



JULY 2026

Halifax Minster

Sustainability Strategy



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Contents

Executive Summary 04

1.0 Objectives and methodology 07

1.1	Project objectives	08
1.2	Project team and structure	08
1.3	Methodology	09
1.4	Previous studies and reports	09

2.0 Context 10

2.1	Overview	11
2.2	Organisational context	11
2.3	Sustainability commitments	11
2.4	Site location and surroundings	13
2.5	Historic development	14
2.6	Heritage significance	15
2.7	Use and users	16
2.8	Construction and condition	20
2.9	Climate analysis	25
2.10	Energy and carbon	27
2.11	Nature and ecology	28
2.12	Planning and regulatory context	29

3.0 Sustainability principles 30

3.1	Eco Church Framework	31
3.2	Stakeholder engagement	32
3.3	Halifax Minster Sustainability Principles	33
3.4	Useful precedents	34

4.0 Opportunities 35

4.1	Summary	36
4.2	Energy and carbon	35
4.3	Fabric upgrades	39
4.4	Services and systems	44
4.5	Spatial opportunities	45
4.6	Water management	46
4.7	Biodiversity and nature	47
4.8	Community engagement	48

5.0 Option comparison 49

5.1	Options	50
5.2	Reducing demand and decarbonising heat and energy	51
5.3	Capturing broader sustainability and community benefits	55
5.4	Whole life carbon	56

6.0 Conclusion and next steps 57

6.1	Key considerations	58
6.2	Additional surveys and investigations	59
6.3	Next steps	59

Appendices

A	RIBA 2 Heating Feasibility Study	
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Executive Summary

This report has been produced by Purcell, on behalf of the Reverend Hilary Barber and Halifax Minster Development Board. Its purpose is to set out a sustainability strategy for the Minster which aligns with the Minster's strategic plan, liturgical plan, conservation management plan, and with the Church of England's broader net zero goals.

The intention is that the proposals put forward in this strategy can be costed and used to support the Minster's long-term strategic development goals.

This report should be read in conjunction with the appended report produced by TGA Engineers who have developed the strategy for services and systems which work towards removing fossil fuels from the Minster, reducing energy consumption, and improving energy security.

The following page summarises the long-term sustainability vision for the Minster which is set out in more detail throughout this report. It demonstrates how an incremental, whole building approach to sustainability will combine fabric repairs and upgrades, services interventions, biodiversity improvements, climate resilience, and community engagement.

Page 6 provides a simple routemap for how the Minster might implement the measures described, with specific actions and indicative timescales structured around:

- Mobilise and evidence
- Reduce demand
- Decarbonise heat and power
- Capture broader sustainability and community benefits

Subsequent chapters set out context of the Minster, drawing on previous studies carried out. Summarised within Section 2 is an overview of the building's history, significance, condition, use, climate, and legislative context. This analysis has informed the development of the strategy and opportunities discussed in later chapters.

Six sustainability principles are described. These have been borne out of the Eco Church Framework, the Minster's Strategic Plan, and the outcome of the community engagement event held during the Festival of Faith in 2025.

These are:

- Community
- Energy & carbon
- Water management
- Access & connectivity
- Materials & waste
- Biodiversity & nature

Opportunities discussed in Section 4 are intended to capture all possibilities relating to the above six themes. These have then been collated into three scenarios:

Light retrofit
Medium retrofit
Deep retrofit

These scenarios help compare the different impacts of measures described, and setting out how these might be incrementally achieved. There is a strong focus on energy efficiency and low carbon solutions in all scenarios. In order to assess the implications of each scenario, TGA has undertaken dynamic thermal

modelling following the energy hierarchy by prioritising demand reduction through fabric improvements and efficient systems before renewable energy generation.

The conclusion of the modelling exercise demonstrates that high temperature air source heat pumps deliver significant carbon reductions across all scenarios, with the greatest savings in energy use achieved when combined with 'deep' level fabric improvements.

Low temperature air source heat pumps with localised pew heaters deliver the greatest energy savings by focusing on occupant comfort rather than heating the building in its entirety.

Overall, the best performance is achieved through a combination of fabric improvements and low carbon technologies, subject to capital cost analysis. More detailed assessment of the results is included in TGA's RIBA Stage 2 Heating Feasibility Study, appended to this report.

Recommended next steps are included in Section 6. More detailed capital costs for the proposed interventions should be sought, with a clear strategic plan for delivery developed, based on available funding opportunities. Requirements for further investigations and design development are also described.

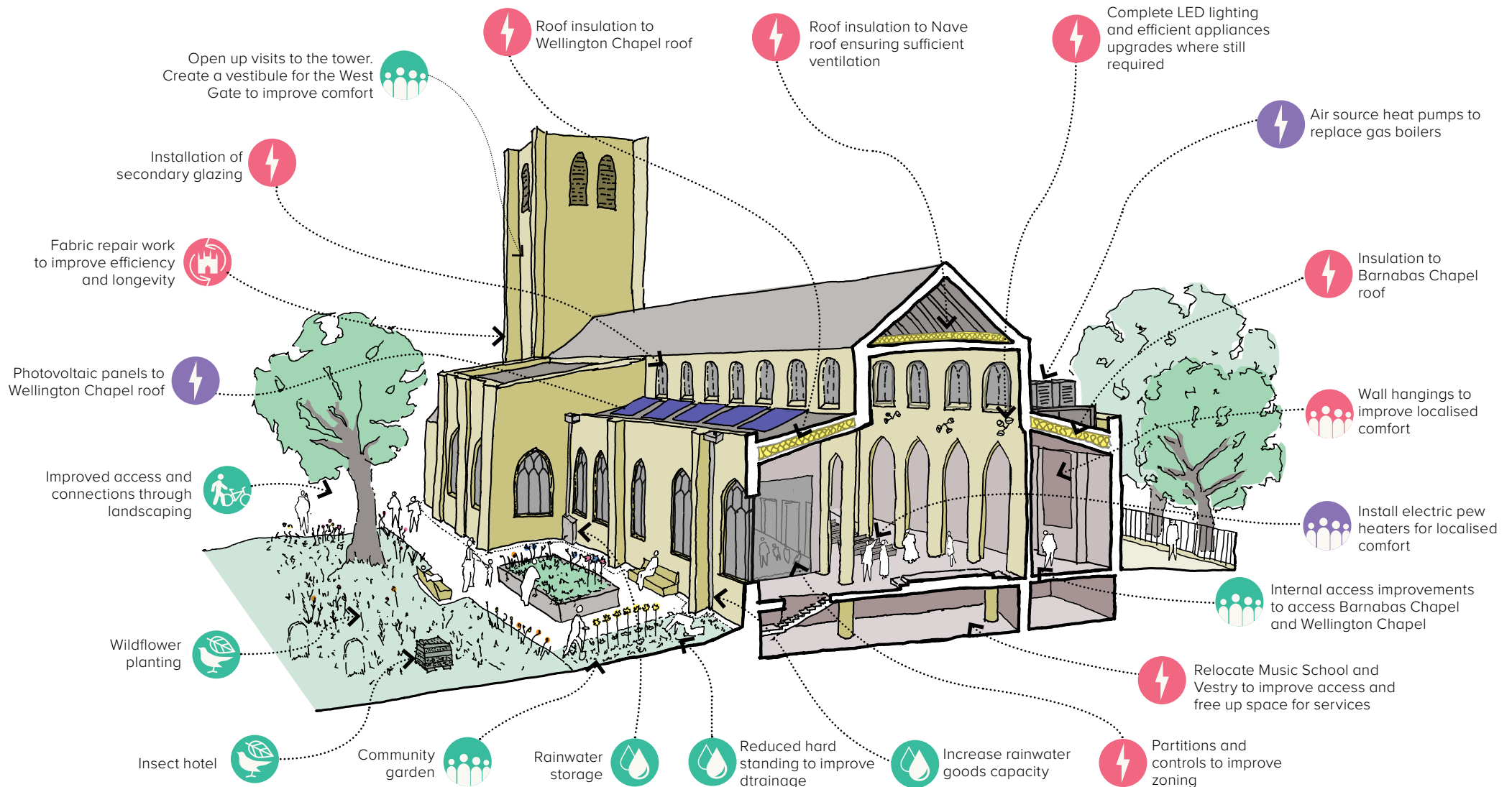
Executive Summary

Halifax Minster Sustainability Vision

Reduce demand ●

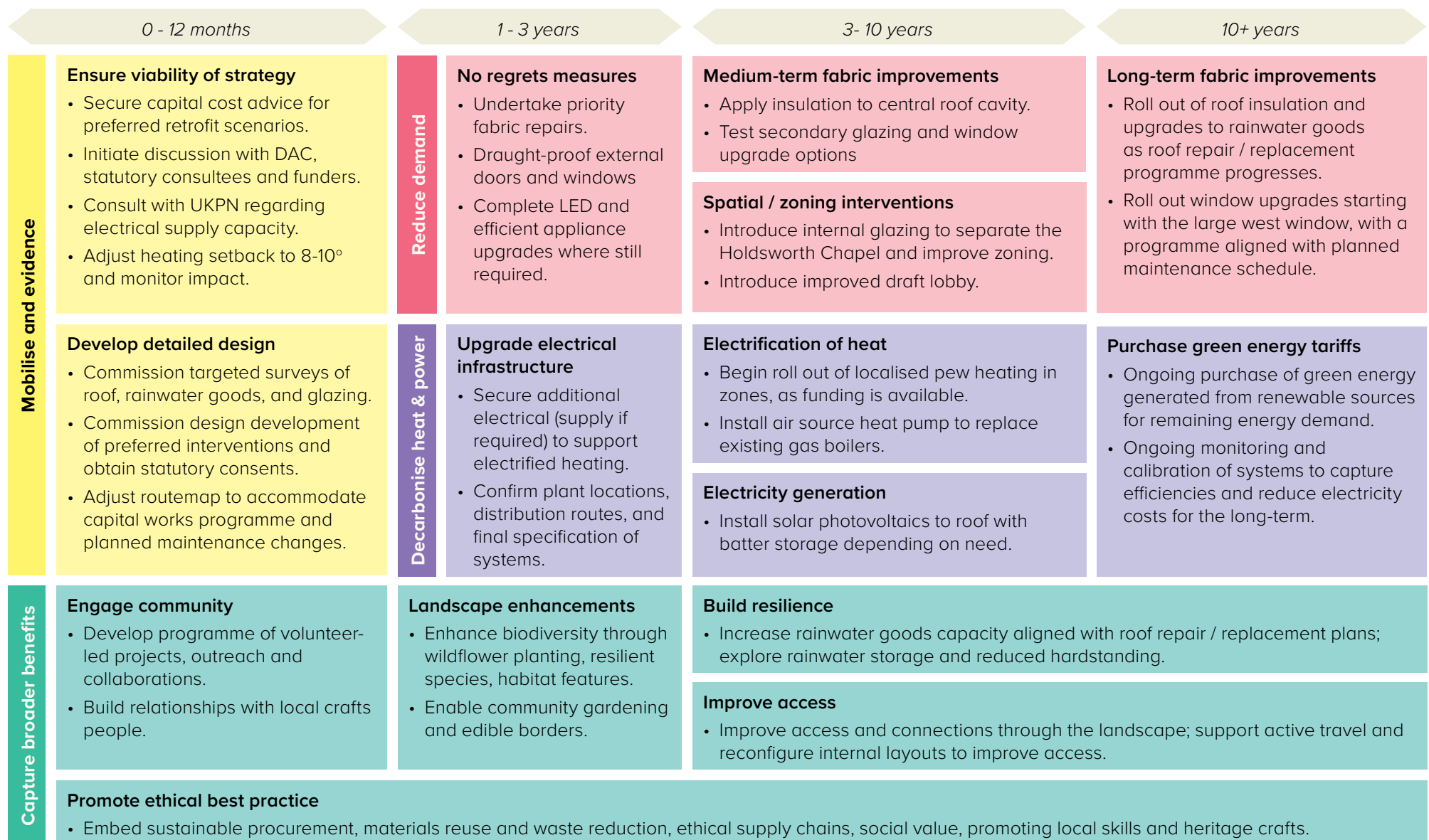
Decarbonise heat and power ●

Capture broader benefits ●



Executive Summary

Halifax Minster Sustainability Routemap



Section 1

Objectives and methodology

1.0 Objectives and methodology

1.1 Project objectives

The purpose of this report is to set out a strategic sustainability vision for Halifax Minster, and a strategy for delivery. The strategy aligns with the Minster's Strategic Plan, Liturgical Plan, the Conservation Management Plan, and with the Church of England's net zero aspirations. It takes into consideration the sensitive nature of this important heritage asset and the constraints of building. The aim is for this strategy to inform strategic development plans, and support future funding applications.

1.2 Project team and structure

This strategy has been developed by Purcell and TGA Engineers. TGA Engineers have provided energy modelling to support the optioneering and assessment process. They have produced a separate report which is included within Appendix A, and should be read in conjunction with the main report.

Halifax Minster as the client body for this report has been represented by:

- Reverend Cannon Hilary Barber, Vicar of Halifax Minster
- Andy Barber, Halifax Minster Operations Manager

The brief for this piece of work has been developed over a number of meetings and workshops with the client team, including:

15th May 2024

Laura Baron presentation to the Development Board to explain what a sustainability strategy would look like and what the benefits are.

19th March 2025

At the Festival of Faith, several team members from Purcell hosted a workshop with community members from Halifax, to understand what the key drivers for the sustainability strategy should be.

15th January 2026

A project Inception meeting was held with Hilary Barber and Andy Barber, Purcell and TGA to agree the methodology and outputs of the project.

26th March 2026

Purcell and TGA attended a site visit and conducted a high-level visual survey of the building and services.

3rd June 2026

An presentation to the Development Board to update on progress and receive initial feedback.



South elevation of the Minster looking west.



Presentation given by Purcell at the Festival of Faith

1.3 Methodology

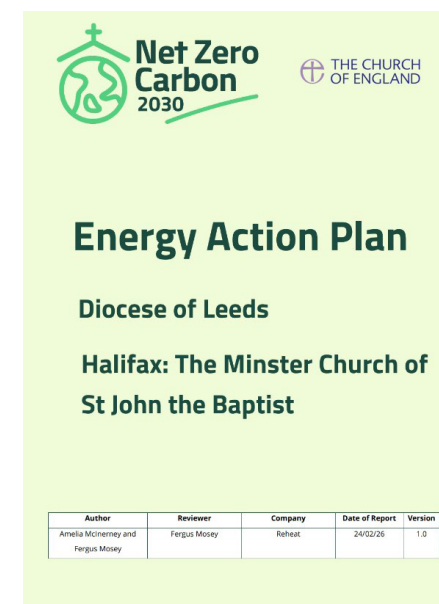
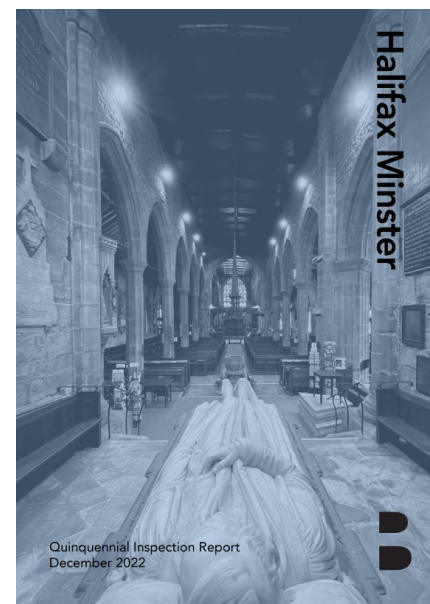
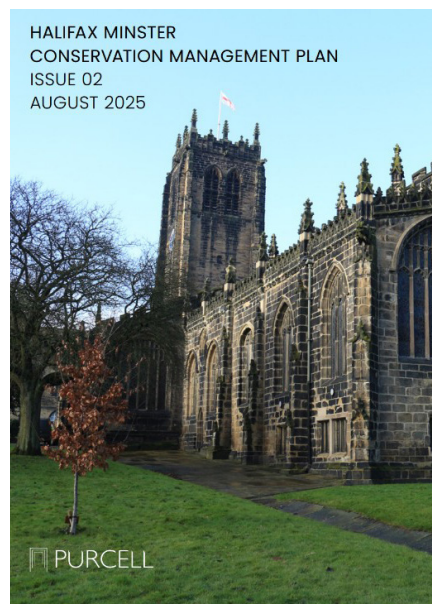
In collaboration with TGA Engineers, our approach to developing this strategy has included the following:

- A high-level assess of the existing condition and construction of the building. A site visit was undertaken alongside a meeting with the facilities team to understand current operational requirements, use and condition.
- A high-level review of building fabric, significance, performance, energy use, carbon emissions, and services (by TGA)
- Assessment of patterns of use, comfort, behaviours, and existing environmental and social qualities.
- Identification of risks and opportunities, including climate risks and maladaptation.
- Testing of opportunities against impacts on energy use, carbon emissions, climate resilience, heritage significance, building use, and wider social and environmental outcomes.
- Presentation to the Development Board to review baseline findings, agree preferred opportunities, and confirm strategic direction.
- Development of an integrated sustainability strategy aligned with maintenance and development plans, including phasing, delivery, and next steps.

1.4 Previous studies and reports

Several pieces of work have been carried out prior to the development of this work which have informed the strategy. These include:

- *Halifax Minster Conservation Management Plan, 2025, Purcell Architects*
This report provides the basis for our understanding of heritage significance at Halifax Minster. Works discussed in this report have taken the recommendations set out in the CMP into account.
- *Halifax Minster: Quinquennial Inspection Report, December 2022, Butress Architects*
This report highlights repair work which is needed in the short, medium and long-term. These works have been considered throughout this report, and will inform future phasing strategies.
- *Energy Action Plan, February 2026, ReHeat*
This report was undertaken to provide advice on how the Minster can be more energy efficient, provide a sustainable and comfortable environment, and move towards net zero carbon. This sustainability strategy expands on this initial report.



