Installation of roof-top PV panels

King's College Chapel

Planning and Heritage Statement

August 2022

Turley

Contents

Client
Turley

Our reference
KINC3004

July 2022

1. Purpose of this report

1.1 This report has been prepared by Turley, with input from Caroe Architecture Ltd, Kings College, Max Fordham and others to support an application for Planning Permission for the installation of photovoltaic panels (PVs) on both slopes of the roof of King's College Chapel.

1.2 The College fully understands the heritage significance of the Chapel as custodians of the building since its foundation in 1441. Equally it understands, as we swelter in 40 degree heat, the very real challenges posed by climate change and how the nation's plans for zero emissions are on track to fall short of international and UK obligations and legislation by some distance. A major repair of the roof is needed and this is therefore a once in a lifetime opportunity to undertake works which will safeguard this unique building and help the College respond to the challenges of climate change.

1.3 It is not a situation where the College can choose to ignore this opportunity and concentrate efforts elsewhere on the College estate. If it is to meet zero emissions targets, it needs to take every available option as the opportunity arises.

1.4 This application to Greater Cambridge Shared Planning Services (GCSPS) is for planning permission and was subject to pre-application discussions with the Conservation Officer initially in October 2021 and then once more with Planning and Conservation Officers on 3 May 2022. A separate meeting was held with Historic England on 31 May 2022. These two most recent pre-application meetings allowed officers to view an on-site installation of the PVs which will be used (the 'mock up'). Officers have also been consulted by the Diocesan Advisory Committee under the Faculty Jurisdiction (see Section 5 of this report).

1.5 Following the May 2022 meetings, the panels have been moved down the roof, to further minimise their impact, as the edge of the array was noticeable from ground level in a limited number of viewpoints.

1.6 Listed Building Consent is not needed from GCSPS for these works as the Chapel is subject to the 'Ecclesiastical Exemption[1]' and the equivalent approval must be gained from, in this case, the Church of England through the Faculty Jurisdiction. Historic England are key advisors to both the secular and ecclesiastical bodies on such matters.

1.7 Pre-application enquiries began in September 2021 with the Diocese of Ely (DAC), and via this process, the Church Building Council (CBC), Historic England (HE) and Greater Cambridge Shared Planning Partnership (GCSPS). The DAC convened two site visits which were also attended by representatives of the national amenity societies.

1.8 The Church Buildings Council (CBC) considered the case at their meeting in December 2021 and circulated their advice, confirming support for the application for re-roofing and the addition of PV to the college chapel roof. (See full advice letter in Appendix 1).

[1] The Ecclesiastical Exemption (Listed Buildings and Conservation Areas) (England) Order 2010

1.9 The DAC has convened a working party on the designs, taken advice internally and the application for faculty approval is being considered in parallel with this planning application. They aim to revisit the College shortly and will be advised by Historic England, who are considering the proposals at a meeting of their Historic England Advisory Committee on or before 17 November. They are also due to visit the site imminently.

1.10 This application is therefore made for:

The installation of photovoltaic panel arrays on the north and south slopes of King's College Chapel and related infrastructure.

1.11 In addition to this report, this application is supported by:-

Location Plan (001)

Site Plan (LG 100)

PV Installation Plan (BW 200 BWIC)

Scope of Work (GA 200.1)

Roof Plan with PVs West (RF 200.3)

Roof Plan with PVs East (RF 200.4)

Fixing points for PV array Section and Detail (RF 300.1)

MFP PV Specifications (Max Fordham)

Covering Paper and Design (and access) Statement plus Appendices (Caroe Architecture)

Statement of Significance and Visual Impact Assessment (Caroe Architecture)

Decarbonisation Report (Max Fordham)

Preliminary Bat Appraisal (Philip Parker Associates)

Fitting Instructions for PV Fixing Posts (Nicholson)

2. Statutory Constraints

2.1 Kings College Chapel is a Grade I Listed Building. This is the only listed building which will be physically affected by the proposed works.

2.2 To the south are the other listed buildings of Kings College which include:-

- The Fellows' (or Gibbs) Building (UID 1125533) Grade I;
- The Fountain in the Centre of First Court (UID 1318932) Grade II,
- The Screens and entrance gateway on King's Parade (UID 1125532) Grade I;
- The South Range of First Court (UID 1139452), Grade I;
- Twelve lampposts in First Court (UID 1332162) Grade II.

The setting of these buildings has the potential to be affected by works to the Chapel.

2.3 To the immediate north of the Chapel are the Grade I Listed Buildings of the University known as the Old Schools and listed as 'The Law School and University Offices' (UID 1126279). On the north side of this complex is the former Squire Law Library or Cockerell Building which is also Grade I listed (UID 1121518). On the lawn between the Old Schools and King's Parade is a Grade II listed urn (UID 1122675) whilst the railings are Grade I Listed (UID 1126280). To the north of the lawn is the Grade I listed University Senate House (UID 1322818).

