abbey floor, meant that sensitive ethical treatment and extensive archaeological recording was required. While the careful conservation of memorial stones and burials was time-consuming, it ultimately strengthened the project's impact by uncovering and interpreting a previously hidden layer of Bath's social history. This material now informs the Abbey's Discovery Centre, ensuring that regeneration did not erase the past but instead made it visible, valued and accessible to future generations (Feilden Clegg Bradley Studios, 2021).

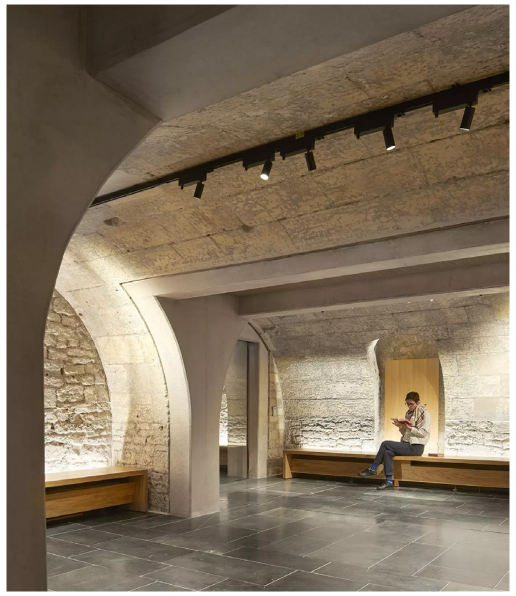

Figure 22: Renovated cellars

3.6 Outcomes and impacts

The Footprint Project has been widely recognised for its technical ingenuity and sensitive approach, receiving major accolades including the Architects' Journal Award in 2022 for its "simply knockout" scheme, demonstrating how a "1,000-year-old building can become a pioneer for a new, sustainable future, both in this century and the next" (Williams, 2022). Ultimately, the adaptive reuse of Bath Abbey has improved visitor circulation, enhanced the legibility of the site's heritage, and allowed the church to achieve its full potential (Feilden Clegg Bradley Studios, 2021).

The project has greatly decreased the carbon footprint of the abbey through the removal of the Victorian trench heating system and implementation of an underfloor system that utilises the pre-existing thermal energy running beneath the city, delivering up to 200kW of energy to heat the building and contributing to the Church of England's ambitious goal of an 80% carbon reduction by 2050 with an interim 2020 target of 42% (Regional Awards Jury, 2024).

Figure 23: Drawing of the site of Bath Abbey

Figure 24: Interior of Bath Abbey

...adaptive reuse is a process that lends itself effectively to regenerative design, as it allows regenerative strategies to be shaped by the pre-existing cultural, structural and social conditions embedded within the fabric of the building.

Conclusion

The Shrewsbury Flax Mill and Bath Abbey projects demonstrate that strict heritage constraints, while often perceived as barriers to change, can instead act as catalysts for innovation. Although both buildings are Grade I listed and required urgent intervention, each demanded a very different approach; Bath Abbey, located at the heart of a UNESCO World Heritage Site, needed to remain open for daily worship and a continuous flow of visitors, necessitating a highly conservative, light-touch strategy, ensuring the protection of its historic fabric while allowing discreet contemporary interventions to modernise the building and improve its environmental performance.

Shrewsbury Flax Mill, on the other hand, as a former industrial site, required a more rigorous intervention to maintain its infamous iron-framed structure, which had suffered significant deterioration following decades of neglect. Due to its industrial character, the conservation requirements allowed for a more visible and robust approach to repair and adaptation, enabling structural strengthening and the integration of contemporary systems to support new uses.

This dissertation explores the contribution that adaptive re-use can make to regenerative architectural practice. According to Architects Declare (Architects Declare, 2024), the key components of a regenerative design approach are:

- To be a good ancestor
- Create a just space for people
- Coevolve with nature

Taking the first case study, the Shrewsbury Flax Mill, it is apparent that, while the listing constraints made the project more challenging to undertake, the adaptive re-use of the building contributed to many aspects of regenerative design.

The sustainability derived from retained carbon and improved internal insulation, means that it sits within the ‘Create a just place for people’ component, as does the use of local materials and expertise.

The community involvement and educational element of the development, together with the multifunctionality of the building and projected economic benefits that the adaptive re-use of the building has brought meet the ‘Becoming a good Ancestor’ criterion. In fact, the local community has shifted position, from ‘demolish this eyesore’ to local pride in the building’s industrial heritage and architectural importance.

Improved biodiversity of the site, through the reintroduction of species and their habitats, together with improvements to the natural beauty surrounding the Flaxmill also meet the criteria for the ‘Co-evolve with nature’ component.

The Flax Mill has become more appreciated by the community, strengthening the pride in the once derelict building, adopting a more circular approach and therefore aligning with regenerative principles.

The analysis of the Bath Abbey footprints projects also gave clear insight into the ability of adaptive reuse to meet regenerative design criteria.

The use of Bath’s natural geothermal springs to implement underfloor heating, meets the criterion of ‘Creating a Just space for People’ as it harnesses natural energy flows.

The re-laying of the ledger stones and re-imagining of the cellars beneath the Kingston Parade to create a song school and discovery centre along with the archaeological recording and conservation of memorial stones meets the requirement of ‘Becoming a Good Ancestor’.

Despite their differences, both projects adopted conservation-led strategies that prioritised the retention of historic fabric while integrating contemporary technologies and new uses. In both cases, carbon emissions were reduced through the preservation of embodied carbon, key in adaptive reuse, alongside innovative approaches to heating and insulation that lower operational energy demand.