The above reports have all informed the development of this strategy

Section 2

Context

2.0 Context

2.1 Overview

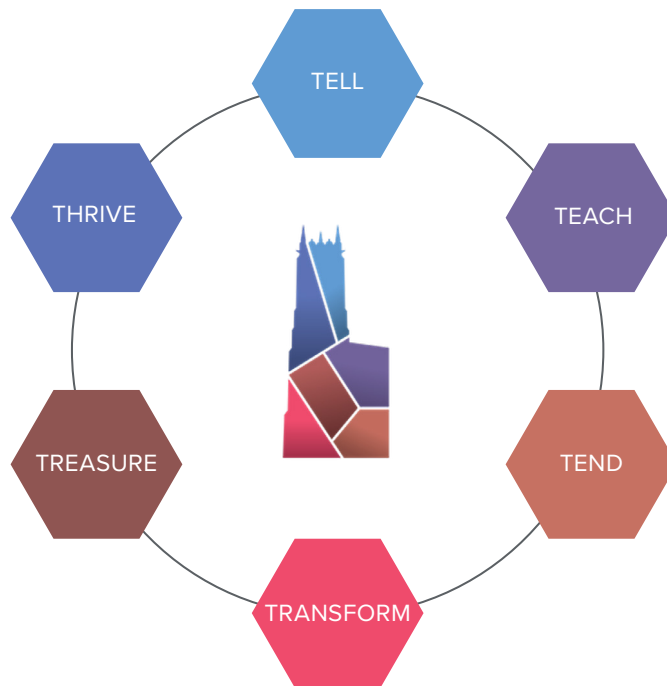
Halifax Minster, officially the Minster Parish Church of St John the Baptist, is a Grade I listed building of exceptional heritage significance located in Halifax, West Yorkshire. It functions as a focal point for daily worship, civic events, and the arts. The current structure is primarily an excellent example of 15th-century Perpendicular Gothic architecture. The building is celebrated for its rare 17th-century box pews, iconic heraldic panelled ceilings added in 1636. Formerly the Halifax Parish Church, it was officially raised to Minster status in 2009.

2.2 Organisational context

Halifax Minster plays an active role in supporting the local community, alongside its religious functions. It regularly hosts community events, concerts, exhibitions, and educational activities, making the building a shared cultural space as well as a place of worship.

Halifax Minster's Strategic Plan set out the church's six objectives for 2021-2026 with the aim that the church can continue to deliver its mission which is based on 900 years of Benedictine spirituality.

A new Strategic Plan is being developed which will align the Minster's objectives with the 5 P's of the United Nations Sustainable Development Goals: people, planet, prosperity, peace, and partnership. Added to this, will be praise. The new plan will run from 2027-2034, to align with Calderdale's Vision 34. This will sit alongside



The six objectives of Halifax Minster Strategic Plan 2021-2026

the Minsters effort to reduce its dependance on fossil fuel and overall ambition to serve not only as a historic landmark but also as an example of best practice for the community (locally and globally), demonstrating that careful stewardship of our planet and our built heritage, can act as a catalyst for community cohesion and prosperity.

2.3 Sustainability commitments

The Church of England recognise the climate emergency and the necessity of a strong, visible, Christian response to what is happening to our world. In February 2020, General Synod set the Church of England an ambitious challenge: to reach net zero carbon across our parish, cathedral, diocesan, and school estates by 2030. It recognised the mission of the Church is the mission of Christ and the Fifth Mark of Mission is to strive to safeguard the integrity of creation, and to sustain, and renew the life of the Earth.

In response, the Church of England has produced its Routemap to Net Zero Carbon by 2030 and established a national Net Zero Programme. Church decarbonisation is a key workstream within the programme and funding has been allocated to provide Energy Action Plans for the highest emitting churches to understand what measures will help that church reach net zero carbon. An Energy Action Plan was provided by ReHeat for Halifax Minster, and this Sustainability Strategy builds on the outcomes of that plan.

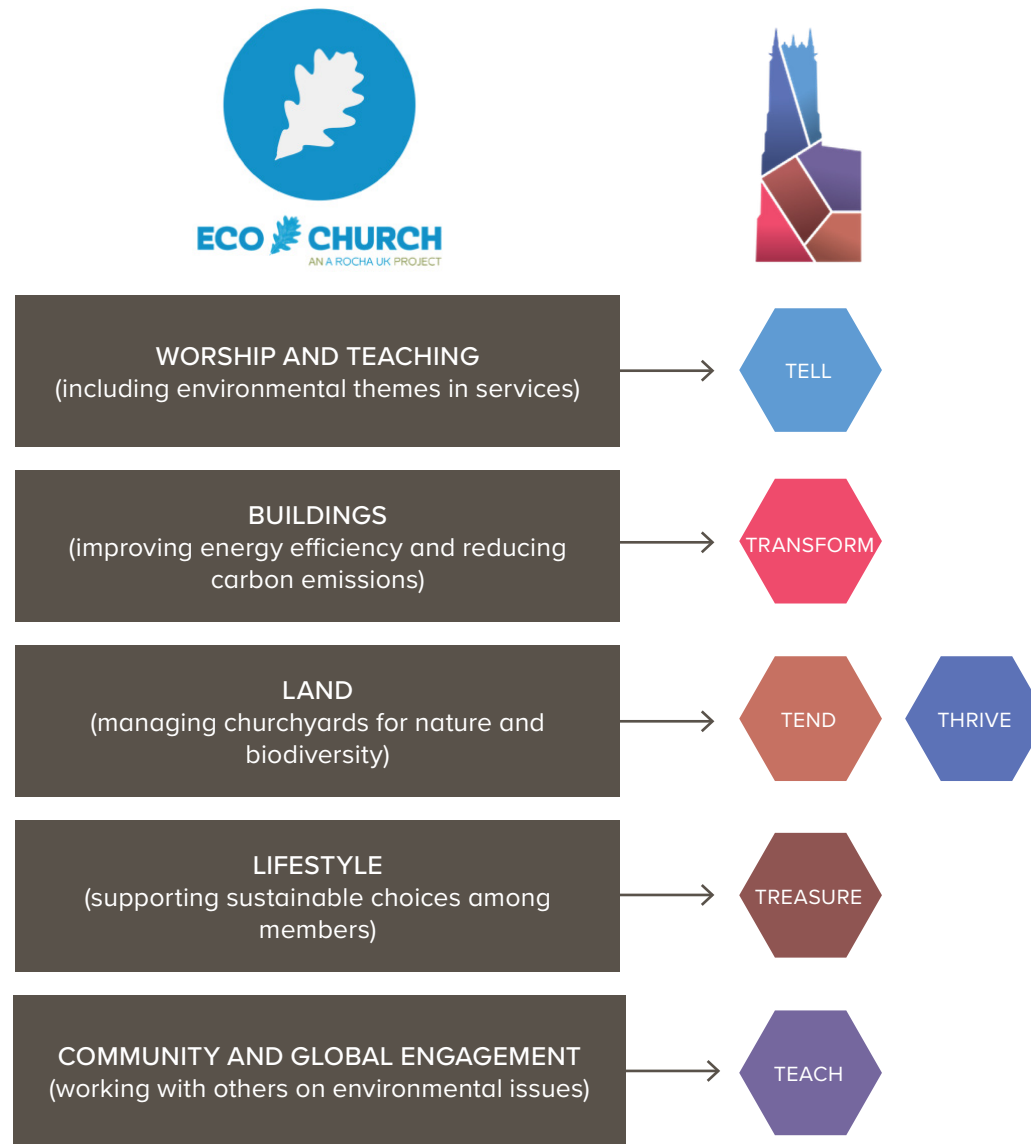
The Leeds DAC is committed to encouraging best practice in every matter relating to church buildings. Increasingly, this includes environmental sustainability and energy efficiency, reflecting the Leeds Diocesan Environmental Policy and the General Synod commitment to reaching zero carbon by 2030.

The Eco Church programme, run by A Rocha UK, supports churches in taking practical action to care for the environment as an expression of their faith. It encourages congregations to integrate sustainability into all aspects of church life.

By assessing their progress in these areas, churches can work toward Bronze, Silver, and Gold awards, which recognise increasing levels of environmental commitment. Widely adopted across the Church of England, the programme helps churches contribute to the wider goal of reaching net zero carbon while also strengthening their role as environmentally responsible and community-focused institutions.

Eco Church is based around five core themes. These have been aligned against the six objectives of the Halifax Strategic Plan. This has formed the basis for the structure of this strategy.

Halifax Minster has achieved Eco Church Bronze rating and is currently working towards Silver. The proposals set out in this report align with the themes set out in Eco Church and if implemented, would put the Minster in an excellent position to achieve Gold.



2.4 Site location and surroundings

Halifax is a town in the Metropolitan Borough of Calderdale, in West Yorkshire, England. It is located in the south-eastern foothills of the South Pennines.

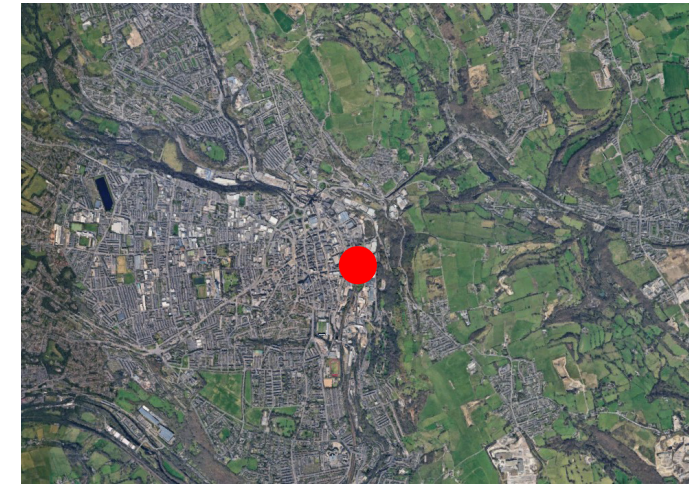
In the 15th century, the town became an economic hub of the old West Riding of Yorkshire, primarily in woollen manufacture with the large Piece Hall square later built for trading wool in the town centre.

In the 2021 census, the town was recorded as having a population of 88,134. It is also the administrative centre of the Calderdale Metropolitan Borough.

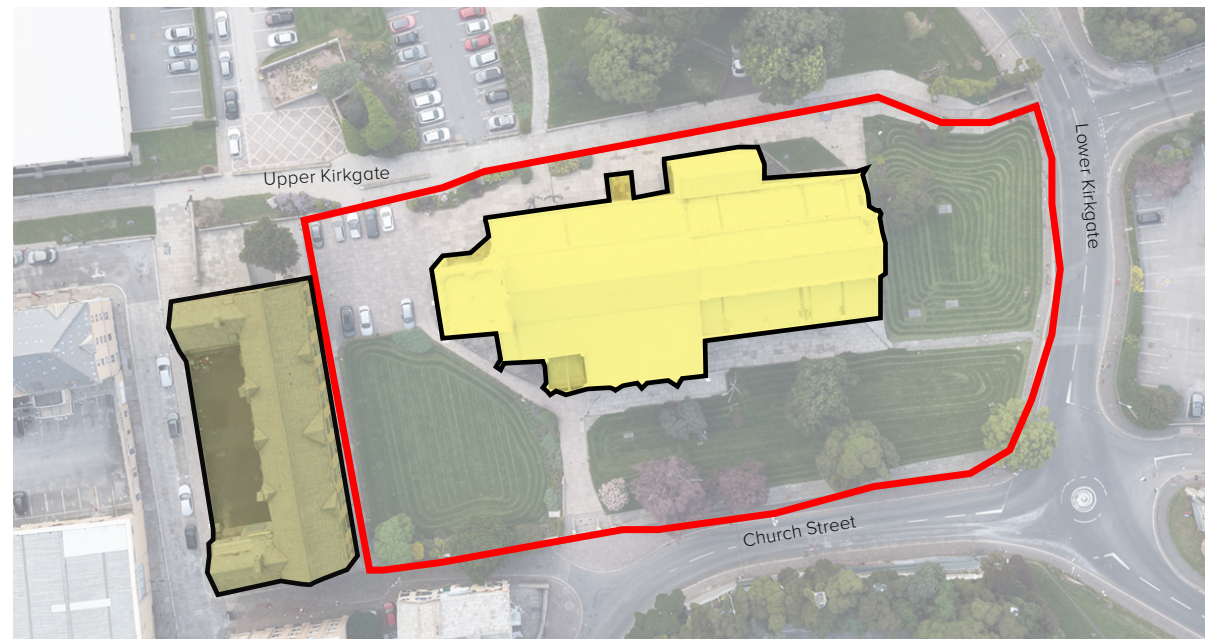
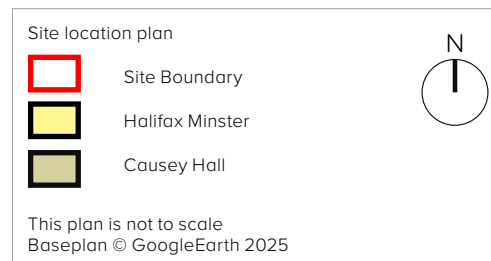
Halifax Minster is located to the east of the town centre, on Church Street, in an approximately 1.4 acre plot bounded by a pedestrian walkway to the north, the streets of Lower Kirkgate and Church Street to the east and south, and Causey Hall to the west. The Church sits to the north of the churchyard aligned on a broadly east-west axis with principal entrances to the site at the south and west boundaries. Car parking is located in the northwest corner of the site.



Halifax is situated in West Yorkshire, England.



Halifax Minster is to the east of the town centre.



2.5 Historic development

Halifax Minster is a historic parish church in the centre of Halifax, West Yorkshire, officially dedicated to St John the Baptist. Its origins date back to at least the 12th century, though the present building largely reflects 15th-century Perpendicular Gothic architecture. The church grew in importance alongside Halifax's development as a centre for the wool and textile trade, serving a vast medieval parish. Notable features include its tall tower, fine stonework, and the Eure family monuments.

The present church building largely dates from a major rebuilding during the 15th century, reflecting the growing wealth of the town generated from the wool trade. The church was rebuilt with a long 5-bay choir with aisles, 5-bay nave with aisles and a west tower. A south porch and side chapels to north and south aisles were added in the early 16th century.

Below the chancel is a crypt, later used for library and vestries. The 15th century rebuilding appears to have taken place in phases; the 3 east bays of the choir, choir clerestory, south porch and tower belong to the later phases. The octagonal stone piers of the nave arcade are part of the initial nave rebuilding of 1437.

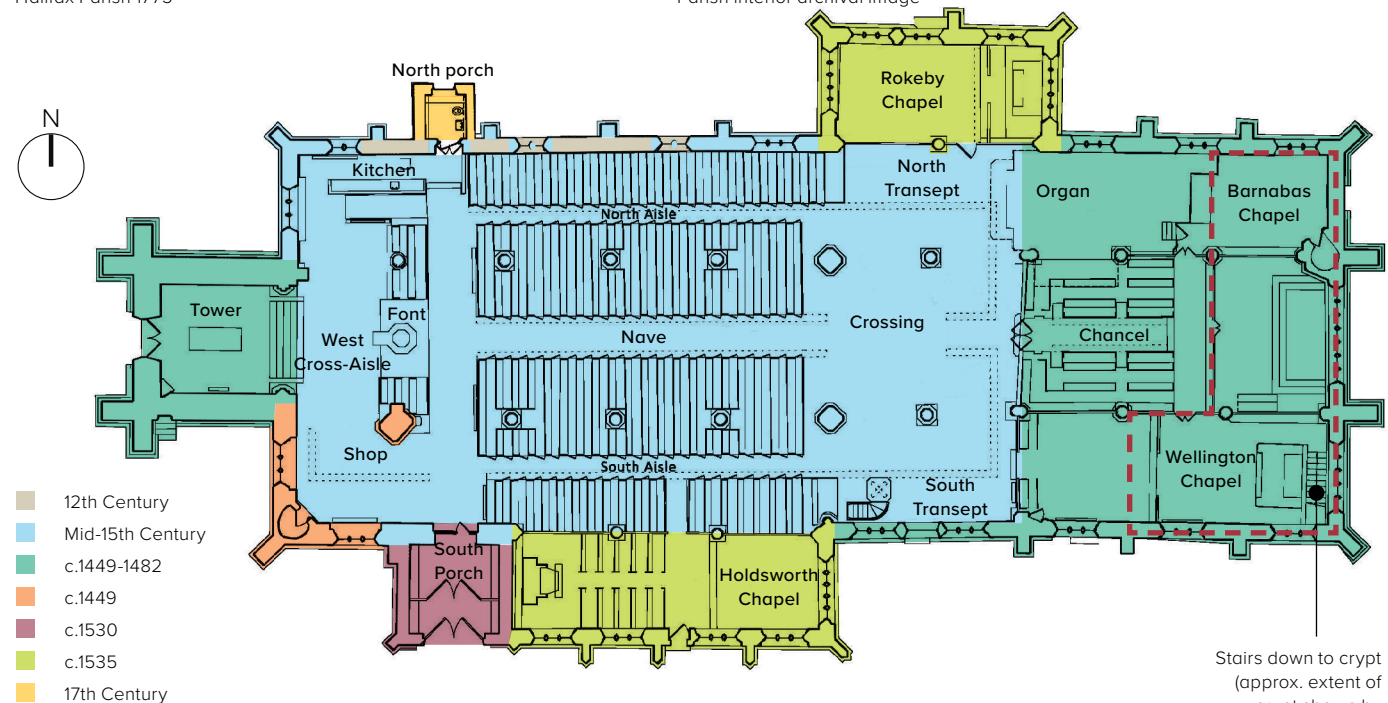
The choir west of the chancel screen now forms the eastern 2 bays of the nave; the chancel arch on large, diagonally set piers is now within the nave. A south-west tower was planned but not completed; the massive pier and mural stair in the south-west corner relate to this. The west tower was built between c.1450 and 1480, and the east window was finished in 1480.



Halifax Parish 1775



Parish interior archival image



Historic development plan (not to scale, taken from CMP)

Stairs down to crypt
(approx. extent of
crypt shown by
dashed outline)

2.6 Heritage significance

The Conservation Management Plan sets out the heritage significance of the Minster in more detail. Below is a summary.