2.4 To the north-west of the Chapel are the buildings of Clare College. The group includes the buildings surrounding Fore and Principal Courts (Grade I: UID 1320280) and gates and railings to Trinity Lane (also Grade I: UID 1125550).

2.5 To the east of the Chapel on the east side of King's Parade is the Grade I Listed Church of St Mary the Great (UID: 1126084). South of this are a number of Grade II listed 'town' buildings, generally shops and cafes with King's College student accommodation above. These form a continuous and attractive group along the east side of King's Parade and turn the corner into St Mary's Passage.

2.6 The settings of all these buildings and possibly others in the surrounding streets have the potential to be affected by works to the Chapel, particularly at high level. The assessment is considered as part of the general impact on the character and appearance of the Conservation Area, as all the buildings sit within the Historic Core part of the Cambridge Conservation Area No.1.

2.7 The Chapel and all the buildings of King's College sit within the Grade II* Registered Park and Garden which encompasses all the College's Courts and Gardens (including those west of the river and therefore forming part of 'The Backs'. Separate assessment of the heritage impact on this is therefore made.

2.8 Clare College grounds to the north are similarly a Registered Park and Garden (Grade II) as are Queens' College Grounds (also Grade II) south of Kings and similarly they form

part of ‘the Backs’. Any impact on the setting of these is however made under the wider Conservation Area impact.

2.9 In summary then, the impact assessment will consider the direct impact on King’s College Chapel, the impact on the character and appearance of the conservation area (including the settings of various adjacent listed buildings and neighbouring parks and gardens) and the impact on the setting of the King’s College park and garden including the settings of the separately listed King’s College buildings.

3. Heritage Significance

Kings College Chapel, Grade I Listed Building

3.1 Kings College Chapel is an iconic building in Cambridge that is of recognisable international importance. It is a key component of visitors' experience to 'The Backs' and is known the world over for the annual Christmas broadcast 'Carols from Kings'. It is a true landmark and perhaps the most identifiable symbol of Cambridge.

3.2 This universal importance was recognised when the building formed part of the Cambridge Colleges and Backs property that was added to the tentative list of world heritage sites submitted by the UK to UNESCO in 1989. Although the nomination did not proceed (it was deferred as a larger area was considered to be required to maintain the coherence of the University town) its very nomination as part of this picturesque grouping highlights its global significance.

3.3 A detailed architectural description of the building was provided in the pre-application paper by Caroe Architecture and is not repeated here. It is evident that the building holds great architectural and artistic interest, being considered one of the finest examples of late Perpendicular Gothic English architecture and features the world's largest fan vault. It is also evident that it is of great historic interest being the oldest surviving building within the College site and it was planned by King Henry VI who decided the dimensions with the likely 'architect', the King's master mason, Reginald Ely.

3.4 Henry VI went to great lengths to ensure that the Chapel would be without equal in size and beauty. The building was modelled on the plan of a cathedral choir and Ely probably designed the elevations. Henry VI laid the first stone in 1446, but Richard III, Henry VII and finally Henry VIII would accede to the throne before the building was finally completed in 1515 although the windows were yet to be made, being completed between 1515 and 1531 (with the exception of that in the west elevation which is C19). The C16 windows are some of the finest in the world from their era, largely made by Flemish craftsmen.

3.5 The ante-chapel screen, organ, choirstalls, windows and stone masonry are all individual elements of superb craftsmanship that together create one of Europe's finest late medieval buildings, 'a work of kings'. What is however noticeable is that although the effect of the interior of the building is superb (especially the 'noblest stone ceiling in existence') and the exterior is monumental, the lead roof itself is a relatively plain, largely invisible element of the incredible whole.

3.6 The great timber roof structure is of high significance. The basic design of arch-braced principals with two tiers of shallow-arched wind-braces to the purlins was drawn in 1480 by the carpenter Martin Prentice. The western part followed in 1510-12, made by Richard Russell, who was also carpenter at Westminster Abbey. The diminished haunches of the tenons at this western end are the earliest known example of this most structurally efficient form of jointing. In 1512 the shell of the building was finished and roofed throughout its length in timber boarding and lead.

3.7 The chapel roof is nearly 300ft long and laid without steps in mini-roll lead, falling to lead parapet gutters. Although a large expanse, it is a plain, practical roof with no decorative leadwork and largely concealed by the openwork parapet, pinnacles, upper turrets and battlements. The artistry and architectural interest is provided by the masonry (external and internal), not the external roof covering itself.

Kings College Park and Garden – Grade II* Registered

3.8 The registered area encompasses the College courts and landscaped pleasure grounds and gardens laid out C18-C20 including the Fellows' Garden. These spaces lie either side of the River Cam, stretching between King's Parade in the east and King's College Garden Hostel on the west side of Queen's Road.