This research demonstrates that, when considering heritage buildings, adaptive reuse is a process that lends itself effectively to regenerative design, as it allows regenerative strategies to be shaped by the pre-existing cultural, structural and social conditions embedded within the fabric of the building. Adaptive reuse also supports sustainable development through the retention of embodied carbon and the reduction of demolition waste, extending the lifecycle of existing buildings and aligning with regenerative and circular principles. By minimising unnecessary material loss and encouraging long-term use, adaptive reuse enables the built environment to give back to those who inhabit it, fostering environmental stability and community pride while maintaining architectural heritage. However, adaptive reuse is by no means an easy option; restoring deteriorating listed buildings presents significant technical and regulatory challenges.

Despite the challenges, these projects, alongside others, can serve as important precedents that help to further educate the industry, in turn encouraging the development of improved methods and technologies. As this approach becomes more widely recognised and understood, the process of adaptive reuse is likely to become more straightforward and more confidently adopted within architectural practice.

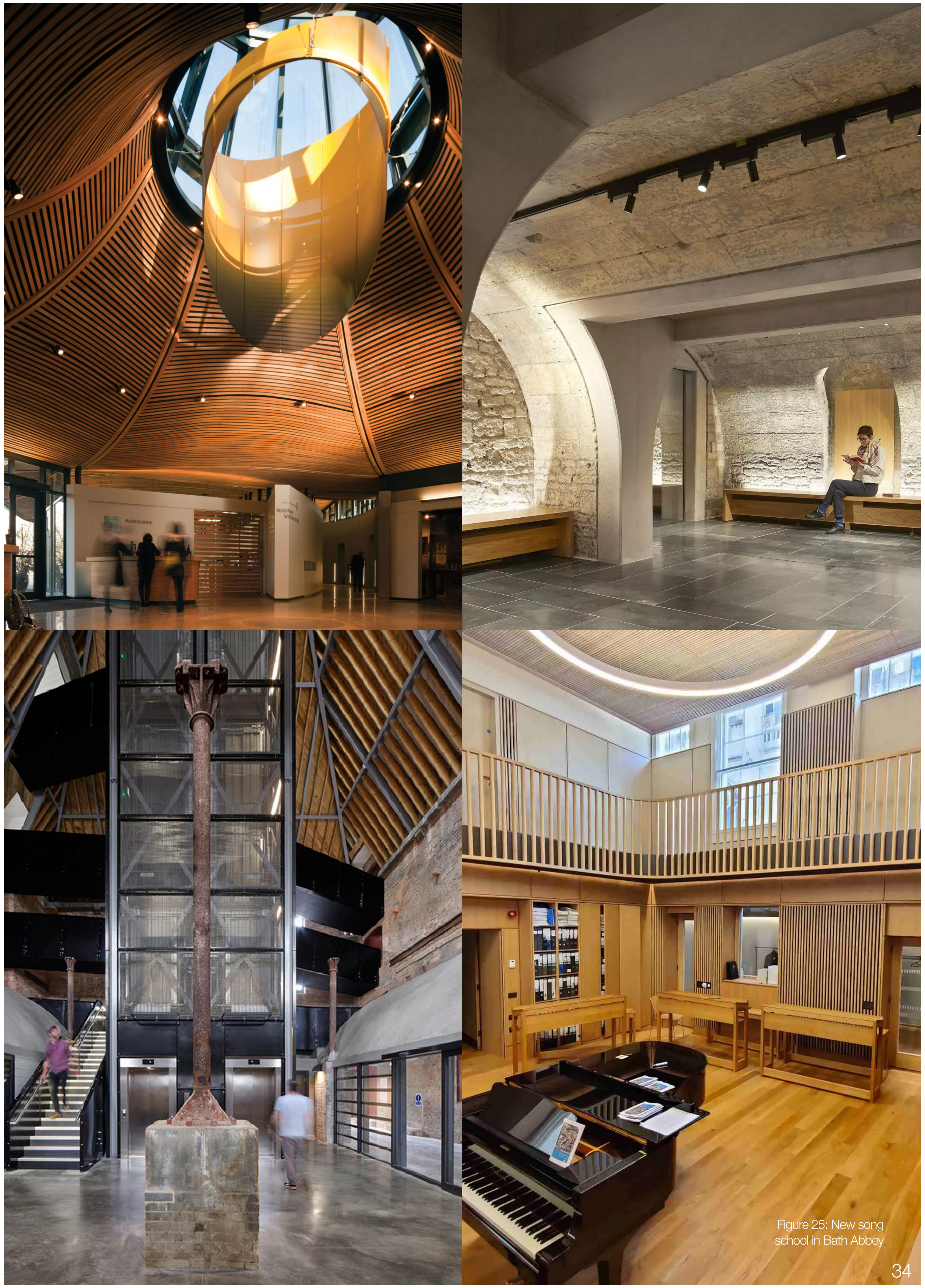

Figure 25: New song school in Bath Abbey

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List of figures

Figure 2: Perkins&Wills (no date) *Central Oculus of VanDusen Botanical Garden Visitor Centre* [Photograph]. Available from: https://perkinswill.com/project/vandusen-botanical-garden-visitor-centre/ [Accessed 5 January 2026].

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Figure 22: Newton, J. (no date) *Renovated cellars FCB studios* [Photograph]. Available from: https://fcbstudios.com/projects/bath-abbey/ [Accessed 5 January 2026].

Figure 23: Fielden Clegg Bradley Studios (no date) *Drawing of the site of Bath Abbey FCB studios* [Drawing]. Available from: https://fcbstudios.com/projects/bath-abbey/ [Accessed 5 January 2026].

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