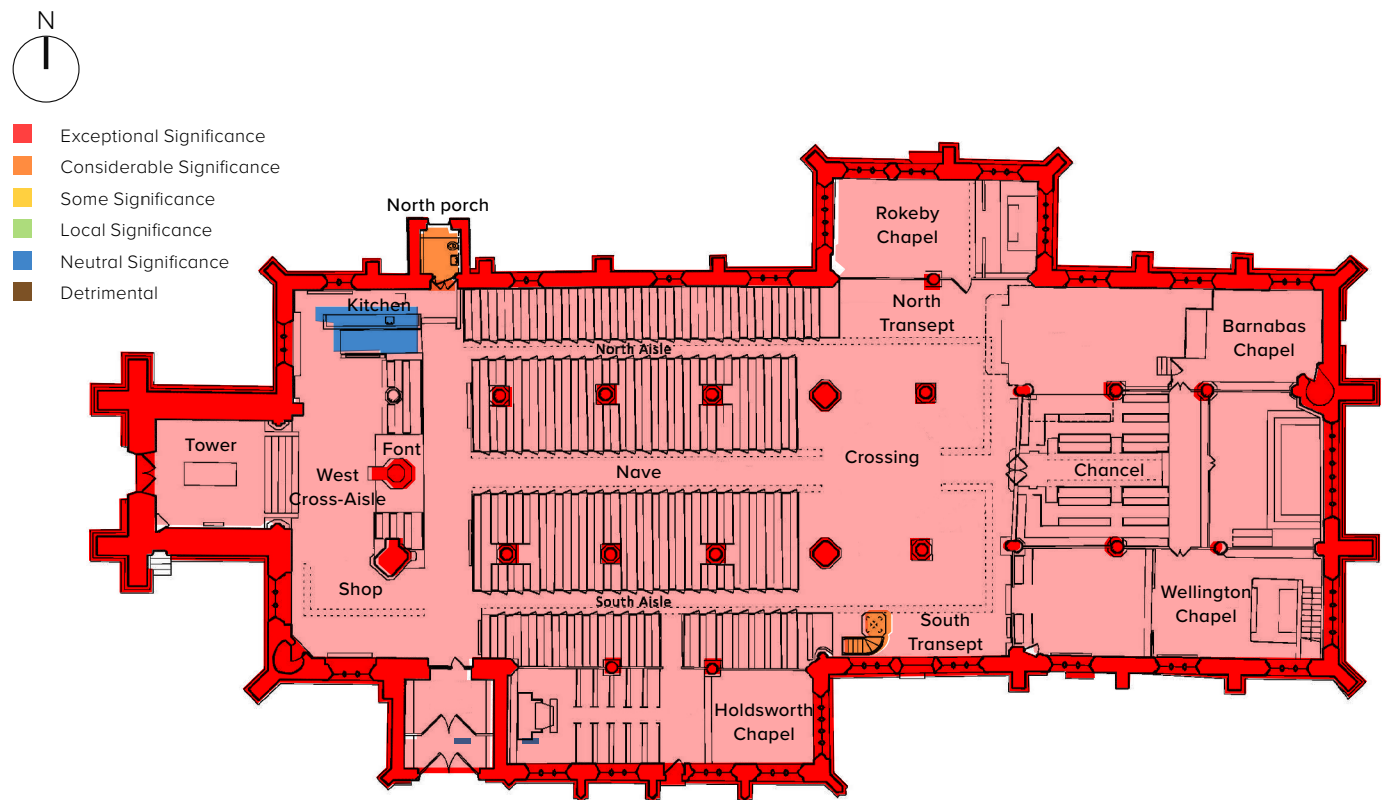
Halifax Minster is a grade I listed building of exceptional significance, with nationally important historical and architectural interest.

It is significant for its continued use as a site of Christian worship since Norman times. The Minster has the potential to inform understanding of the development of Christian places of worship in England over this period.

Study of the church and its various elements has been undertaken, but questions still remain about the first church on site, part of which is incorporated in the north wall of the extant building.

Architecturally, the Minster is an excellent example of a Perpendicular Gothic church and retains a very fine collection of stained glass windows. It retains a large number of individual fixtures and fittings, such as screens, pews and memorials which add a high level of architectural and artistic interest to the Minster.

The Minster is associated with many key figures in Halifax's history, including the famous 19th century diarist, Anne Lister, and local philanthropists, the Waterhouse family. It illustrates changing patterns of worship and commemoration over centuries and continues to be a focal point for the community.



Significance plan (not to scale, taken from CMP)

2.7 Use & Users

The way a church is used has a significant influence on both its energy consumption and the level of comfort experienced by those seated during services and events. When people remain seated for extended periods, maintaining a comfortable environment becomes particularly important. This study therefore prioritises such spaces, recognising that improving thermal conditions can greatly enhance the overall experience for congregants.

Comfort for seated occupants is influenced not only by the indoor air temperature but also other factors such as the surface temperature of the building fabric itself. Where there are known issues with damaged building elements, or where people are stationary for long durations, targeted improvements should be prioritised to ensure a welcoming and usable space. The assumptions outlined here have been made to guide this assessment.

Religious worship

Halifax Minster holds three services on a weekday which normally last about 30 minutes each. On Sundays, there are two longer services held at 10:30am and 4:00pm which last up to 1.5 hours.

The areas of worship are not only limited to the main body of the church, but also smaller chapels; Rokeby, Wellington and Holdsworth Chapels. Weekday services rotate locations between these three chapels.

There is also Barnabas Chapel located by the Chancel, however it is currently not open to public or used for services.

Halifax Minster hosts a wide range of activities and events.

Events

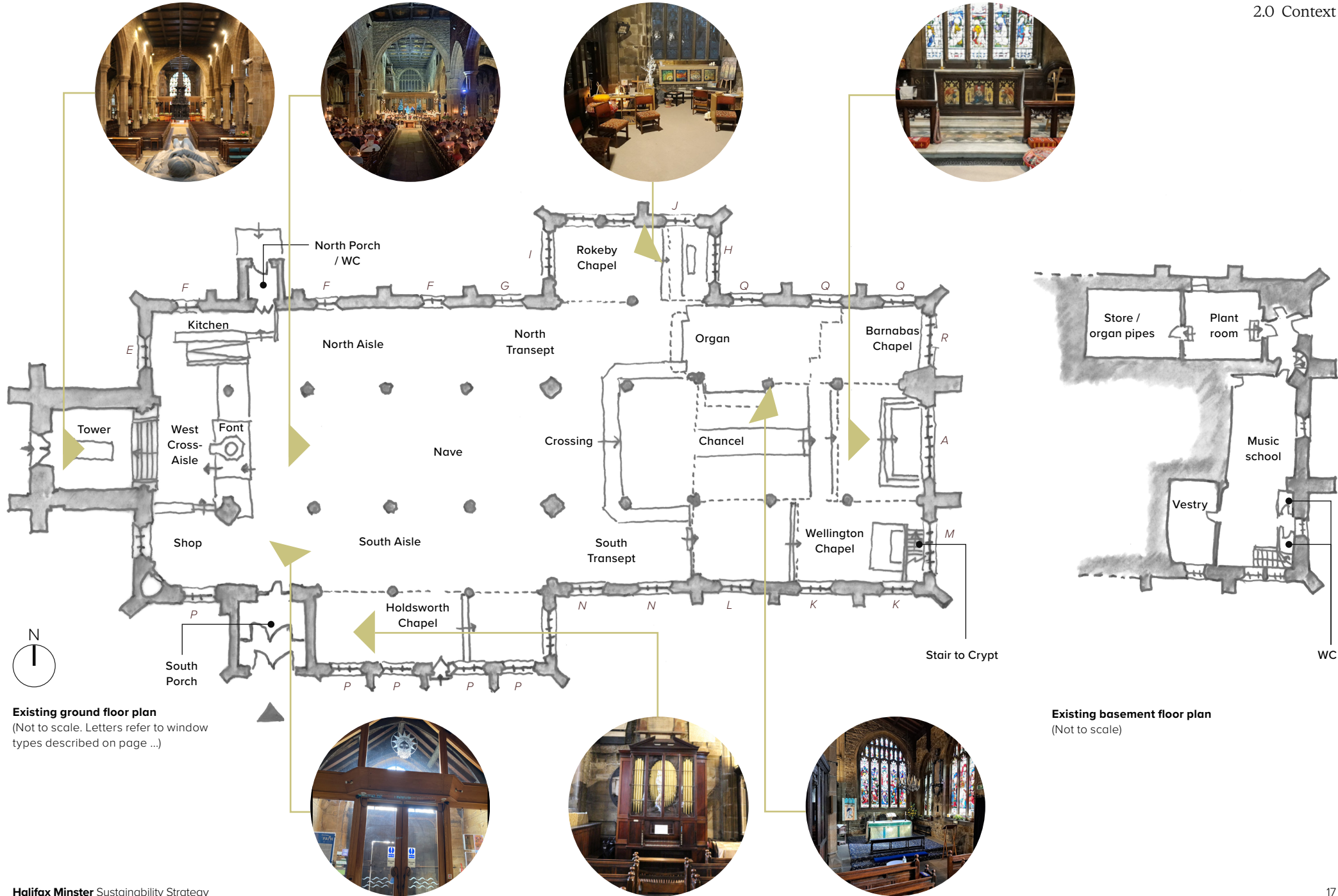
Music events take place every week, typically in the form of a candlelit concert or a choir. The candlelit concerts are particularly popular and could attract up to 600 guests.

The Minster can be booked for private events such as wedding, baptisms, funeral and graduations. Like many other churches, everyone is welcome to visit during the day unless it is booked for a private event.



Other amenities

Other amenities on the ground floor include the font, kitchen, shop, the organ, the pulpit, WC and the tomb. Other areas of the church include the tower and the crypt which are not generally open to the public, mainly due to accessibility and safety reasons. The crypt does have its own door and can be directly accessed from outside. The rooms within the crypt include the vestry, music room, additional WCs as well as storage areas.



**Low capacity**

Very light occupation, minimal movement and limited need for lighting and heating throughout.

**Medium capacity**

Moderate occupation, limited to individual chapels and chancel. Localised lighting and heating required.

**High capacity**

Maximum occupation, full use of nave with 500-600 people. Increased requirement for temperature control and lighting.

**Capacity considerations**

At times between services and events, the Minster operates at very low capacity. Outside scheduled worship, the nave and chapels are often empty, creating long intervals where the space is used only intermittently for private prayer, preparation, or brief pastoral activity. These periods are characterised by minimal movement and limited use of lighting and heating. Activity is concentrated on maintaining readiness for the next service rather than active occupation.

Medium capacity use typically occurs during short, spoken services such as Morning Prayer, Daily Eucharist, and Evening Prayer, which take place in the chancel or individual chapels rather than the full nave. Attendance is modest, with small congregations gathering for 20 to 30 minutes at set points during the day. Activity is localised to specific areas of the building, meaning that much of the Minster remains unoccupied while worship is focused in a contained space.

The building reaches its highest capacity during major services and evening cultural events, such as the Sung Eucharist, Choral Evensong, Christmas Eve services, concerts, or special festivals. On these occasions, attendance typically reaching around 500–600 people. Congregations are large and events can last up to 90 minutes or more. The use of amplified sound, lighting rigs, and other technical equipment can introduce substantial internal heat gains, leading to short-term spikes in internal temperatures and energy use.

Accessibility considerations

The crossing features a removable dais and movable stalls which provide flexibility between religious services and evening concerts.

The South Porch is used as the main entrance because it is the only entrance with level access. There are other entrances, such as the main West door under the tower, the North Porch, the door to the Holdsworth Chapel and the Crypt door however steps need to be negotiated in order to access the main body of the church. The north porch no longer acts as an entrance because it has been converted into the only accessible WC in the church.

There is level access to the majority of the church on the ground floor, however, like many historic churches, not all areas of Halifax Minster can be accessible by a wheelchair. Some ground surfaces can be uneven.

Two of the three chapels which are regularly used for services, Rokerby and Holdsworth Chapels, are accessible from the main body of the church however four steps need to be negotiated to access Wellington Chapel. Barnabas Chapel is at the same level as the Wellington Chapel. As it is located behind the organ, it can only be accessed via Wellington Chapel by crossing the Chancel.

The accessible WC has been created in the north porch with a ramp. The ramp also provide wheelchair access to the kitchen.

The floor plan shows the existing steps in the church. Some raised areas are important in a church as they represent sacred space such as the altar or the chancel. Other areas could be altered to provide improved access for the wheelchair users and those with mobility issues. Where the ground surfaces are uneven, the existing stone slabs could be lifted, substrate altered and the slabs re-laid to provide level access. Alternatively, an appropriately designed ramp or a slope could be introduced to minimise aesthetic impact in a historic church.

Smaller chapels offer private prayer space which differs from the Nave. Making these spaces accessible could invite congregants to a more intimate experience with god. Barnabas Chapel could be re-opened to the public as it is tucked away from the main body of the chapel and such a different experience could lead to increased visitor numbers.

Roof access can be challenging in churches where you may need to negotiate a narrow spiral steps or steep pitched slate roofs, and Halifax Minster is no exception. The Nave and Chancel roofs consist of stone slate roof tiles, as well as the porch roofs and the Rokeby Chapel roof. The North Aisle Roof is also in the same stone slate. Lead is used on the tower, the South Aisle and the Holdsworth Chapel roofs. Modern materials cover the Chancel Aisle roofs, membrane on the north side and stainless steel on the south side.

2.8 Construction and condition

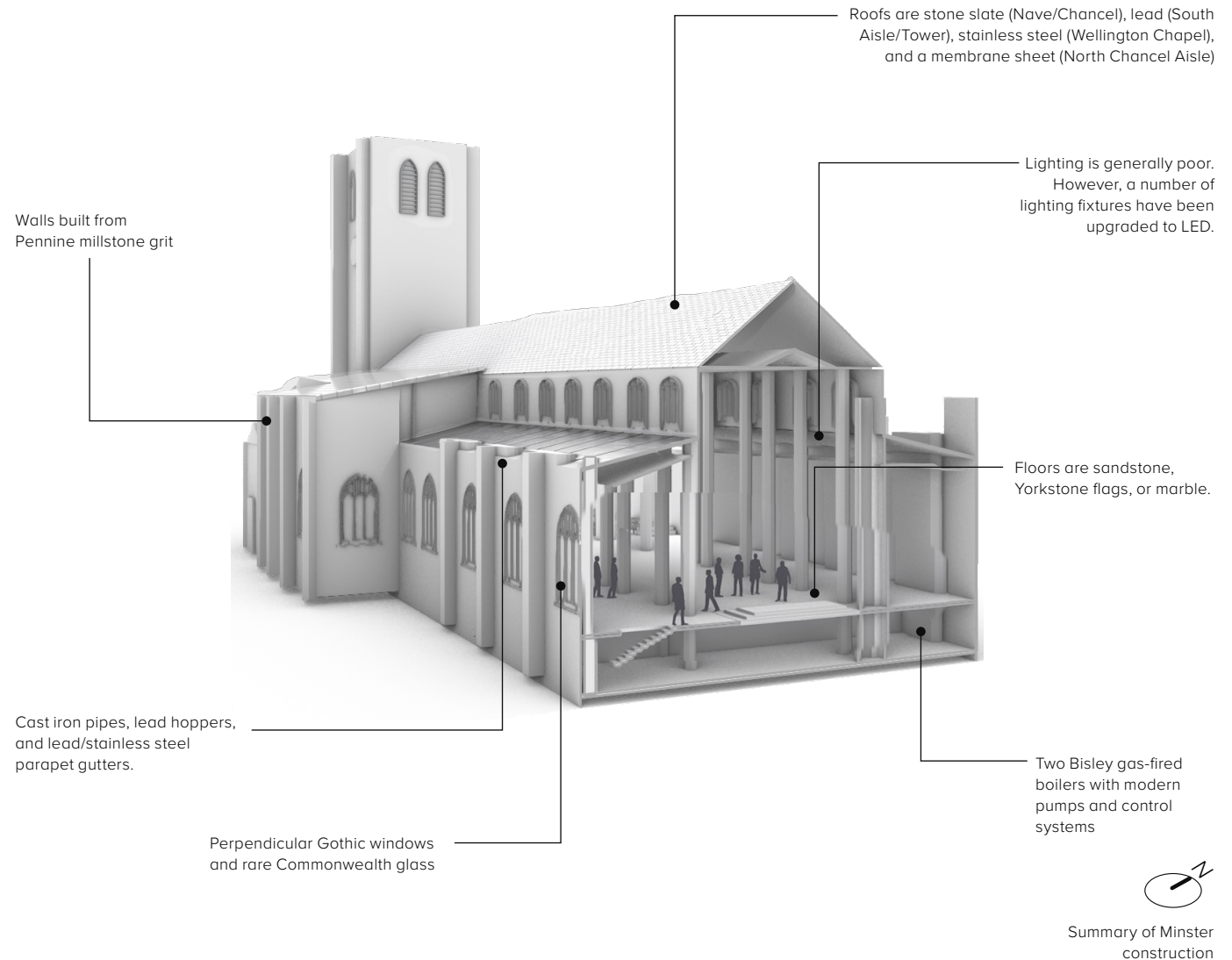
The last quinquennial inspection was carried out by Butress in December 2022. The below is a summary of the Minster construction taken from that report.

The church is of traditional design consisting of a chancel flanked by aisles and a nave also with aisles. The substantial tower projects out from the west end of the nave. The Rokeby Chapel projects out from the eastern end of the north nave aisle and the Holdsworth Chapel projects from the south nave aisle and runs into the south porch. There is a small north porch, now converted to a toilet.

The north chancel aisle now houses the organ and a working vestry. The south chancel was laid out as a military chapel, The Wellington Chapel in 1951. The Rokeby Chapel is screened off from the nave.

The floor level to the west end of the church and into the tower is stepped up from the main floor level, reflecting the rise in the external ground level since the church is built on a steep hill. At the east end this allows for a lower floor level, now containing vestries and the plant room. Most of the pews at the western end of the nave have been removed and a tea brew facility and ramp have been constructed. The small north porch has been remodelled as a toilet and the external door blocked.

The walls are built from a Pennine millstone grit, a hard stone that has blackened in the harsh industrial climate. Internally the walls are in rubble stonework with dressed stone used for the arcading and other details. It is probable that the current finish dates from the 19th C restoration when the galleries' were removed, the chancel screen installed and the chancel remodelled.



The quinquennial report summarises some work to be undertaken immediately, in the next 18 months, and in the next five years. The below works taken from that list would have a positive impact on energy use, carbon emissions, climate resilience and user comfort.

Walls and floors

- Rake out and renew all loose and defective pointing and undertake a detailed inspection of the condition of the masonry and programme a phase of repair that addresses the findings of the report.
- Arrange for a conservation accredited structural engineer to further investigate settlement to areas adjacent to tower and south porch.
- Undertake a detailed inspection of the condition of the masonry and programme a phase of repair that addresses the findings of the report.
- Where cementitious pointing fails, this should be carefully removed by hand without the assistance of mechanical equipment and the joint raked out and re-pointed in a lime-based mortar to match the original mix.

Roofs and rainwater goods

- Remove silt and debris from all gutters.
- Further investigate water ingress to Barnabas Chapel/Organ Chamber.
- Install safe access/fall arrest systems to roof voids.
- Reconfigure flashing adjacent to sump to eastern end of parapet to nave south roof slope.