3.9 By the late C17 (Loggan, 1688) the land east of the river (now divided into Front Court and Back Lawn) consisted mainly of a large open lawn, Chapel Yard, dominated in the north-east corner by the chapel, and crossed at right angles by two central paths in cruciform pattern. From 1724 the Gibbs Building (Grade I listed) divided Chapel Yard lawn into Back Lawn to the west and Front Court to the east. To the east, Front Court is bounded by Wilkins' screen and to the south by his south range (1824-8, listed grade I).

3.10 In 1771 Back Lawn was freed of bowling green walls and other enclosures, levelled and laid to an open lawn surrounded by a perimeter path, this work being directed by James Essex, who also designed new panelling within Chapel. Part of Wilkins' works in the early C19 was the replacement of the central bridge over the river further south by the present bridge, and Back Lawn was graded so that it sloped down to the river, giving it its present landscaped appearance. Wilkins too had a hand in the adornment of Chapel, leaving a portion of his stained glass collections to be installed within the lower side chapel windows. Scholars' Piece was also landscaped, and the serpentine

path to the bridge constructed across it. Several further buildings were erected during the later C19 and C20 in the area south of Front Court and Back Lawn.

3.11 Today, the Gibbs Building (J Gibbs 1724-31, listed grade I) with its central, open-arched gatehall frames views of Back Lawn and Scholars' Piece beyond. At the centre of the Front Court lawn stands a stone basin with a central fountain supporting a bronze statue of Henry VI (H A Armstead 1879, listed grade II).

3.12 The south side of Front Court's perimeter path continues west, forming part of the perimeter path which encircles the open rectangular lawn of Back Lawn and running down to the river, with views across Scholars' Piece and Clare College gardens and bridge to the north. The path continues west from the bridge in a serpentine line along the south boundary of Scholars' Piece, flanked by a lime avenue, raised above the level of the adjacent meadow and overlooking Queens' Green to the south. It seems to have been designed with the approach from the west in mind, the curved path with its flanking avenue being planned to conceal the buildings, including the Chapel, across Back Lawn until they are dramatically revealed across the bridge. This view is perhaps the most photographed view of Cambridge, and the Chapel, particularly its western front, features prominently, flanked by the Gibbs Building and the southern face of Clare College's Old Court.

3.13 The heritage interest of the landscape lies in its group value with the College buildings and it is a key component of their setting, lending cohesion to the buildings and garden features of the College and unifying them with the other registered landscapes of The Backs. The openness of Back Lawn (the product of landscaping work directed by two prominent architects of the C18 and C19) enhances the grandeur of the buildings enclosing the space.

Cambridge Historic Core Conservation Area Appraisal

3.14 King's College Chapel is one of a very few tall buildings within the central historic core of Cambridge and is therefore a major landmark within the conservation area. The scale and formality of the huge Gothic Chapel dominates the more humble town buildings. Its landscape setting within The Backs with its interplay of grand college buildings and verdant landscape is famous the world over and provides one of the most enduring images of Cambridge.

3.15 The Backs and the college and university buildings in the area form an almost continuous run of institutional uses flanking the River Cam from the Magdalene Street bridge in the north to Fen Causeway in the south, although from Silver Street southwards, public open spaces and commercial uses become more evident on the west side of the river.

3.16 From the west, across The Backs, the historic core is seen across open ground, providing great views of many city buildings including the Chapel, and providing the core with strong edges. This also enhances the landmark status of the Chapel within the Cambridge townscape/skyline.

3.17 The Chapel and its setting, and the numerous College buildings with which it shares associative historic interest together contribute strongly to a number of the key

characteristics of the Historic Core Conservation Area as a whole and specifically of the Colleges. These include:

THE CORE AS WHOLE

- Strong edges between landscape and buildings/different uses
- Few but prominent 'landmark' buildings
- High quality, well designed buildings
- Contrasts – of landscape and buildings, tranquillity and activity, buildings of different scale, etc.

THE COLLEGES

- 'Country house' setting in the landscape
- Street presence through gatehouses and landmark buildings (particularly chapels)
- Buildings of particular styles as opposed to vernacular buildings
- Huge contribution to the skyline and roofscapes in streets
- High quality materials and well-detailed buildings

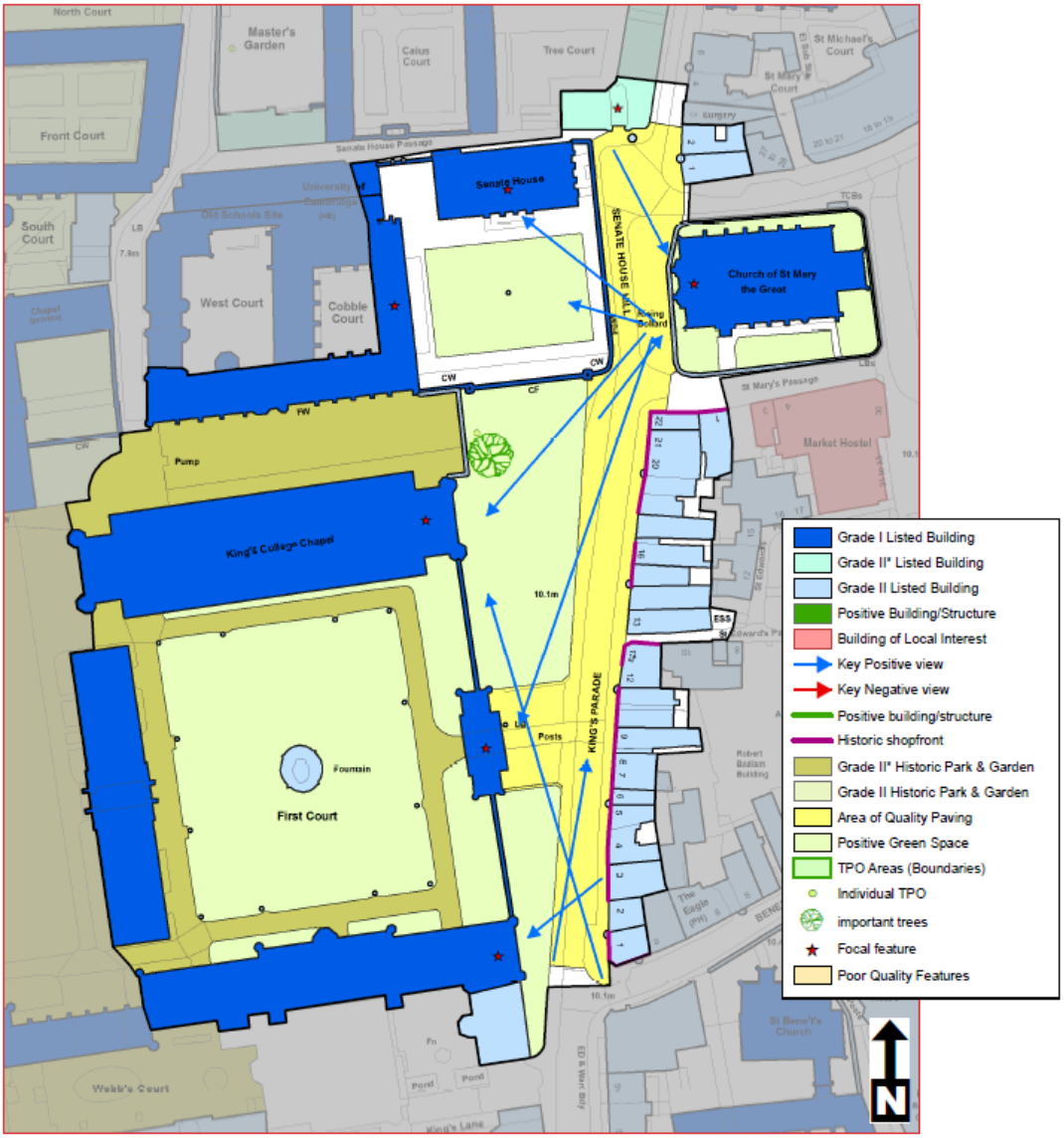

Figure 3.1: Townscape Analysis map for King's Parade/Senate House Hill © Historic Core Conservation Area Appraisal (2016)

3.18 The importance of the Chapel to the streetscape of King's Parade/Senate House Hill is also highlighted in the street-by-street analysis which grades this street as being of very high significance in the Conservation Area. It is described as '*The most iconic street in Cambridge with a streetscape of international significance centred on King's College Chapel and the Senate House, the University's ceremonial focus*.' The General Overview of the street goes onto describe King's College Chapel as:

'…the most visually important building with its east end rising well above the other buildings and its vast east window framed by corner towers. In views along King's Parade from the south, the roofline of the long south frontage is seen above the college screen with its many pinnacles breaking above the roofline and creating an intricate silhouette.'

3.19 The roofscape of King's College's Gothic buildings is noted as providing 'an impressive roofscape, particularly in silhouette at dusk.' The large horse chestnut tree in front of King's College Chapel is also highlighted as a key landscape feature of the area providing 'an attractive juxtaposition of a soft natural form against the formality and geometry of the Gothic tracery of the chapel's east window.'

3.20 The width of King's Parade/Senate House Hill allows many good views of the Chapel as annotated on the Townscape Analysis map (reproduced above). This contrasts with the intimacy of the other streets around the Chapel, notably Trinity Lane where the Chapel 'forms an imposing end stop in views south', channelled by the buildings of Gonville and Caius and Clare Colleges, the frontage of the latter prominent in this southerly view.