Condition key

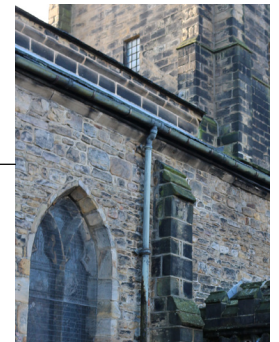
- Severely Damaged
- Requires Attention
- Good Condition



● Vestibule in good condition



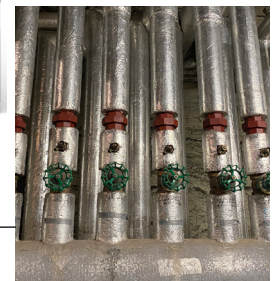
● Damaged and failing membrane



● Deteriorating rainwater goods

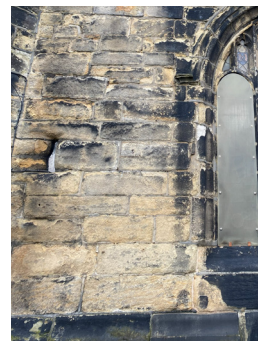


● Potential for partition improvements

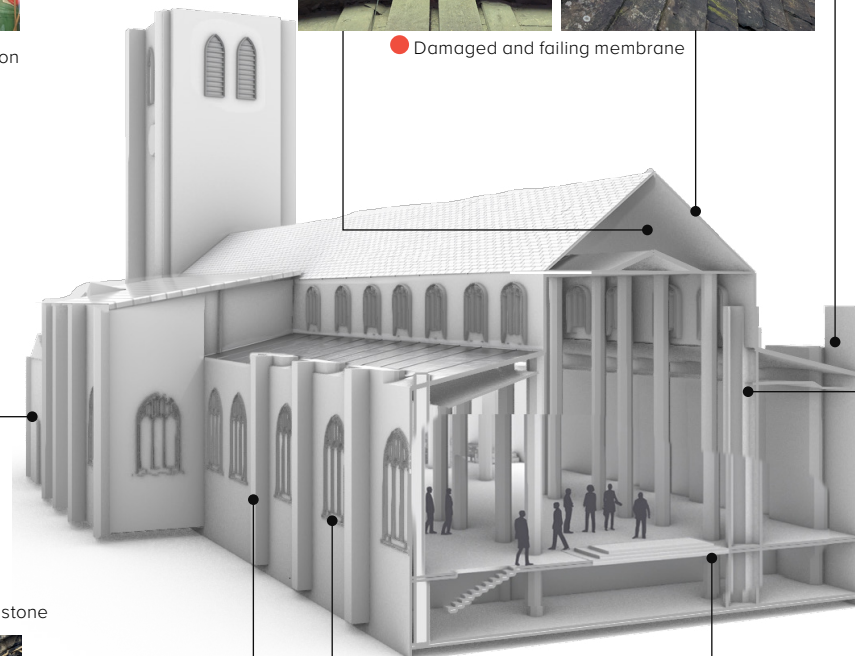


● Heating system reaching end of life

● Damaged spalling stone
● Blackened Pennine Mill stone



● Damaged stained glass windows



Summary of Minster condition

- Overhaul and redecorate all rainwater goods.
- Carry out works to repair section of failed render to south-east inside face of tower parapet.
- Carry out works to repair damage to ceiling in clergy vestry.

Systems and services

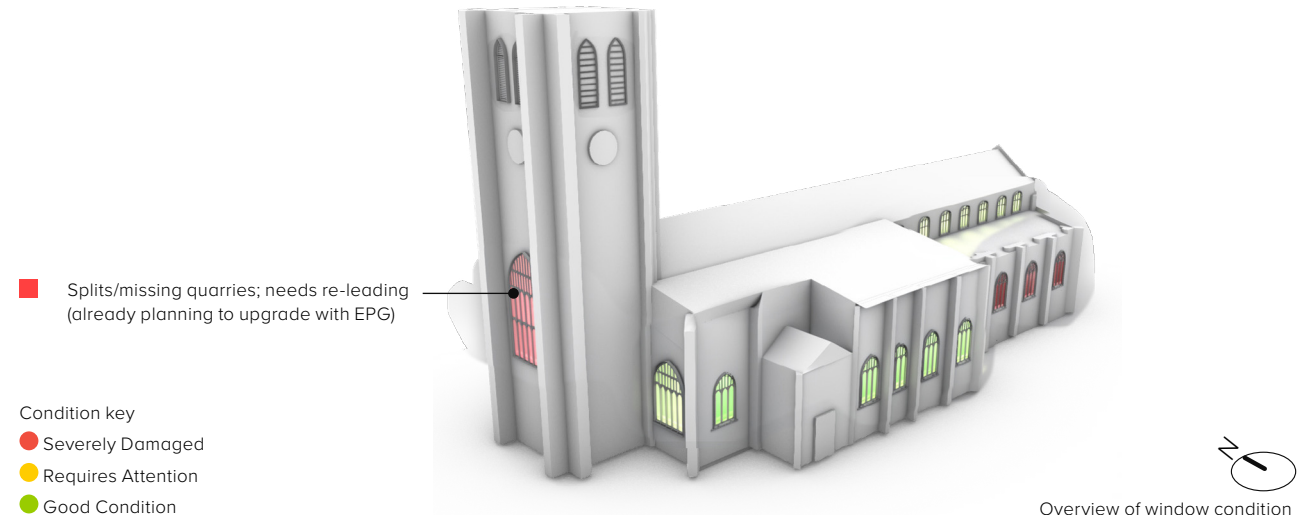
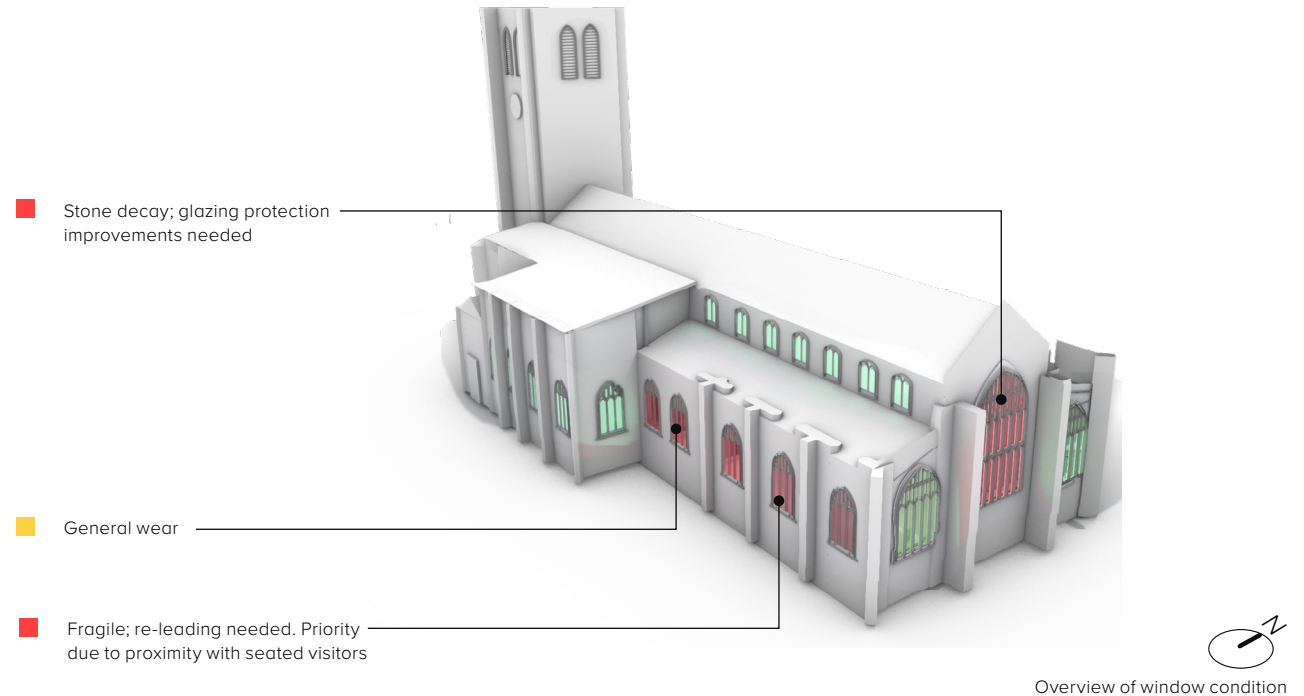
- Remove stored items immediately from heating chamber.

Windows

- Carefully remove all loose and failing mortar to the perimeter of the north chancel clerestory windows and repoint in a lime base mortar to match the existing mix.
- Replace all severely fractured and/or broken panes of glazing with historic glass to match existing to north chancel clerestory windows.

Landscaping

- Arrange for an arboriculturist to report on the trees within the churchyard.



Windows

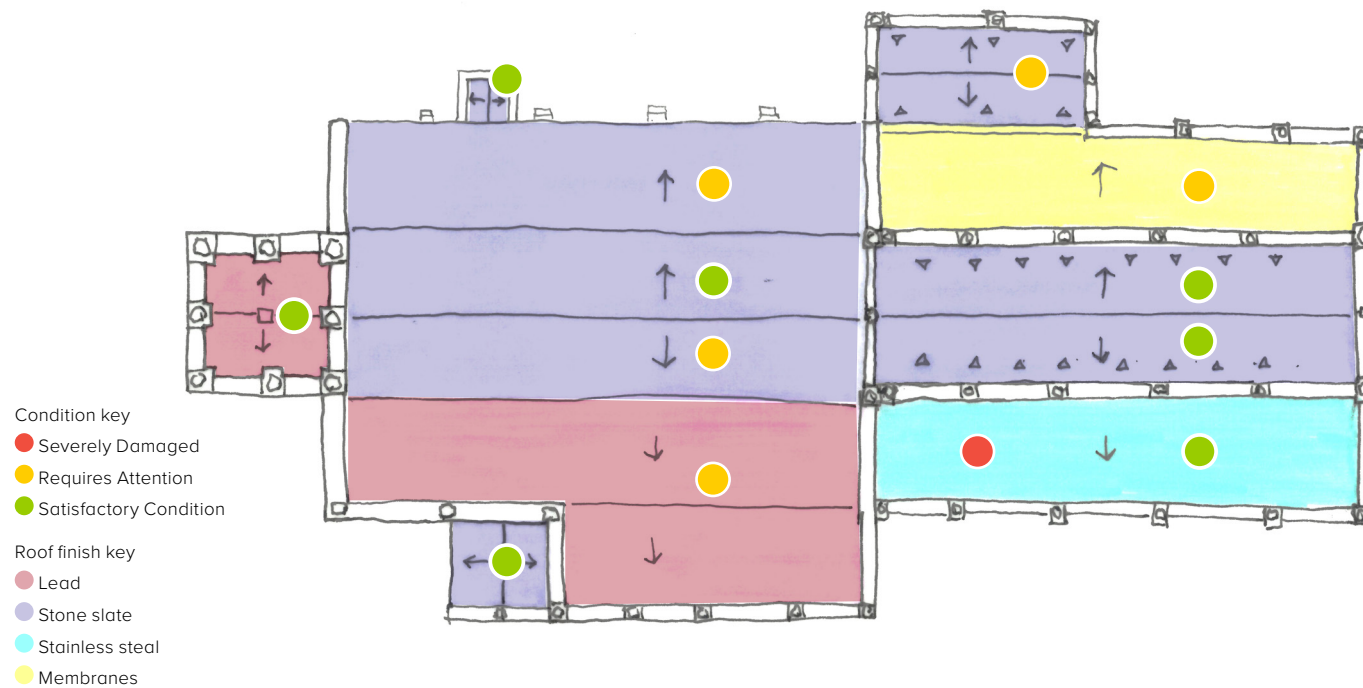
Location	Description	Glass Type	Type of frame	Century	Condition
● Chancel East Window	Large pointed-arch Perpendicular window	Stained glass	Stained / Perpendicular	15th c.; 1856 & 1951 restorations	Stone decay; glazing protection improvements needed
● Chancel Clerestory (North) x7	Seven 3-light mullioned windows	Clear/Leaded	Mullioned	Late 15th c.	Repairs to perimeter pointing; glazing issues
● Chancel Clerestory (South) x8	Eight 3-light mullioned windows	Clear/Leaded	Mullioned	Late 15th c.	Hood moulding erosion
● Nave West Window (Tower)	Six-light Perpendicular window, later Commonwealth glazing	Clear geometric leaded	Perpendicular/ Commonwealth	15th c.; glazing mid-17th c.	Splits/missing quarries; needs re-leading (already planning to upgrade with EPG)
● North Aisle West Bay	Perpendicular panel tracery	Clear/Stained mix	Perpendicular	15th c.	High-level stonework survey needed
● North Aisle Y-tracery Bays	Three Y-tracery pointed arch windows	Clear	Y-tracery	13th–15th c.	Weathering; condensation issues
● North Aisle Square Window	Three-light mullion	Clear	Mullioned	15th c.	Weathering to surrounds
● Rokeby Chapel East	Large Perpendicular stained window	Stained	Stained / Perpendicular	c.1535	Stonework weathering
● Rokeby Chapel West	Perpendicular (19th-c. replacement)	Stained	Perpendicular	19th c.	Minor pointing needed
● Rokeby Chapel North	Two Perpendicular + one mullion	Mixed	Perpendicular/Mullion	16th c.	Water ingress issues
● Wellington Chapel South (x2)	Two Perpendicular windows with Commonwealth glazing	Clear geometric leaded	Commonwealth	15th c.; glazing 1650s	Fragile; re-leading needed
● Wellington Chapel South (depressed arch)	Three-centred arch window	Clear	Commonwealth	15th c.; glazing 1650s	Fragile; re-leading needed
● Wellington Chapel East	Perpendicular stained glass	Stained	Stained	15th c.	Stable; routine maintenance
● South Transept Perpendicular (x2)	Two Perpendicular windows, Commonwealth glazing	Clear	Commonwealth	15th c.; glazing 1650s	General wear; monitor
● South Transept Rose	Oval stained glass window	Stained	Stained	1830	Stable
● Holdsworth Chapel	Five Perpendicular windows	Stained	Stained/Perpendicular	16th c.	Mullions renewed; glazing check needed
● Barnabas Chapel North	Three Perpendicular windows (one Commonwealth)	Mixed	Perpendicular/ Commonwealth	15th c.; glazing 17th c.	Moisture ingress requires investigation
● Barnabas Chapel East	Perpendicular window	Stained	Stained	15th c.	Stable

Overview of window condition

Roofs and rainwater goods

The Minster's rainwater goods comprise a mix of cast iron pipes, lead hoppers, and lead or stainless-steel parapet gutters, most of which are suffering from widespread deterioration of their decorative finishes and now require comprehensive overhaul and redecoration. Particular problems include leaking joints to rainwater pipes at the Holdsworth Chapel, causing water to discharge directly onto the ground, and the accumulation of silt, debris, and mortar fragments within several gutters, notably at the chancel north

slope and Rokeby Chapel, creating a risk of blockage. Regular maintenance, including cleaning at least twice a year, is identified as critically important, and in light of increasingly extreme weather, there is a need to review the overall capacity of the system to ensure it can cope with heavier rainfall.



Overview of roof finish condition



Photo of roof from tower.

2.9 Climate analysis

A holistic approach to sustainable design must reduce environmental impact while building resilience to a changing climate. Purcell's climate analysis for Halifax Minster uses local weather data to understand the local climatic challenges and improve the strategies around temperature, humidity, solar radiation, and wind.

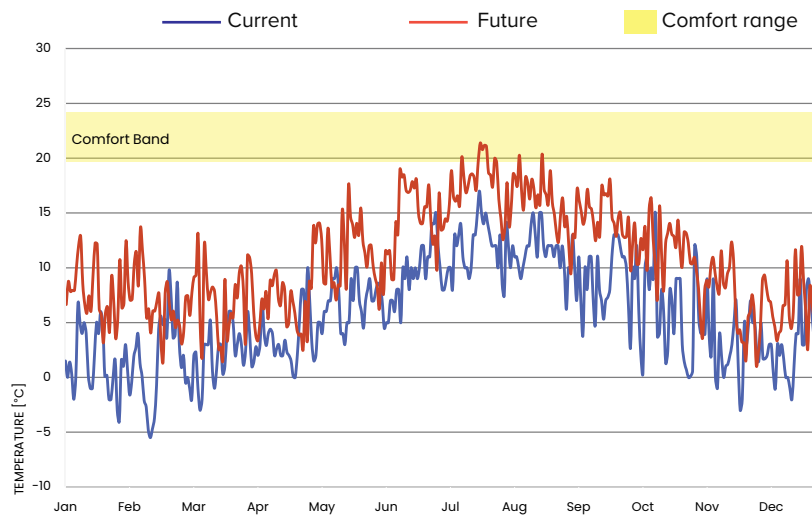
Halifax's cool temperate oceanic climate, with higher rainfall, lower average temperatures, and greater exposure due to upland topography, presents challenges including persistent dampness, heat loss, and limited solar gain. High wind exposure and frequent cloud cover reduce opportunities for passive solar heating, while elevated humidity can contribute to internal discomfort issues and fabric performance risks of decay.

The graph below shows the external current and predicted temperature. Even with the predicted rise of temperatures due to global warming, it is likely that heating will remain the main challenge in the Halifax region for most of the year while episodes of overheating are likely to increase in number during summer months.

The typology of apertures in the Minster combined with the important thermal mass of its walls and ground mean that overheating risk is not considered a major climate risk at this stage.

The building is situated uphill from an area prone to high flood risk plays which means that it has the ability to manage heavy rainfall. The condition and permeability of the land surrounding the building directly influences

how much runoff eventually reaches the vulnerable valley below. If the green site is designed or maintained to absorb and retain rainwater through permeable soils, vegetation, and appropriate drainage strategies it can significantly slow the movement of water during periods of intense rainfall. This reduces the volume and speed of surface runoff travelling downhill, thereby lowering the likelihood of overwhelming drainage systems or watercourses in the flood-prone area.



Current and future annual temperatures in Halifax
(source: CIBSE predicted future (2050s) weather files based on the UKCP09 projections)

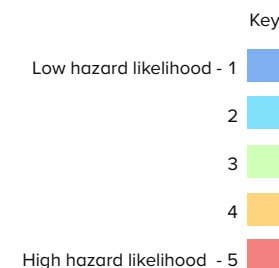


Flood map in Halifax
(source: Gov.uk flood risk map)

Future climate hazards

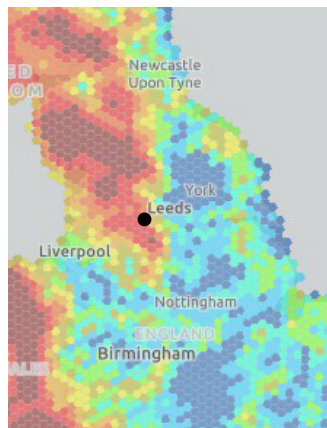
A climate hazard is a natural or human-induced physical event or trend that may cause loss of life, injury or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources. A risk is the probability or chance that adverse consequences will occur, where something of value is at stake and where the occurrence and degree of an outcome is uncertain.

The UK Green Building Council (UKGBC) have identified five key climate hazards for the UK built environment. These represent the most significant and immediate threats to the UK's built environment and are listed below. The maps shown are taken from the National Trusts climate hazard mapping data to given a visual indication of the different hazards effecting Halifax.



Flooding

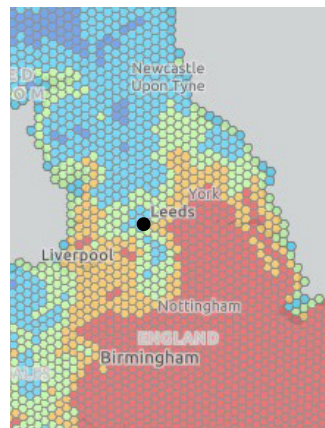
Flooding presents a major threat to the built environment, with increasing rainfall intensity, rising sea levels, and more frequent extreme weather events heightening the risk to buildings and infrastructure.



Future risk of extreme rainfall (number of days per year exceeding 50mm).
Source: National Trust Climate Hazards

Overheating

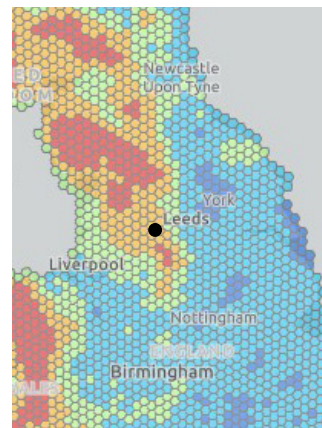
Overheating poses a significant hazard to the built environment and its occupants, with more frequent heat waves, the likelihood of buildings becoming uncomfortably or dangerously hot increases..



Future risk of overheating and humidity (2060-2080)
Source: National Trust Climate Hazards

Storms

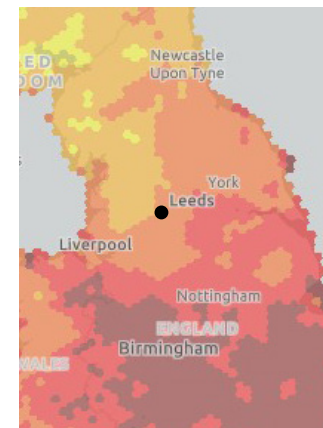
Increased storm intensity and frequency pose significant risks to buildings and infrastructure, leading to potential damage from high winds, heavy rainfall and flooding.



Future risk of storm damage (2060-2080)
Source: National Trust Climate Hazards

Droughts

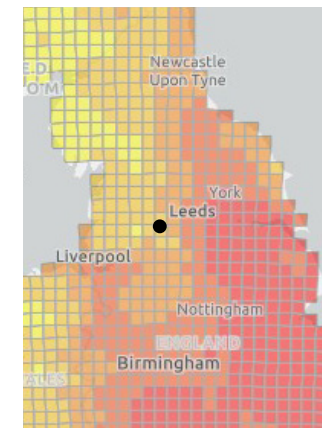
Drought conditions are intensifying due to changing climate patterns, putting pressure on water resources and affecting building operations.



Future risk of drought (2060-2080)
Source: National Trust Climate Hazards

Wildfires

As wildfires grow more frequent and severe, they pose a growing threat to buildings, infrastructure and the natural environment, particularly in areas prone to dry conditions and elevated temperatures.



Future risk of wildfire (2060-2080)
Source: National Trust Climate Hazards

2.10 Energy & Carbon

The energy audit of Halifax Minster reveals a building heavily dependent on fossil fuels, with total annual carbon emissions estimated at 44 tCO₂e.

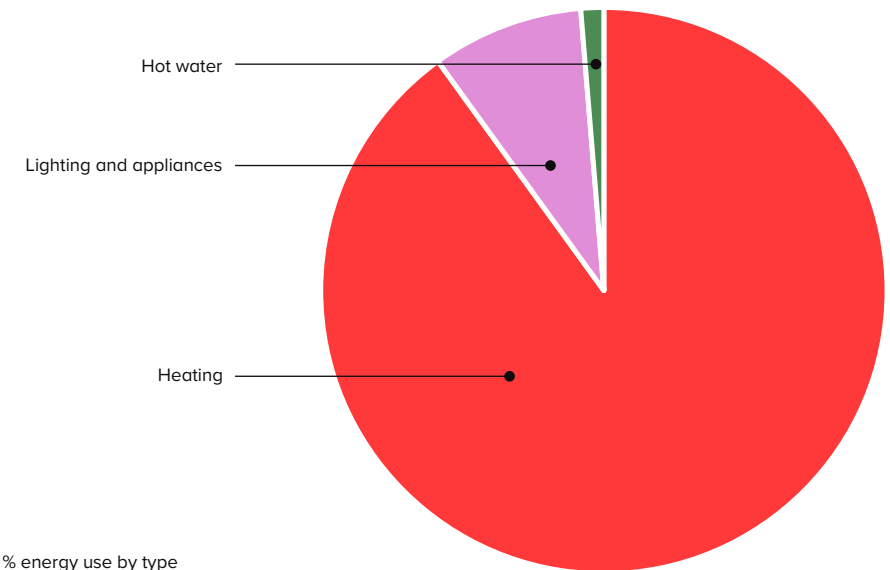
Heating is the primary driver of this consumption, accounting for 89.4% of the total energy load, followed by lighting at 8.6% and hot water at 1.3%.

On average, the Minster consumes 191,949 kWh of gas and 29,391 kWh of electricity per year, with gas alone responsible for nearly 39 tonnes of the total carbon footprint.

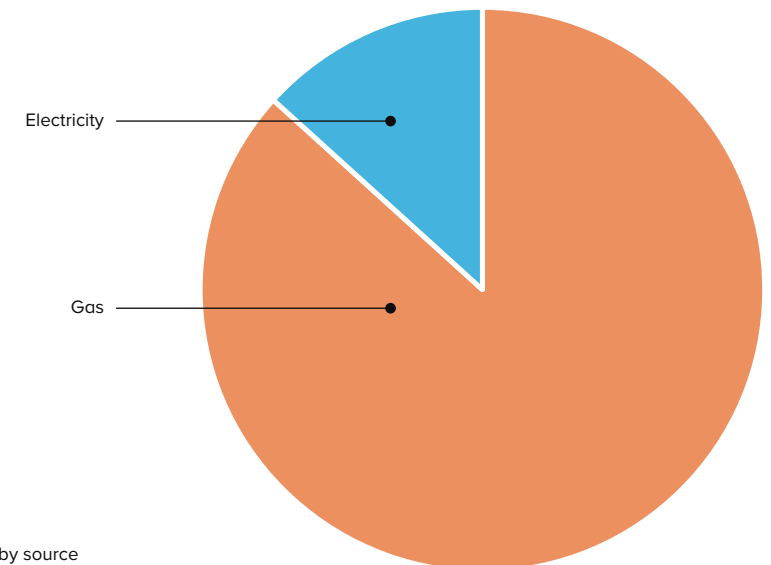
While the church is commended for already procuring its electricity through a 100% renewable tariff, the substantial gas usage remains the most significant obstacle to reaching its net-zero goals by 2030.

A combination of heating demand reduction and high efficiency heating system can be a driving strategy to decarbonisation.

Further analysis of the existing services and systems is included in TGA Engineers report which is appended to this one.



Graph showing % energy use by type



Graph showing % energy use by source

2.11 Nature & Ecology

Halifax lies within the Calderdale district of West Yorkshire, a landscape shaped by steep valleys, upland moorland, and a strong industrial heritage.

This setting gives Halifax a close relationship with surrounding natural environments, even though it developed as a major centre of the wool and textile industry.

The wider region's climate allows for the Sphagnum moss to thrive. This species support a range of wildlife, such as ground-nesting birds. It also plays a crucial ecological role in carbon storage, water regulation and flood management, helping to absorb rainfall that might otherwise flow rapidly into the valley. A research found that sphagnum moss reduced peak stream flow (the maximum amount of water that enters a river after a storm) by 65%.

The site itself is mostly comprised of soft landscaping (essentially made of grass) with a few deciduous trees scattered beside the building itself and the pedestrian walkway surrounding it.

Exploring the introduction of native planting within the grounds of the estate presents a significant opportunity to help mitigate the risks linked to climate change while improving the biodiversity in the minster estate. This could also be linked with community engagement activities.



Aerial view of the Minster showing mature trees to the south with soft landscaping to the south and east.



Existing landscape is limited in biodiversity.



Path and seating to the south east of the Minster.

2.12 Planning and Regulatory Context

Halifax Town Centre Conservation Area

The minster is located in the original medieval core of the the Calderdale town at the foot of the Calder Valley.

The area is characterised by a rich concentration of listed buildings, including ecclesiastical structures such as Halifax Minster, civic landmarks, and a diverse range of Georgian and Victorian commercial properties constructed in locally quarried sandstone. Its urban grain, street pattern, and key vistas (particularly those focused on landmark buildings) are central to its significance. Within this context, any alterations or interventions must carefully consider their impact on heritage assets, ensuring that changes preserve or enhance the character and appearance of the conservation area in accordance with national and local planning policies.

Historic England

Listed Building Consent is required for any works to listed buildings which will affect their ‘special interest’ and is a legal requirement under the Planning (Listed Buildings and Conservation Areas Act) 1990. Very few works are permitted without consent, other than general maintenance and like-for-like repair, and consent will need to be obtained from the relevant Local Planning Authority (LPA).

When considering whether to grant consent for development which affects a listed building or its setting, Sections 16 and 66 of the principal Act requires LPAs to have special regard to the desirability of preserving the building or its setting or any features of special architectural or historic interest which it possesses.

NPPF

On March 6th 2014 the Department for Communities and Local Government (DCLG) launched the National Planning Practice Guidance online. The guidance is a live document intended to provide further detailed information with regard to the implementation of the NPPF and includes a detailed chapter on the Historic Environment.

Historic England Advisory Note HEAN 18

The Advice Note provides advice on what permissions are needed for some of the common changes required to decarbonise and improve the energy efficiency of historic buildings; advice to assist local planning authorities – and other parties involved in the planning process – in determining proposals to decarbonise and improve the energy efficiency of historic buildings to enable positive climate action. Some typical building adaptations in response to climate change impacts are also included. The document also signposts to other relevant information, advice, and guidance.

Section 3

Sustainability principles

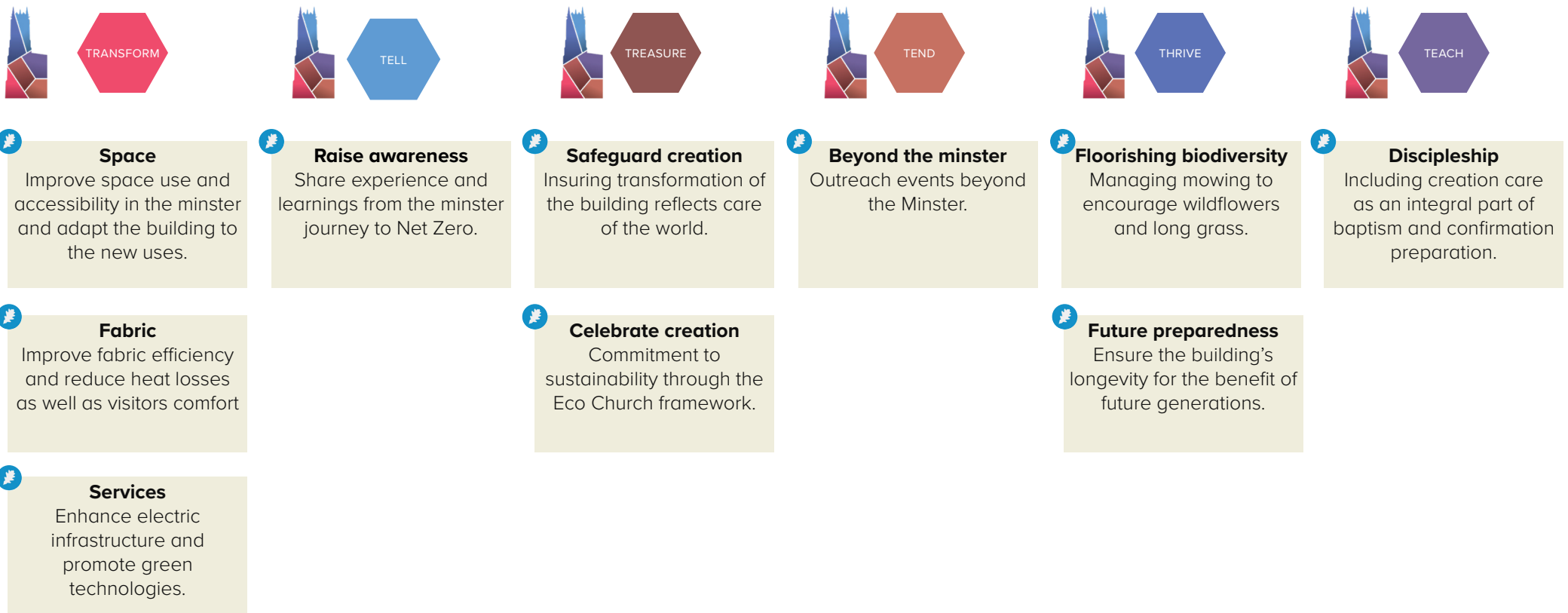
3.0 Sustainability Principles

3.1 Eco Church Framework

Halifax Minster's 2021–2026 Strategic Plan sets out six aims to support its mission rooted in 900 years of Benedictine spirituality, guided by a structured leadership and governance framework. It prioritises careful stewardship of its historic building through regular maintenance and conservation, alongside a commitment to sustainability, including achieving Eco Church status.

The diagram below combines the Minster's Strategic Plan with the sustainability strategy necessary to achieve Eco Church Status. Most strategies will be developed in this section of the report.

The aim of this Sustainability Strategy document, which sits alongside the Conservation Management Plan, is to guide the preservation, maintenance, and evolution of the Minster, today, and for future years.



3.2 Stakeholder engagement

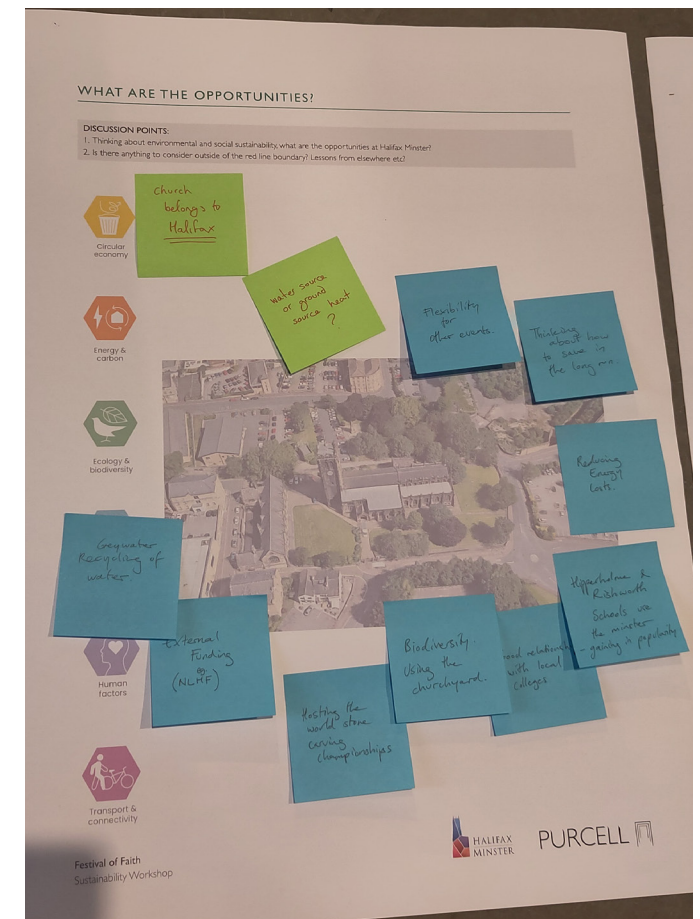
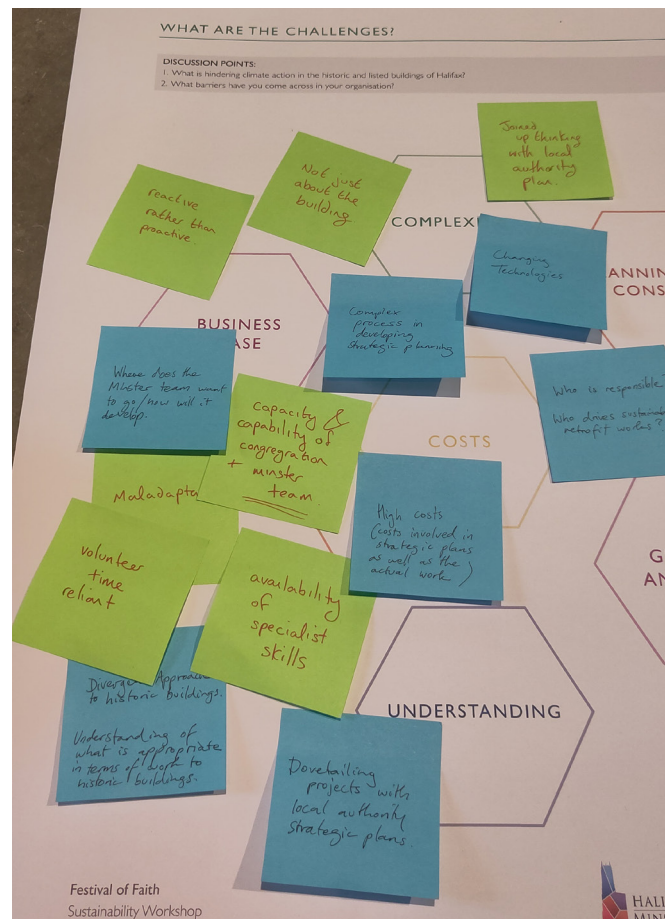
On 19th March 2025, Purcell hosted a sustainability workshop with members of the community as part of the Festival of Faith. Participants were asked to discuss key challenges and opportunities in delivering a sustainable Minster. These are summarised below:

Challenges

- Current approach to development is reactive rather than proactive.
- A lack of specialist skills available to drive the work forward.
- A reliance on volunteer time - the capacity and capability of the Minster team needs to be understood. Who is responsible for delivery?
- The speed of change of technology makes it hard to know what the right action is.
- Alignment with local authority aspirations and strategic plans needs consideration.
- Constraints of such a significant building.

Opportunities

- Building on what is already here and working well.
- Church belongs to all of Halifax, how can this be celebrated?
- Innovative technical solutions to services and fabric upgrades to reduce energy costs.
- Graywater and rainwater recycling.
- Improving biodiversity.
- Rezoning of areas, particularly Holdsworth Chapel.
- Engaging community in process, sharing knowledge and learning. Tapping into the knowledge and skills of the congregation.
- Promoting connectivity and routes, especially from west end.
- Utilising local skills and trades people.



3.3 Halifax Minster Sustainability Principles

Based on the Eco Church Framework, and the feedback from the community consultation, the six adjacent themes have been identified to help guide the development of this sustainability strategy and ensure a holistic approach is adopted.

These will form the guiding principles for reviewing and monitoring the outcomes of the sustainability strategy as it progresses. Rather than addressing these elements in isolation, integrating them from the earliest design stages ensures that the building, its users, and the wider community it serves, function as a cohesive and thriving system.