3.21 Whilst the Chapel is not widely visible from Trinity Lane, this is now the main visitor access point to the building. Upon reaching the Chapel, the gap between it and Clare College allows a rare glimpse from a city centre street across a College court and through to The Backs (part of the Registered landscape). The 'picture postcard' view of Cambridge incorporating the Chapel is, however, of course gained from The Backs and the public's appreciation of these vistas is gained from Queen's Road. The street by street analysis of Queen's Road describes these as follows:

The views across The Backs are the most frequently reproduced images of Cambridge, with the view of Clare College and King's College Chapel being the iconic image used to represent the university and city around the world. The quality of these views is a combination of the green setting of manicured lawns with wilder paddocks, the river with its traditional activity of punting and architecturally elaborate bridges, the spectacular architecture of the historic college buildings as the focus of the view (without interruption of discordant structures), and the clear space behind, again without interference of structures that might draw attention away from historic college buildings.

3.22 Trinity Lane and Queen's Road, like King's Parade and most of the routes around the Chapel, are also of very high significance. This reflects the high number of historic buildings, great archaeological importance and/or important areas of landscape that this and the other routes incorporate and their sensitivity to change because of the great architectural and historic interest. The Chapel and views of it are an integral and

very important part of this significance and interest and a key component of the conservation area's character and appearance.

King's College Listed Buildings

3.23 The Chapel forms the north side of First Court which is enclosed by buildings which are all Grade I listed. They are The Fellows' (or Gibbs) Building (UID 1125533) which forms the west side; The Screens and entrance gateway on King's Parade (UID 1125532) which forms the east side; and, The South Range of First Court (UID 1139452). Within First Court are Twelve lampposts (UID 1332162) Grade II and a Fountain in the centre (UID 1318932); all of these are Grade II listed.

3.24 Gibbs' Building is described as 'by some distance the greatest collegiate building of C18 Cambridge'[2] and is 'appreciated as an architectural monument on its own'. It is accordingly of great architectural interest and historic interest, with the large expanses of lawns either side allowing the strong lines and great scale of both Gibbs' Building and the Chapel to be appreciated in all their glory.

3.25 A century later, Wilkins' Screen and South range completed the First Court in a mixture of Gothic styles. The screen has a lightweight appearance with seven-light Perpendicular openings and lots of pinnacles and a 2-storey gatehouse with a cupola. It was designed to reflect the style of the Chapel which it adjoins, but was kept low so as not to compete with this. The Hall Range to the south is symmetrical in a Tudor-Gothic style of 3 blocks, each of 3 storeys. It continues westwards towards Back Lawn with the Library and former Provost's Lodge. Bodley's Buildings (Grade II listed) were added to the western end at the end of the C19. The whole forms an attractive composition of significant historic and architectural interest.

3.26 The fountain and lampposts contribute to the C19 character of the College court and form incidental features of historic and artistic interest within First Court.

University Buildings – Grade I Listed Buildings

3.27 This cluster of buildings comprising the Senate House, The Cockerell Building (Squire Law Building) and The Law School and University Offices (the Old Schools) forms the centre of the University from its earliest times. It remains its ceremonial and administrative centre with The Senate House hosting graduation ceremonies. The Old Schools largely comprise a mixture of the Old Court of King's College dating from the C14 and C15, with C18 rebuilding (the East side of Cobble Court) and the C19 library to the north.

3.28 The Senate House is a grand C18 addition to the composition and this together with the C18 range of Cobble Court frames the north west corner of King's Parade/Senate House Hill. The Classicism of these buildings contrasts with the Gothic splendour of the Chapel and the medieval Old Schools buildings. The open lawn to the south of The Senate House is enclosed by Grade I listed cast iron railings, amongst the earliest of cast iron in England. And on the lawn sits a C19 Grade II listed bronze Urn.

[2] Bradley, S and Pevsner, N 'The Buildings of England: Cambridgeshire'; London (2014) p 126

3.29 This collection of buildings and structures is of very high architectural and historic interest due to their age and historic associations with the University, formerly King's College and the notable architects who designed them. They have a strong presence in the townscape, emphasised by the formal green space in front of the Senate House, with the southern side of this green space enclosed by the north side of the Chapel.

Clare College Buildings and Gardens

3.30 The Buildings surrounding the Fore and Principal Courts (also known as Old Court) are a remarkably unified and fine example of the Early Renaissance Style dating from 1638-1715 (completion delayed by the Civil War). These Grade I listed buildings sit within Grade II Registered grounds with a separately Grade II listed wall enclosing the southern boundary of the Scholars' Garden to the west (next to the river) and Grade I listed gates and railings contemporary with Old Court enclosing its set back position from Trinity Lane.