These principles seek to capture both environmental and social benefits - a clear directive from the community consultation. This interconnection, grounded in environmental and economic targets, will support the creation of a resilient and future-ready Minster that optimises resource efficiency, enhances quality of life, and contributes meaningfully to both climate and social goals.

RESPECTING HERITAGE

CLIMATE RESILIENCE



Community

The development of design and management solutions which enhance occupant wellbeing, improve comfort, and support community engagement.



Energy & carbon

The elimination of greenhouse gas emissions from the Minster, and the reduction of energy use through a whole building approach.



Biodiversity & nature

Enhance biodiversity around the Minster, considering climate adaptation, climate resilient plant species, community engagement and flood mitigation.



Materials and waste

An emphasis is on retaining and reusing existing materials as much as possible. Where new materials are used, considering their provenance, maintenance, and disposal.



Water Management

A focuses on water use and efficiency, harvesting and recycling, as well as climate change's impact on natural rainwater systems, and water scarcity.



Access and connectivity

Considering accessibility, how people get to, and around, the site, promoting active and green travel, and promoting connectivity with the rest of Halifax.

3.4 Useful precedents

Described here are some relevant precedents of other Places of Worship who have been driving climate action in their heritage settings.



The Grade I listed St Andrew by the Wardrobe (Diocese of London) has undertaken a major reordering, including insulation and air source heat pumps located in the belfry.



206 solar panels at Chester Cathedral generate 22-25% of the total energy consumption of the building.



Salford Cathedral incorporates ground source heat pumps, insulation, underfloor heating, and secondary glazing. (by Purcell)



Solar panel installation at grade II listed St John's Waterloo (Diocese of Southwark). The crypt now has electric infra-red panel heating, LED lighting, and electric kitchen appliances.*



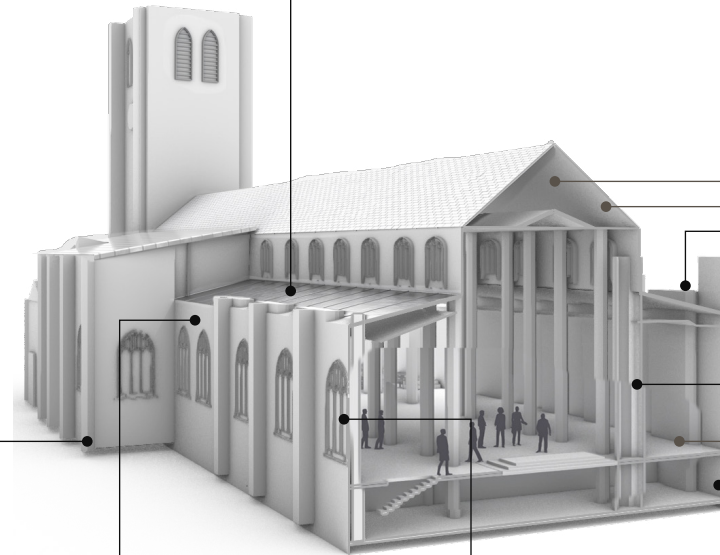
Newcastle Cathedral incorporates air source heat pumps and underfloor heating. (by Purcell)

Section 4

Opportunities

4.0 Opportunities

4.1 Summary



New pedestrian and cycle connections



Enhanced biodiversity



Community garden



Local skills and crafts



Repair and maintenance



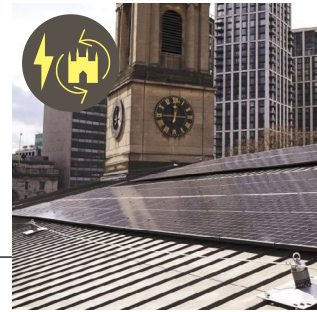
Improved glazing performance



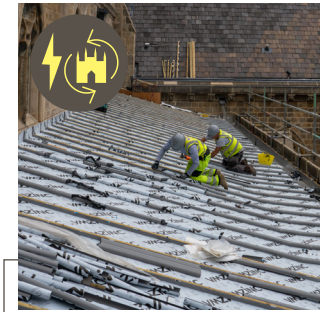
Replacement of gas boilers



Improved accessibility



On site renewables



Improved thermal performance



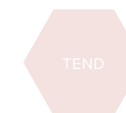
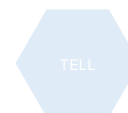
Material reuse



Rainwater management



Better zoning and control



4.2 Energy and carbon

Whole Building Approach

When it comes to reducing energy use, a whole-building approach should be adopted. This means that we consider the building as a system of interconnected materials, services and users, which each influence and complement the other.

Finding an equilibrium that suits the building and its inhabitants requires a holistic approach, which understands the interdependencies between the four most important factors affecting a building's energy use in operation, which are:

- Building location and orientation
- Building use and people
- Building fabric
- Building services and equipment

A whole building approach does not necessitate implementing all of the proposed improvements at once. Works can be phased, but a whole building approach ensures that each phase is considered as part of the wider objectives, with consideration of the potential risks and impact upon other measures or phases. For example, upgrading windows and insulating walls can improve air tightness, but reducing air movement can cause the buildup of moisture, and so must be considered alongside a whole building ventilation strategy.

The key to developing a whole building approach is an informed understanding, combined with a logical and systematic process, that questions what is required and why, encourages a continuous feedback loop, and iterative design process. This requires engagement with building users, owners, and managers throughout the whole process, including handover, and reviewing outcomes to inform future processes.

The greenest and cheapest energy is the energy we don't use. Reducing energy demand is more than simply insulating and adding solar panels. Much can be achieved by changing behaviour, avoiding waste, using efficient controls and equipment, and managing the building to its optimum performance. Fabric energy efficiency measures have been considered in this document against the below Responsible Retrofit Hierarchy which has informed the strategies explored, providing a framework with which to prioritise the various measures and next steps.

Our work starts from a position of knowledge. It is important that we fully understand the building, its significance, condition and construction; as well as current energy use and patterns of occupation. As noted above, for Halifax Minster, this has involved the reviewing the following information:

- A site visit and visual survey
- Review of archival drawings and record information
- An understanding of current and future space use

The next step is to eliminate unnecessary energy use and energy wastage. The building's condition has a major influence on energy use. Defects such as damp walls and leaking roofs and windows can substantially reduce performance. Repairs are an important energy-saving measure in their own right. They are also an essential prerequisite for some thermal improvements, such as the addition of roof insulation and repair of windows.

The accompanying report by TGA Engineers covers interventions involving services and systems.

Repair and maintenance

The quinquennial survey highlighted a number of defects that should be resolved. Addressing these issues not only protects against long-term decay and timber defects but also directly impacts occupant health and comfort, ensuring the Minster remains a viable community venue.

Lessons from unsuccessful historic repairs, specifically the widespread use of hard cementitious mortars that trap moisture and accelerate stonework decay, underscore the critical need to understand existing building performance through regular inspections before any intervention to avoid unintended consequences and abortive work.

Key actions include implementing a comprehensive programme of masonry repair and repointing, concentrating on the north elevation and tower and using breathable lime-based mortar throughout. This will include the repair or replacement of broken panes and the repointing of window perimeters to the north chancel clerestory, alongside the overhaul and redecoration of all rainwater goods, with thorough removal of silt and debris from gutters to prevent blockages.

Further investigations should be undertaken to identify and resolve ongoing water ingress in the Barnabas Chapel and organ chamber, and any loose or defective pointing to flashings at roof junctions should be raked out and renewed as necessary.



Water ingress damage in chapels



Stonework spalling



West tower window

4.3 Fabric upgrades

Significant opportunities exist to improve the performance of the existing fabric and airtightness.

Floor

The existing floor layout and pew seating is considered highly significant. However, there are a number of accessibility challenges with the existing arrangement. If these challenges were to be addressed, and the existing floor taken up and relaid, there would be an opportunity to install new insulation beneath the stone slabs, along with underfloor heating. Heating systems are discussed in more detail in TGA Engineers report. This is a similar approach to one taken at Newcastle Cathedral. There may also be opportunities to relevel areas of the church to improve accessibility.

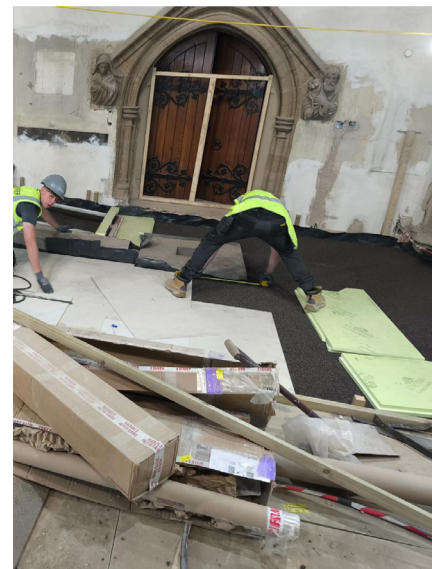


Newcastle cathedral after underfloor heating and insulation were added, and the stone ledgers relaid to improve accessibility

Walls

The solid masonry walls are considered highly significant. They provide a great deal of thermal mass, helping the building stay cool in the warmer months. Adding wall insulation would detrimentally harm the heritage significance of the building, and could cause unintended consequences with moisture build up. It is not recommended to install insulation to the walls, however carrying out the repair work identified previously, will go some way to reducing drafts and cold patches caused by defects.

To address thermal comfort, adding more soft furnishings to the walls could reduce the feeling of cold when in close proximity to the exposed stone. Wall hangings have been used historically very successfully to provide more comfortable spaces in old buildings.



Insulation and underfloor heating being laid in Salford Cathedral

TRANSFORM

TELL

TREASURE

TEND

THRIVE

TEACH

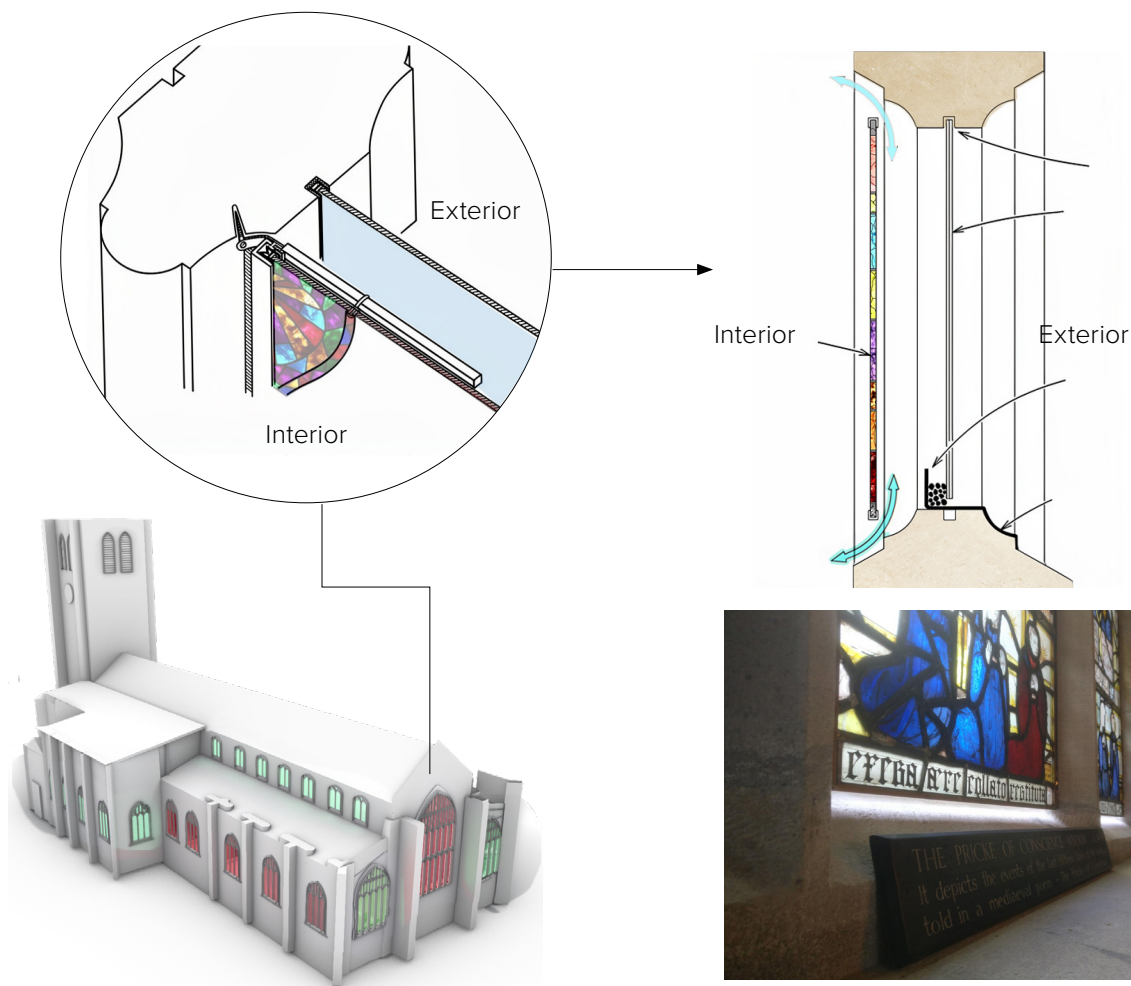
Glazing

There is an opportunity to improve the performance of the windows, which are a considerable source of heat loss. Whilst they are incredibly significant, there are ways of conserving their heritage value, whilst improving air tightness, thermal performance and security.

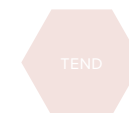
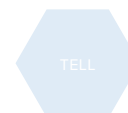
Environmental Protective Glazing

Internally ventilated Environmental Protective Glazing (EPG) works by allowing air from inside the building to circulate freely over both sides of the stained glass, keeping the temperature equal and the glass dry. By removing the need for the stained glass to act as a climatic barrier, EPG allows historic windows to be displayed as works of art while significantly slowing further deterioration. As a result, invasive conservation treatments can often be reduced or avoided, with original leadwork preserved and minimal interventions such as cold painting used to restore lost or faded detail. EPG systems are now widely adopted by cathedral and independent conservation studios. Installations can be seen in York Minster for instance.

Environmental Protective Glazing (EPG) in a church is constructed by setting the stained glass into a metal frame and moving it towards the interior of the building, creating an interspace between the historic glass and the new outer protective glazing. Apertures at the top and bottom of the system allow internal ventilation of this interspace, with air flowing from the interior of the building into the cavity, as shown in the diagram. This airflow helps keep conditions stable around the stained glass. The protective glazing is fitted into the original glazing groove, maintaining the existing structure. A lead cill is added at the base to ensure that any condensation forming on the protective glazing can drain safely to the



Environmental Protective Glazing at Salford Cathedral



exterior. Additionally, gravel is used to prevent external air from entering the interspace, ensuring that ventilation is controlled from the interior side only

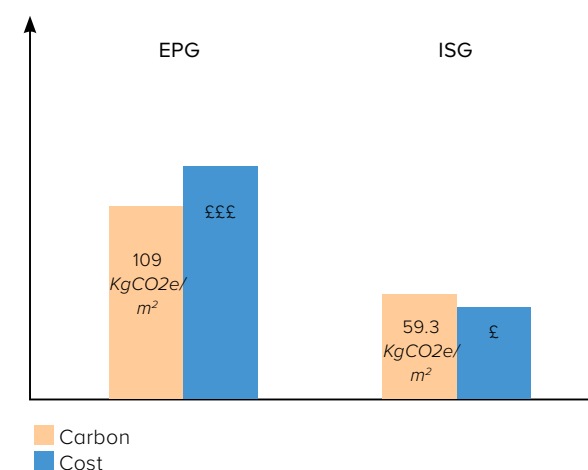
Internal secondary glazing

The retrofit of Salford Cathedral utilises two distinct techniques: environmental protective glazing (EPG) for windows of the highest historic value and internal secondary glazing (ISG) for those considered of lower value. The EPG process is more complex, requiring the careful removal and conservation of original stained glass, which is then reinstalled ~50mm further into the internal stonework while the new protective glazing is fitted into the existing glazing groove. In contrast, ISG allows the original stained glass to remain in its original position, with the new secondary glazing installed ~50mm into the internal reveal of the stone tracery using components such as rawlplugs and fitting tabs.

When assessing whether to invest in glazing rather than other strategies, focusing on the functional unit (FU) defined as the “reduction of 1 MWh of heating energy demand over 25 years” is essential because it provides a fairer comparison by accounting for both operational energy savings and the product’s total lifetime.

Phasing

A strategy for window upgrades could be informed by their current condition, and their ability to improve comfort for church users. For example, the windows located closest the pews, that are in poor condition, would be good candidates for early upgrades, as this will allow the necessary conservation of the windows to be carried out, whilst improving energy efficiency, and thermal comfort for those sitting down in the church for longer periods.



Carbon and cost comparison of EPG and ISG

Roof

Insulating the roof void presents a significant opportunity to reduce heat loss and improve thermal comfort. As does improvements to other roof areas when the current roof finishes come to the end of their life.

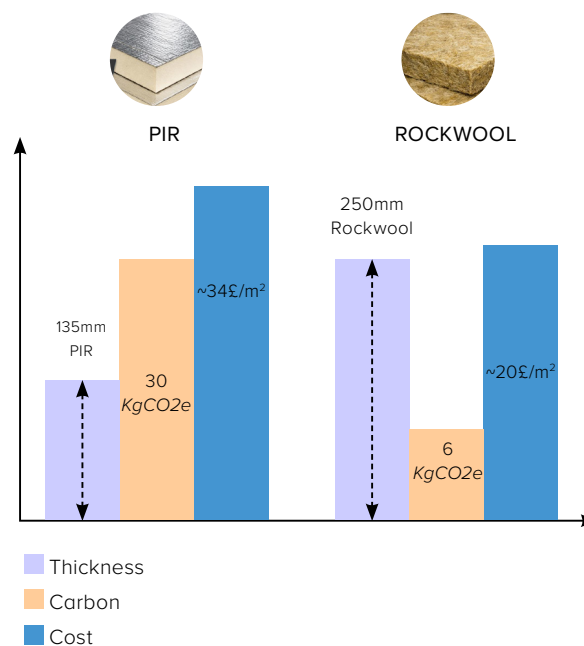
When considering insulation specification, a number of factors need to be considered, including supply chain, life span, compatibility with existing fabric, the embodied carbon of the material, and its recyclability.

Assessing Global Warming Potential (GWP) and other environmental indicators across the full Life Cycle Assessment (LCA) of building materials enables a comprehensive understanding of the resources, energy, and water consumed during manufacturing, and their associated environmental impacts, including contributions to global warming.

Opposite, we evaluate the carbon performance of the two most prevalent types of thermal insulation derived from different resource origins—inorganic mineral and organic fossil-based materials. The assessment focuses on life-cycle stages A1–A3 (cradle-to-gate), which cover raw material extraction and manufacturing emissions. Although end-of-life stages can significantly influence the overall environmental impact of certain materials, they are excluded here for simplicity.