3.31 The complete Old Court is more of one style than any other C17 work in Cambridge despite the elongated construction period. This Court replaced the medieval buildings from the College's foundation in 1338. Clare Bridge (Grade I listed) over the River Cam is contemporary with the Court and is the oldest surviving bridge in the City and the first in a Classical style. Its construction provided access to the gardens on the other side of the river.

3.32 Clare College is part of the group of city centre colleges (including King's) whose gardens and meadows together form The Backs. From Clare Bridge, views open up to the north and south of the river and across to the adjacent College gardens, particularly those of King's, Trinity and Trinity Hall. These vistas allow the architectural spectacle of each of the Colleges to be appreciated and Clare College forms an integral part of the iconic view of the Chapel from The Backs.

Great St Mary's Church – Grade I listed building

3.33 This University Church is the foil to the Chapel and the other College and University buildings and is as impressive externally as it is splendid internally. A church has existed in this location since 1205 and the University has used it for meetings and ceremonies from the C13. It is clearly of great historic and architectural interest, complemented by the high artistic interest of the furnishings, decoration, sculpture, etc. of the building. Archaeological interest is correspondingly high too.

3.34 It is framed by an open setting created by the relatively wide spaces on all sides, including its churchyard which is enclosed by a Grade II listed cast-iron fence and gates. The church sits as part of this centrepiece of the city and university.

'Town' Buildings – Grade II Listed

3.35 In contrast to the formal grandeur and relative tranquillity of the setback University and College buildings on the west side of King's Parade/Senate House Hill, the 'town' buildings are set on the back of the pavement with shopfronts providing a high degree of interaction with the street. This bustling character underlines their commercial nature with their generally narrow frontages reflecting the earlier medieval tenement

plots, again contrasting sharply with the monumental scale of the College and University buildings on the opposite side of the road.

3.36 The buildings are a mixture of historic town houses in a variety of architectural styles and materials reflecting their periods of construction which range from the C16 to the C19. The scale also varies between 3 and 5 storeys creating a varied and interesting roofscape with dormers occasionally punctuating the rooflines. In much the same way as Great St Mary's Church is a foil to the Chapel, the 'town' buildings are a foil to the collegiate buildings opposite. As a whole they display architectural details of interest, with many retaining C19 shopfronts and they are of historic interest as part of the town's development.

4. Outline of Proposed Works

Introduction:

4.1 Attention was drawn to the condition of the Chapel roofs following the latest Quinquennial Inspection (QI) in 2018 and in the two previous QIs by Freeland Rees Roberts. The 2018 report highlighted significant problems of continuing and rapidly worsening failure of the leadwork. In order to emphasise the concern and call for action, the QI plotted water ingress and where rot (brown and 'dry' rots) had established locally, threatening the roof timbers. At the request of the College Fellowship, the need for replacement was also validated in a subsequent Assessment and Report by the Lead Contractors Association in 2021. Emergency repairs have been undertaken to the roofs (with Faculty approval) over the past three summer seasons to address the most serious decay and water ingress. Each time these 'holding' repairs are made, the College find that the splits and slips in the leadwork are worse and also that the more recent temporary repairs are not holding.

4.2 Consent has already been gained to safeguard the at-risk heritage of the chapel roof by re-roofing and undertaking essential repairs. However, the need and opportunity to set the chapel roof project in the context of the climate emergency is a requirement of policy both of the College Fellowship and the Church of England nationally. Hence from the outset our brief has been to explore and seek consent for sympathetic and carefully judged measures to address the climate emergency

4.3 GCSPS have confirmed that the necessary scaffolding and site huts and hoardings to carry out the works to the Chapel benefit from 'permitted development' and so do not need to form part of this application. As the hoardings will be there for some time, on one of the City's most loved streets, the College intends to use them as a means of community engagement by incorporation of a printed display to include information on the history of the Chapel and details of the works. This will be secured using counterweights rather than penetrating the ground, to avoid archaeological disturbance. GCSPS have also confirmed that Advertising Consent will not be required.

Installation of PVs

4.4 It is proposed to fix arrays of 246 PV panels to each of the north and south slopes of the Chapel roof (a total of 492 panels). The proposed panels are all black monocrystalline silicon panels, which have been used in the trial array. These were determined to provide the best standard as they have the greatest efficiency in electricity generation for the lowest visual impact.

4.5 The array will generate power that will meet some of the base load needs of the college estate. The wider estate strategy shows clearly why Kings needs to invest in this scheme and on-site.

4.6 Section 6.2.4 in the accompanying design statement details fully the options for fixing the array to the new lead roof. The chosen approach is direct fixings using the Nicholson Rooftrak IFP-MR product. These have been designed with the coefficient of

thermal expansion of lead in mind and can accommodate expansion/contraction of the lead, thereby designing out potential risks associated with premature failure of the lead. Ballast was ruled out due to the added loading, and risk of repeated and prolonged condensation cycles where the pads and panels are in contact with the lead: an unknown which may cause hastened deterioration of the lead. Clamping options were not feasible due to the hollow roll and similar uncertainties around performance in the longer term.

4.7 The number of fixings required to secure the arrays are relative to their overall area rather than a set number per panel. These would be spaced at 1.5m centres up the roof slope and across the length of the roof, resulting in 4 rows up the slope, centred on every other bay, as shown in drawings RF 200.3 rev 4.04, RF 200.4 rev 4.05 & RF 300.1 Rev 4.05. This has been designed to accommodate the setting out of the lead, not the other way around. The fixings have been coordinated with the internal structure to ensure that there is no impact internally, and also reversibility.

4.8 As with any abutments or penetrations, the fixing points require minimum upstands and cover to ensure appropriate weathering is provided. The height of the panels above the lead will be 260mm. This will allow air to flow beneath the panels and to avoid prolonged wetting of the lead.

4.9 The location of the arrays on the roof has been tested through the mock-up process and subsequent visual analysis including viewings by GCSPS, Historic England and a number of College visitors. The panels in the mock-up have been moved down from near the ridge (the location for maximum solar exposure) to reduce potential visual impact. The panels will be 1.3m down from the ridge (rather than the 0.63m originally proposed) and closer to the lead (260mm rather than 360mm) than in the original mock-up. Please see again drawing RF 300.1 rev 4.05 for the setting out, and the accompanying Visual Impact Assessment for further details.

4.10 The amount of associated infrastructure required is very small and largely comprises cables which will be taken down the SW stair turret. Cables will then run below ground to re-enter the building in the Dean's Verger's Office where it will connect into existing switchgear.

4.11 The total potential output (peak) is 192 kWp. The annual PV Output is 105,864 KWh/yr. The North-slope panels are circa 57% as efficient as the south facing ones. Whilst viability and payback calculations suggest beneficial payback, the College's business case for the installation is primarily based on non-financial goals such as achieving Net-Zero targets and the binding policy commitments for college estate.

4.12 There are now pressing targets for carbon zero, some enshrined in legislation and some as institutional priorities and policies (see Sections 7 & 8 of this report). Kings College Chapel itself and the domus estate of the Fellowship is subject to UK government legislation; the Church of England Synod 2030 Carbon Zero target; the University of Cambridge 'Cambridge Zero' targets of 2038 and 2048 respectively; The City of Cambridge Climate Change Strategy. The College body – Students and Fellows – have also defined commensurate targets for responding to the IPPC reports on anthropocentric climate change and the crisis faced by the planet, societies and eco-systems.

Rain water harvesting:

4.13 Following pre-application discussions, the College has decided not to pursue proposals for rainwater harvesting at this stage.

5. Previous Consultation

5.1 Two consultation events (including site visits) took place in October and November 2021 when the principles of the proposed development were discussed.

5.2 The first event in October included the Ely Diocesan Advisory Committee (DAC) and the Greater Cambridge Shared Planning Services (GCSPS) Conservation Officer who was present in his role as advisor to the DAC.

5.3 The second event in November included Ely DAC, the Church Buildings Council (CBC), the Society for the Preservation of Ancient Buildings (SPAB), and Historic England (HE).

5.4 The CBC has responded in writing on 22 December 2021 (see Appendix A) whilst the DAC has held a number of internal case review workshops. They intend to revisit the College, hopefully in the week commencing 5 Sept.

5.5 Following an email from Christian Brady at GCSPS (dated 2 November 2021) asking for a pre-application submission, detailed material was submitted to the Council and a site meeting held with planning and conservation officers on 3 May 2022. This allowed both to see the 'mock up' (in its original position closest to the ridge) on the roof and from the ground. Following this, on 31 May, the Historic England (HE) Inspector visited the College to undertake the same exercise.

5.6 In the responses from GCSPS on 16 May, various detailed comments from the conservation officer were received and have been acted upon. In the accompanying email, the planning officer confirmed that the site hoarding is permitted development and explained the Council's scheme of delegation with regard to decision making for planning applications. She also confirmed that biodiversity net-gain is not a requirement of the works and set out application requirements. Since then, the decision has been made to not proceed with the rainwater harvesting and so it is not considered that water harvesting measures of an archaeology desk-based assessment are now required.

5.7 Subject to the normal caveats, officers concluded that '*in summary provided all opportunities are taken to minimise the visibility of the panels (colour, position etc), officers are of the opinion that there is likelihood that the proposal would be supported on the basis of its benefits'.*

5.8 Subsequently on 11 July a further email was received requesting that the application includes ' *an explanation as to what other alternative sites have been considered for PV and to justify why the college consider the roof of this Grade I listed building of national importance to be an appropriate location for the PV.* This is provided in the following section.

5.9 Since the site-meeting, a consistent dialogue has been maintained with the HE Inspector and information provided to her in advance of the meeting of HE's National Advisory Committee which is proposed on 17 November 2022. A visit to the College and related viewpoints is planned to take place beforehand.