A uniform functional unit (FU) is adopted for the GWP analysis: the quantity of insulation required for a 1 m² wall achieving a U-value of 0.16. The thermal transmittance (U-value), derived from the thermal conductivity (k or λ), represents the rate of heat transfer through a building element per unit temperature difference across it.

Lower U-values indicate better thermal performance. Because insulation materials vary in apparent density and thermal properties, different thicknesses - and therefore different material quantities - are required to achieve the same U-value. This results in varying environmental impacts depending on the insulation type. It also impacts the loading of the roof space which could have additional consequences. These would all need to be considered and developed in the next stage of design development.



Carbon, Thermal and cost performance comparison of PIR and Rockwool to achieve a U-value of 0.16W/m².k



Nave roof attics



View from Wellington Chapel

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4.4 Services and systems

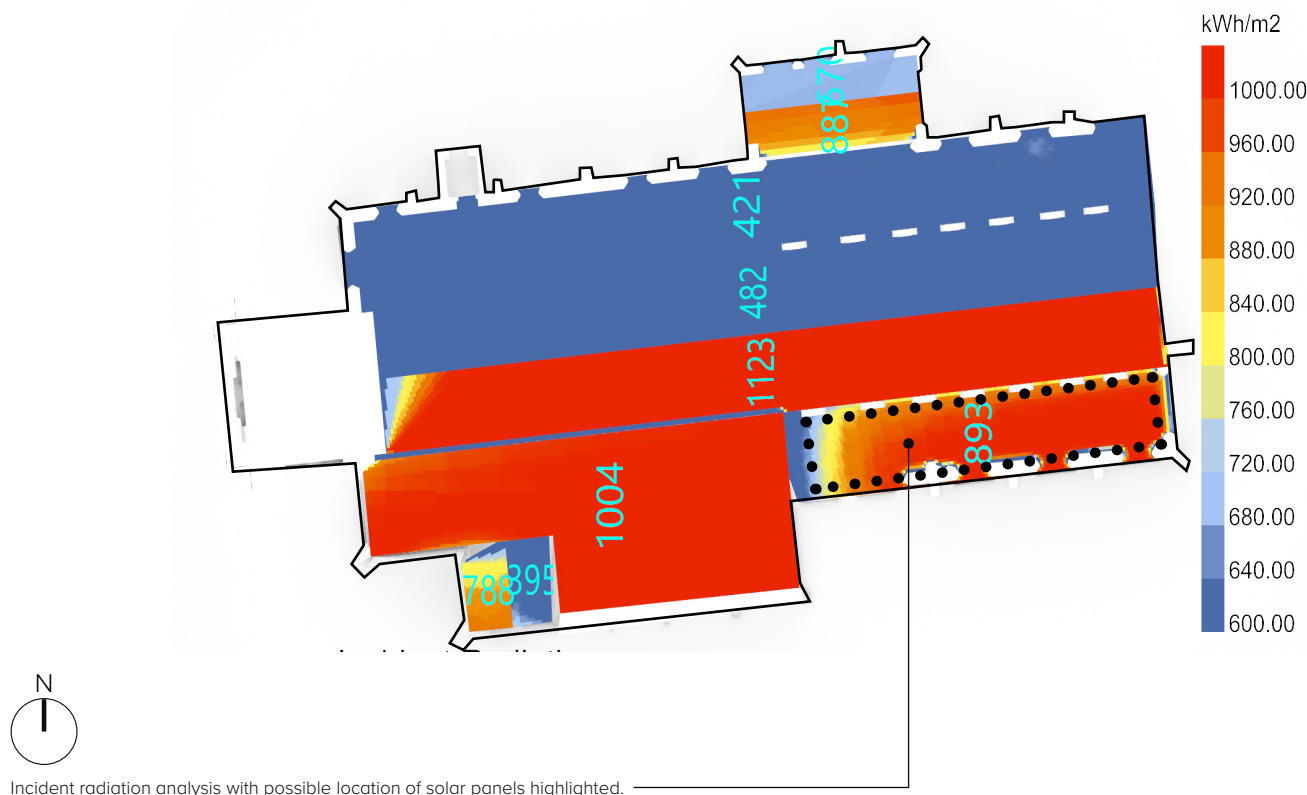
Upgrading services like lighting and overhauling aging mechanical and electrical infrastructure improves energy efficiency while reducing operating costs. TGA's report covers services and system upgrades in more detail. This is included in Appendix A.

Solar panels

Shown here is an incident radiation analysis to assess the viability of installing photovoltaic panels to the roof of the Minster. Given the location and visibility of the south side of the Minster roof, the roofs to the south transept and Wellington Chapel seem like the most viable locations for solar panels because of its lower significance of its tin cover as well as the fact that it is less exposed and visible from ground level. Further discussion with conservation officers could support additional solar panels else where, and more investigation would be needed to understand the structural implications of such an addition.

The addition of solar panels to these roofs shows an annual average of 893 kWh/m² on the south transept and wellington chapel roof level . A conservative 9.6kWp solar PV system size covering 40 PV panels has been used for the sake of this calculation with a daily energy generation number of hours set at 4.9 hours a day annually. The system should also be supported by an inverter with the capacity to handle the generated power.

Such a system could generate more than 8MWh annually which corresponds to a yearly saving more than £2k If the capital cost of the system is assumed to be up to circa £20k, It would be possible to recoup the investment in approximately 7 years with the predicted increased energy cost of 30p/kWh. If trends continue and electricity per unit goes up by 3.6% per year, the estimated payback period will reduce to 6 years.



Incident radiation analysis with possible location of solar panels highlighted.

Heat pump considerations

In response to the need for a low-carbon space heating solution and phasing out from the fossil fuel powered, low efficiency gas boiler used in the building, Air Source Heat Pump (ASHP) is proposed as an alternative to serve the Minster. This technology relies on electricity, which has a lower carbon intensity per unit of energy compared to gas. Furthermore, the carbon intensity of electricity is expected to decrease over time as the grid continues to decarbonise.

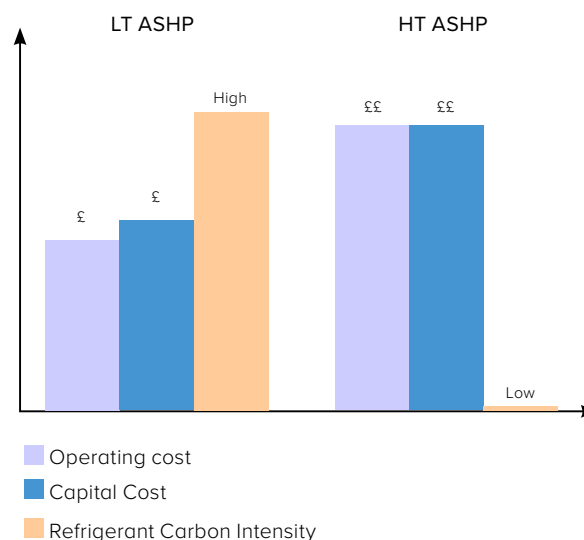
Two specific alternative system configurations have been developed, comprising either:

1. Low Temperature (LT) ASHP : of high efficiency which provides background heating. This system is boosted by electrical localised pew heaters during events and at peak demand.
2. High Temperature (HT) ASHP: of lower efficiency when compared to LT ASHP. It will provide background and comfort heating.

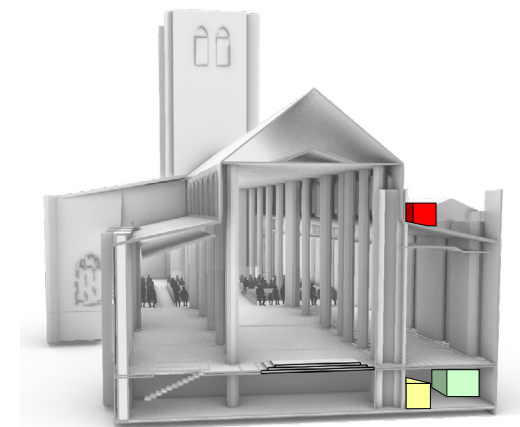
Beyond the system specificity and efficiencies that will be further explained in TGA report, it is important to consider the following:

- Air source heat pumps (ASHPs) are systems that operate using principles similar to conventional vapour-compression refrigeration. This means that refrigerants are essential for the system to operate. Refrigerant commonly used in LT ASHP are on average way higher than that used in HT ASHP.
- Cost of installation and operation of the systems: despite the high efficiency of ASHP when compared to gas boiler, the cost electricity remains about 3 to 4 times higher than gas. It is also important to consider the cost of purchase and installation of the new system when upgrading the systems.

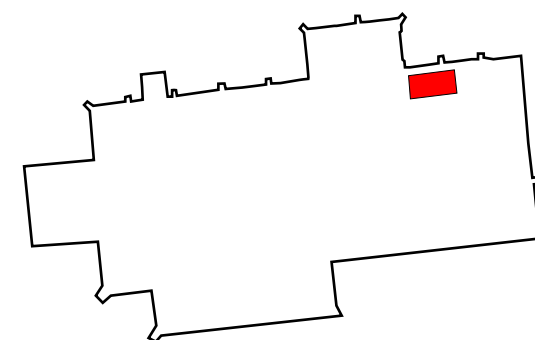
- ASHP usually requires an external and internal equipment to operate. It is important to consider the noise emanating from the external unit as well as the structural integrity of the platform that is receiving this heavy machinery.
- High-temperature (HT) ASHPs can use highly flammable refrigerants, such as R290 (propane), which require specific safety procedures during operation and when handling or refilling the system.
- Plan additional space for possible hot water tank if required.



Carbon, Thermal and cost performance comparison of PIR and Rockwool to achieve a U-value of $0.16\text{W/m}^2\cdot\text{k}$



■ External unit
■ Internal unit
■ Hot water tank



4.5 Spatial opportunities

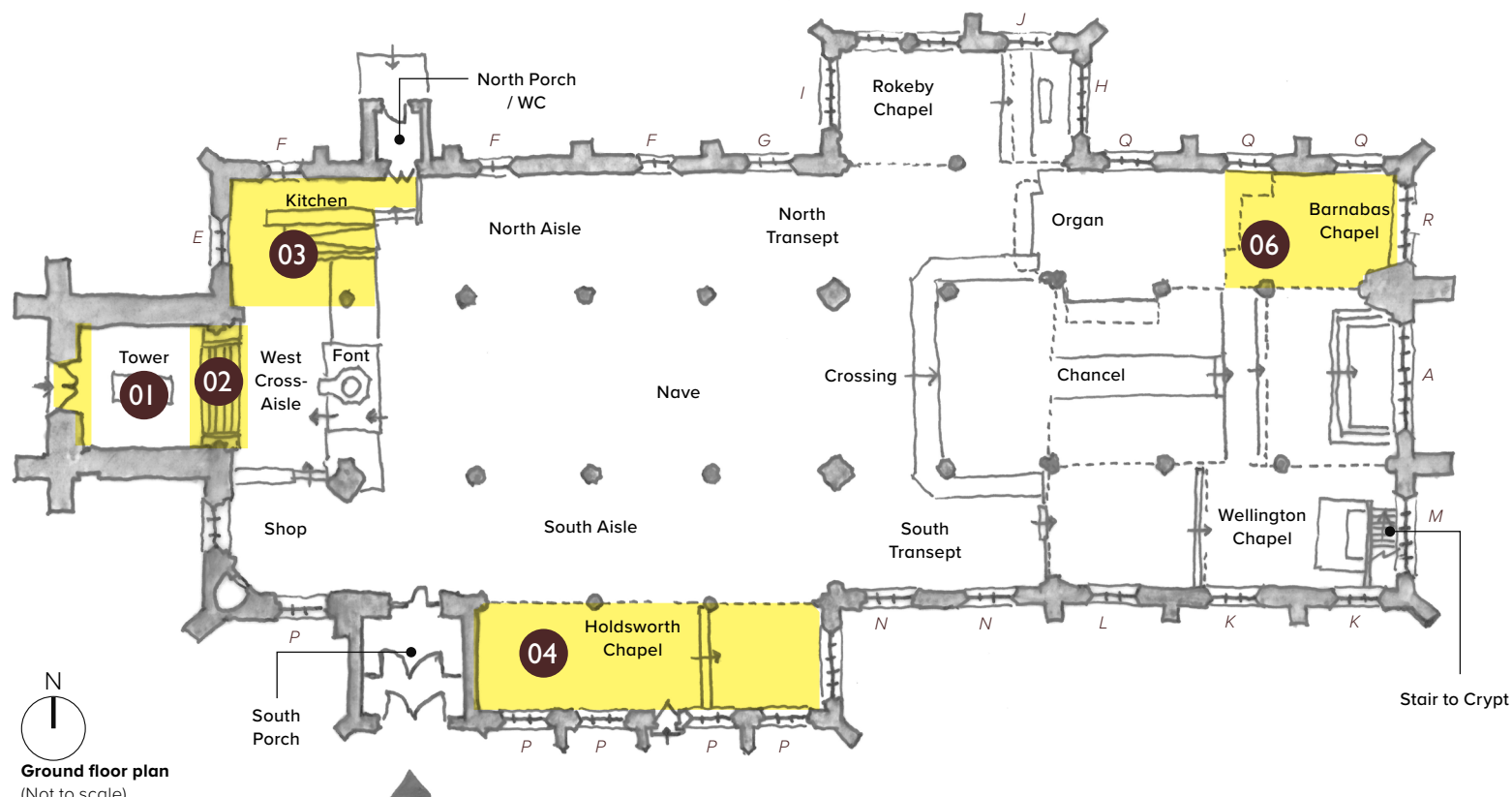
Below are some of the opportunities that could improve the experience of the Minster, both from a sustainability, user comfort, and accessibility perspective.

1. Create a vestibule for the west gate to improve zoning and comfort. Improve tower access to encourage visitors.
2. Increase openness in the West Cross Aisle and potentially alter floor levels to achieve better accessibility.

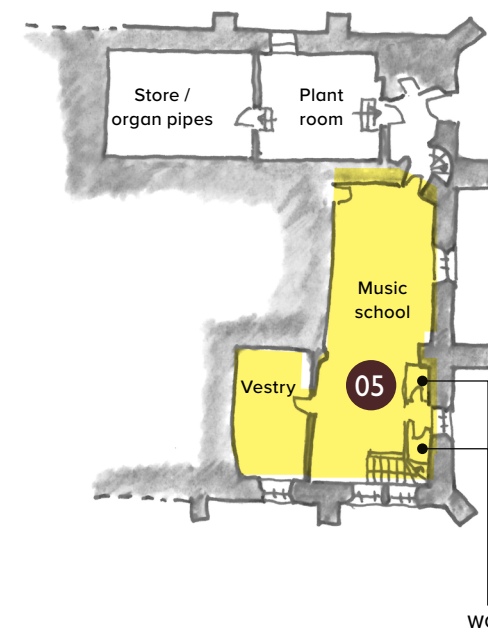
3. Reordering of the Back of the Nave (West End) to facilitate hospitality and improve access. Potential for a stand-alone toilet facility in the grounds to the north to increase provision and improve water efficiency.
4. Create a glazed partition between the Holdsworth Chapel and the South Aisle in order to thermally and acoustically isolate the chapel from the rest of the building. The partition will also create a vestibule to

access the external door in the chapel. Reordering of Holdsworth Chapel and East End to better serve needs.

5. Move the song school to the former school building and relocate the vestry to improve accessibility and thermal comfort, freeing up space for storage and services.
6. Accessibility improvements to access Barnabas Chapel and Wellington Chapel.



Ground floor plan
(Not to scale)



Existing basement floor plan
(Not to scale)

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4.6 Water management

Sanitary provision

A review of current regulations and recommendations around toilet and wellfare provision for this type of building revealed that there is a significant shortfall in provision at the Minster. Given the maximum occupancy of the building is frequently met, consideration should be given for how additional toilets could be integrated into the building.

Where sanitary provision is being upgraded, efficient fittings and potential use of greywater or rainwater for flushing mechanisms should be considered.

Rainwater harvesting

Opportunities to introduce rainwater harvesting should be considered. Likely through the installation of simple water butts adjacent to existing downpipes. These could be located on the northern side of the Minster away from the public view. Water could be used in irrigation, or a more sophisticated system could be considered which reuses rainwater for flushing toilets. This could form part of a new holistic approach to increasing toilet provision across the Minster.

Rainwater goods and climate adaptation

We recommended to undertake a rainwater goods capacity calculation to ascertain whether the existing system design is sufficient in future climatic scenarios or if rainwater goods need to be enlarged. It may also be beneficial to install additional overflow outlets and visible hoppers to help identify any blockages early.

The calculations will determine sizes of replacement gutters and downpipes based on the surveyed measurements. Rainwater calculations should be carried out on each portion of the roof to inform proposed rainwater goods sizes and their capacities for the storm events with 1-in-50 chance of occurring in any given year (considered common heavy storm) but also the 1-in-500 chance which, although not as probable, should be considered and designed for. This will ensure higher security and adaptability in future climate change. All calculations should use the BS-EN-12056-3:2000.

The upgrade of rainwater goods should be aligned with roof upgrade works.

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4.7 Biodiversity & nature

The Minster has already started to take steps towards creating havens for both people and nature, particularly with the introduction of planting along the path, the wildflower area, and additional tree planting. The strategy could go further, creating a quiet, community focused sanctuary within nature, using the open spaces as a means for community engagement and learning. This could be achieved by:

- Extending the clearly communicated wildflower areas and seasonal meadows.
- Establishing a formal land management plan that prioritises biodiversity by providing wildlife features such as bird boxes, bat boxes, and bug hotels, and by managing mowing schedules to allow for long grass and the growth of wildflowers
- Promoting citizen science and accessibility, offering interpretive materials, benches, and wildlife trails to encourage visitors to enjoy and protect the site, while adhering to sustainable gardening practices like avoiding peat and synthetic chemicals
- Introducing native species of plants such as Sphagnum moss which have proven to help mitigate risks of flood in urban areas. The position of the minster uphill from a high risk flooding area means that any mitigative measure within the estate could help reduce surface runoffs.
- Considering wider connections with town, roots for cyclists and pedestrians who may not otherwise visit the Minster.



Community garden



Wildflower meadow



Insect hotel



Introduction of Sphagnum moss and flower beds



Mowing management to allow for long grass as well as raised beds

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4.8 Community Engagement

The minster currently assumes an important role in the local community and can achieve the Eco Church targets in the Community and Global Engagement category by leveraging its significant public and civic role to act as a hopeful advocate and leader for climate and nature justice. Due to its high profile, the minster can work in partnership with the local community and inter-faith groups, to engage with local political and community leaders on environmental matters.

The minster has a unique position that allows to communicate the church's care for the natural world to thousands of visitors and school groups, and inspire engagement. Beyond the advocacy, the minster can serve as a mentor to other churches on their Eco Church and lead by example for other building types in the region on their journeys towards decarbonisation.

Finally, these values should be embedded in the minster's commercial functions by ensuring the cafés and gift shops source sustainable supplies and by communicating the minster progress through carbon reduction plans and visible on-site signage to inspire the wider community to do the same.



Sustainability workshops held during the 2025 Festival of Faith



Sustainability workshops held during the 2025 Festival of Faith



Calderdale College graduation day



Anne Lister Memorial Service

Section 5

Option comparison

5.0 Option comparison

5.1 Options

This section sets out a structured approach to assessing and comparing a range of retrofit and sustainability interventions for the building, organised according to increasing levels of ambition: light, medium, and deep retrofit. These scenarios have been developed to reflect both incremental and comprehensive pathways to improving environmental performance, building resilience, and long-term operational efficiency. Recognising the practical constraints often associated with capital funding and programme delivery, the strategies are conceived to be implemented either sequentially (progressing from light to medium to deep retrofit) or as standalone options where a particular intervention level is prioritised as an initial phase.

In all cases, the proposals have been designed to maintain compatibility with future upgrades, enabling further measures to be integrated over time without compromising earlier investments.

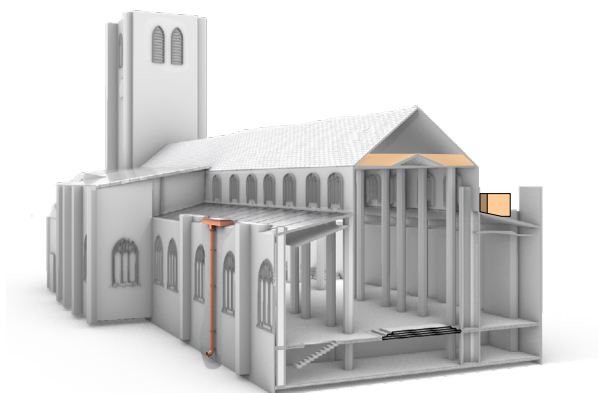
Each retrofit level is evaluated against a consistent set of performance criteria to support informed decision-making by stakeholders and funding bodies. These criteria include:

- Carbon reduction potential, aligned with relevant net-zero and sustainability targets;
- Conservation and enhancement of the building fabric, particularly where heritage or architectural value is a consideration;
- Capital and operational cost implications, including ease of implementation;
- Projected energy savings and associated implication in operational expenditure;
- Indicative payback periods and long-term value for money (particularly for photovoltaics).

By presenting these options in a comparative and transparent manner, this section aims to demonstrate how varying levels of intervention can deliver measurable benefits over time. It also highlights the flexibility available to align retrofit ambition with available funding, while clearly articulating the performance improvements and co-benefits associated with each pathway.

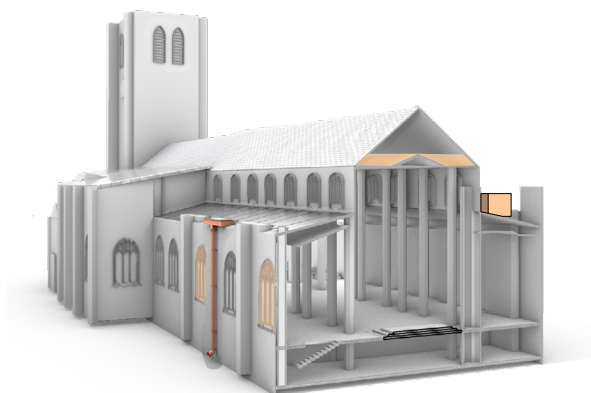
5.2 Reducing demand and decarbonising heat and electric

Light Intervention



Nave roof insulation
Nave West window upgrade (EPG)
Introduction of heat pump
Improved rainwater management

Medium Intervention



Chapels roof insulation
Partial windows upgrade (EPG)
Introduction of heat pump
Improved rainwater management

Deep Intervention



Full roof insulation
Full windows upgrade (EPG/ISG)
Partial floor insulation
Introduction of heat pump
Improved rainwater management

Fabric Changes

The proposed fabric upgrades for Halifax Minster are structured across three levels: Light, Medium, and Deep. Each offering progressively more comprehensive solutions to support decarbonisation.

The fabric upgrades listed in the figures above are combined with the spatial transformations listed in the previous

Systems Changes

Increase the current power supply from the current single phase to a three phase will allow the simultaneous use of heavy duty equipment without system overload. This will allow the introduction of a heat pump system that can operate simultaneously with the sound and light equipment used during religious ceremonies but also cultural events.

In addition to that, on-site energy generation is proposed.

Light Retrofit

This improvement strategy starts by targetting the easy wins such as:

- switching from regular to LED lighting throughout the minster (currently LED external lights only)
- Insulating heating pipes which currently are loosing heat when travelling from the plant room in the basement, all the way to the pews via the main space ceiling. An easy win would consist in maximising the the flow where it is needed.

In addition to that, the following fabric upgrades have been modelled and their impact have been assessed by TGA in the energy model.

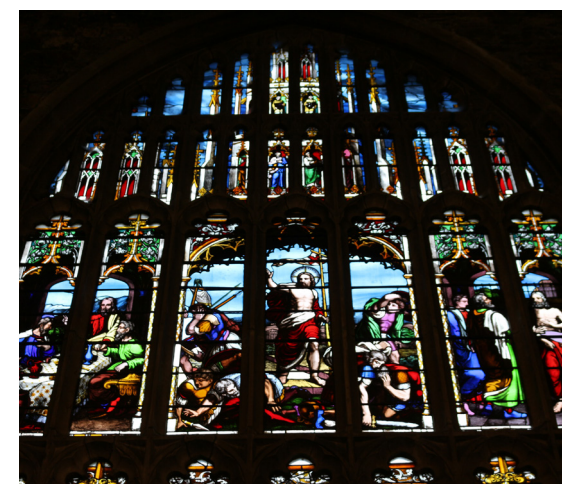
- 250mm Rockwool quilt insulation on central nave roof which should allow for proper attic ventilation via the existing vents to achieve a U-value of $0.16 \text{ W/m}^2\text{K}$. Ensure the ridge level remains the same therefore avoiding the need to increase the height of the parapet or gable end.
- Partition glass in Holdsworth Chapel: A U-value $3.85 \text{ W/m}^2\text{K}$ corresponding to a single glazed partition is proposed. This will significantly improve the thermal comfort of the users while allowing a better zoning in the space.
- Environmental Protective Glazing in the nave west Tower Window with Commonwealth glass to achieve a U-value of $3.9 \text{ W/m}^2\text{K}$
- Light draught proofed solid timber doors and openable windows throughout the building to achieve an air infiltration of 0.5 ACH



Medium Retrofit

The Medium retrofit scenario includes all of the light retrofit measures with specific further improvements such as:

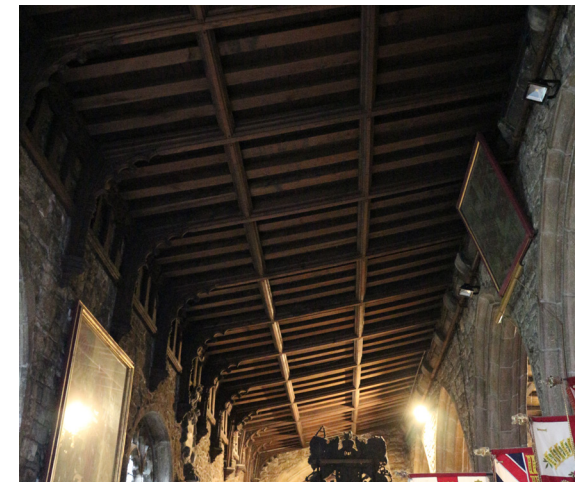
- 250mm Rockwool quilt insulation Rokeby Chapel to achieve a U-value of $0.16\text{W/m}^2\text{K}$. PIR is combustibile and cannot be recycled, however it is more efficient and can remain in reasonable thickness. Could have issues with the building insurer when using PIR insulation
- 250mm Rockwool quilt insulation Holdsworth Chapel to achieve a U-value of $0.16\text{W/m}^2\text{K}$. A study of different types of insulation to demonstrate the efficiency v sustainability for different thickness, same U-value, end-of-life arrangement, warranty
- Environmental Protective Glazing for Severely damaged stained windows to achieve a U-value of $3.9\text{W/m}^2\text{K}$
- Replace all single glazed windows with double glazing
- Add a vestibule to the west entrance further improving the draughtproofing to reach an infiltration rate of 0.45 ACH



Deep Retrofit

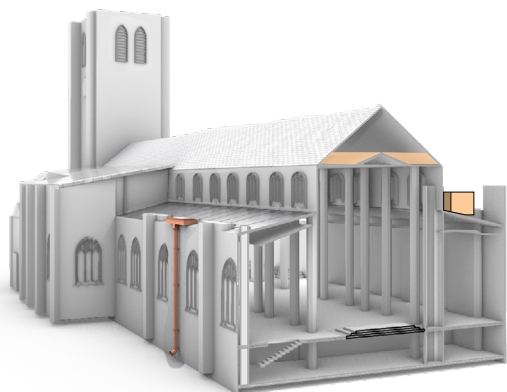
The Deep retrofit scenario includes all of the light and medium retrofit measures with specific further improvements such as:

- Timber frame with tin/Slate/Lead roofing plus insulation
- Accessibility work / floor Solid ground floor, stone tile floor finish plus insulation
- Exposed masonry on both internal and external walls, therefore if insulation is installed on the wall, this would dramatically change the aesthetics of the building. This option has not been considered.
- Further draughtproofing to reach an infiltration rate of 0.35 ACH



5.3 Capturing broader environmental and community benefits

Light Intervention



Share lessons about light touch measures and what people can do at home.



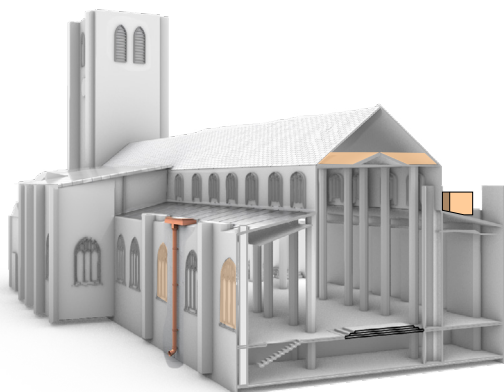
Build an insect hotel with community group.

Engage local schools to help create a wildflower meadow in one section of the church yard.



Address water ingress issues
Provide water butt to northern elevation down pipes for irrigation

Medium Intervention



Engage community in process.

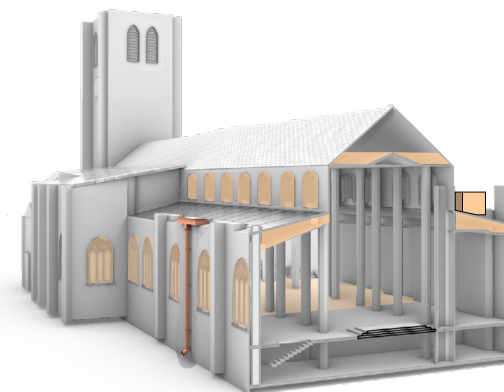
Tell the sustainability story of Halifax through signage.

Dedicate area of church yard as a community garden.

Increase planting which assists with rainwater management.

Improve water efficiency of existing sanitary fittings.

Deep Intervention



Encourage greater community access when works are being carried out to share lessons.
Help build local skills through apprenticeships and school visits during work.

Complete redesign of the landscape, considering routes and connections, entrance and arrival, accessibility.

Increased WC provision, with water efficient fittings, rainwater harvesting for use in flushing.

5.4 Whole Life Carbon

In conclusion, the assessment of embodied carbon associated with the fabric upgrade demonstrates that deeper retrofit options inevitably introduce higher upfront carbon impacts due to the increased use of new construction materials.

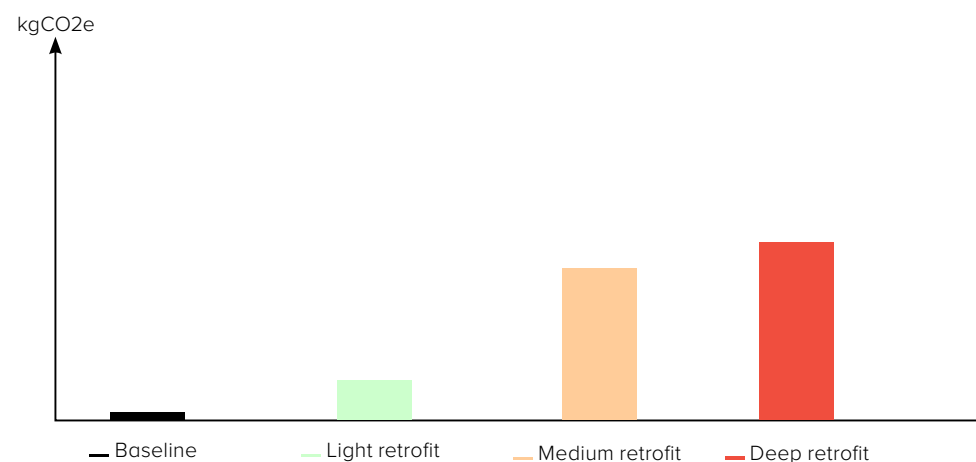
However, when this embodied carbon is evaluated alongside the operational benefits of improved fabric and system performance, the overall carbon outcome is clearly favourable.

Enhanced fabric efficiency leads to a substantial reduction in heating demand and associated operational emissions, which outweighs the initial embodied carbon investment over time. This is particularly critical in a context where electricity costs are approximately four times higher than gas, making fabric upgrades essential to maximise heating system efficiency and control long-term energy costs.

Finally, on-site power generation can further reduce reliance on the grid, reinforcing the long-term carbon and cost benefits of a comprehensive retrofit strategy.

	Baseline	Light	Medium	Deep
Embodied carbon [kgCO ₂ e]	0	6,884	22,362	27,465
Operational Carbon [kgCO ₂ e/annum]	40,500	9,800	9,600	8,700
Reduction in operational carbon	N/A	76%	77%	79%

**Operational carbon estimates based on LT ASHP + Pew heaters scenarios*



Graph comparing embodied carbon for different fabric upgrades

Section 6

Conclusion & next steps

6.0 Conclusion & Next Steps

6.1 Key considerations

This sustainability strategy sets out a pathway for the Minsters to reduce its dependance on fossil fuels, whilst also achieving its overall ambition to serve not only as a historic landmark but also as an example of best practice for the community (locally and globally), demonstrating that careful stewardship of our planet and our built heritage, can act as a catalyst for community cohesion and prosperity. The strategy is intentionally high-level, with clear recommended actions set around short-, medium- and long-term timeframes. These have been described on page 6.

In addition to the recommendations set out in this report, consideration should be made to the following:

Rising costs of energy

The research briefing titled “*Gas and electricity prices during the ‘energy crisis’ and beyond*” published in 2026 explains that, for the consumers subject to standard variable tariff, the price of energy that is currently controlled by the Energy Price Cap is due to rise by Q3 this year. More recently, analysts predicted a rise in the price cap mainly due to the recent conflict in the Middle East.

Funding

Funding opportunities are already being considered by the Minster. At the time of writing, the below opportunities are available:

The Decarbonising Churches Grant Fund from the Net Zero Carbon Programme is opening to churches in all diocese from June 2026.

Give to Go Green is a match-funding project from the Net Zero Carbon Programme helping to double locally raised donations for carbon-cutting projects.

Quick Wins Grant Fund provides grants for smaller or medium projects of up to £10k. This is devolved to dioceses to onward grant to churches who want to take next steps in improving their sustainability.

Place of Worship Renewal Fund (DCMS funded) is a government fund, provided by the Department for Culture, Media and Sport (DCMS), which supports repair and conservation projects for places of worship. Administered by Historic England, it provides capital grants ranging from £10,000 to £1,000,000 for urgent repairs and essential improvements. It is commentative and the deadlines are tight.

Degrading fabric condition

The building faces significant long-term challenges, most notably the widespread historical use of hard, cementitious mortars that are now actively damaging the Pennine millstone grit masonry by trapping moisture. High-level stonework on the north aisle, tower, and south porch has become loose, posing a health and safety hazard, while the failing membrane roof over the north chancel aisle is causing active water ingress into the

organ chamber. Furthermore, several windows exhibit significant bowing or vandal damage, and the rainwater goods require a comprehensive overhaul to address leaking joints and deteriorating decorative finishes.

Increased diversity of events

By hosting regular evening concerts, Halifax Minster extends its role beyond a place of worship into a cultural venue. These events, ranging from choral performances and organ recitals to community choirs and visiting musicians, attract diverse audiences who might not otherwise engage with the building. This strengthens its position as a shared civic and cultural asset.

Frequent public events provide strong evidence that the Minster is actively used and valued. This is crucial when applying for grants (such as DCMS-funded programmes), as funders often prioritise buildings that demonstrate clear community benefit, accessibility, and ongoing use.

Widespread modern technologies

Broad deployment of ground source heat pump systems in Halifax to harness the opportunity of the aquifer is encouraging while air source heat pumps are more affordable and increasingly used in places of worship of this scale.

Health and safety

Throughout any retrofit or conservation work, health and safety considerations are paramount, including managing hazards like high-level loose stones and adhering to the Health & Safety at Work Act 1974.

6.2 Further studies and investigations

The following studies and investigations are considered beneficial should any of the work outlined in the previous chapter be taken forward:

- Drone survey where the roof access is restricted
- Detailed window condition survey by a specialist
- Structural engineer involvement to assess the structural implications of proposals
- Confirmation of the current and predicted occupancy numbers
- Opening up works like lifting the floor slabs, basement structure or opening up the aisle roof where there appear to be little void space available for installing insulation
- Does the church have an inventory of furniture - on of pews, condition of organ/pulpit etc
- Timber rot survey
- Review of significance plan to determine the nuanced heritage significance of the building, e.g. roof significance, floors etc.
- More detailed assessment of fabric performance.

6.3 Next Steps

Key next steps are outlined below. These fit under the 'mobilise and evidence' section of the routemap outlined on page 6. Some of these will require specialist advice and expertise. Purcell are happy to advise on this when the Minster is ready to progress.

- Secure capital cost advice for preferred retrofit scenarios.
- Initiate discussion with DAC, statutory consultees and funders.
- Consult with UKPN regarding electrical supply capacity.
- Adjust heating setback to 8-10° and monitor impact.
- Commission targeted surveys of roof, rainwater goods, and glazing.
- Commission design development of preferred interventions and obtain statutory consents.
- Adjust routemap to accommodate capital works programme and planned maintenance changes.
- Develop programme of volunteer-led projects, outreach and collaborations.

Appendix A

RIBA Stage 2 Heating Feasibility Study

By TGA Engineers

HM-TGA-XX-XX-RP-ME-40-0001

P03

24/06/2026

Refer to separate PDF issued with this report.

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