5.10 As a statutory consultee, the Society for the Protection of Ancient Buildings (SPAB) provided comments on 26 April 2022. Their comments on the roof repairs, access and rainwater harvesting etc are not relevant to this application. They did however comment also on the proposed PVs. They are outlined below with responses beneath (in italics).

5.11 Whilst generally supportive of a PV array on the roof, they felt they should not be seen above the ridge line and suggested mesh in the tracery might reduce any impact from ground level.

Since SPAB's comments, a mock up has been provided. This shows that there is no impact on the view of the ridge. The VIA shows that the visibility from ground level will be minimal and adjustments to the mock up have reduced this further. It is not considered that mesh would be appropriate as it would add a different texture and require physical fixing to the parapet stonework.

5.12 SPAB considered that the north slope array 'was unlikely to be able to pass any test of harm vs benefit'

Max Fordham advise that micro-inverters are to be used for each column of 3 panels to reduce the effects of overshadowing. The north array is not so efficient as the south, but if omitted, the overall output of the array would be reduced by around 40%. It is therefore considered an important part of the overall benefit.

5.13 SPAB asked for further details on fixings and options for the panels. They also commented that if a frame has to be used, it should be matt black.

Max Fordham advise that the colouring of solar panels in the industry is largely dependent on the arrangement of the silicon and layered coatings. Most solar panels have a blue hue, due to an anti-reflective coating that helps improve the absorbing capacity within the polycrystalline silicon, while the rest appear black and are made with monocrystalline silicon. The black monocrystalline panel is generally more efficient in electricity generation though polycrystalline solar panels are less expensive and much more widely used.

Additionally, there have been recent gains in alternative colouring options for solar panels, one option is putting coloured glass in front of the PV panel. Tuned to only reflect a very narrow wavelength of light, gives the panel its colour, letting the rest through. This glass coating reduces the performance by 10-15% and increases the cost. However, these panel applications have not been fully commercially tested in the UK and are still in the early days of development.

Solar panels, as they stand today, are 20 - 15 % efficient at converting sunlight to electricity. Any reduction in efficiency would have to be carefully considered against the increased cost and the added time it takes for simple payback.

The Panels which are proposed will have black frames as noted.

5.14 SPAB asked for accurate mock ups and requested accurate depictions of the PVs including a viewpoint from the Castle Mound.

The mock ups have been provided and adjusted on site. The VIA has been revisited and now includes the Castle Mound viewpoint.

6. Other Options on the College Estate

6.1 A part of the response following the pre-application meeting, GCSPS asked us to explain what other options the College could take to meet its target for Carbon Zero and so avoid undertaking works to the Chapel roof (see 5.8 above)

6.2 In Section 1 of the Design Statement, CAL explain how far short of the 26th Conference of the Parties ('COP 26') targets we will be (globally and nationally) if we continue with present rates of growth in both carbon capture / storage and non-emitting energy generation. In that context, every tonne of carbon emissions saved has a value. As stated:

Renewable electricity generation projects may be *implemented moderately quickly, have relatively short payback periods and create carbon savings while the grid carbon intensity decreases. Beyond the point where grid supplied electricity is carbon neutral, renewable generation has critical relevance in decreasing costs associated with importing electricity and supporting capacity and resilience in the transition to a smart grid.*

6.3 The College has already taken major steps to reduce carbon emissions across its estate as part of its quest to reach Carbon Neutrality by 2030. Its Cranmer Road project completed in 2020 is an extremely low-energy, all electric, development designed to Passivhaus standards (the first such building in the City). Its Croft Gardens scheme, due for completion later this year is similarly to Passivhaus standards and will be carbon negative for the first decade of occupation.

6.4 The College however realises that new building projects are a small part of the equation and the retrofitting and refurbishment of its existing building stock is a major aspect. It has asked quantity surveyors Faithful and Gould to carry out an assessment of the entire College estate to cost out potential approaches and alternatives. However in advance of this, even more marginal sites in terms of likely benefits have been upgraded. These include Market and Garden Hostel which has been provided with GSHPs on Scholar's Piece.

6.5 The College do own farmland land in more outlying areas including at Grantchester. Notwithstanding any potential heritage or environmental constraints which would make them unsuitable for renewable energy regeneration, some are remote from the grid and many are let on a commercial basis. They are therefore not considered to be a workable alternative to the Chapel roof which presents an immediate opportunity. There is also an important distinction historically and presently to draw between lands which are managed as 'home estate' to support and feed the institution and lands that are 'investment estate' to broadly fund financial sustainability and long term repairs, sustaining the endowment. Endowments are not consumable investments to be diverted to meet the needs of the home estate.

6.6 Indeed, the Chapel itself already has taken steps to de-carbonise with a recent low-energy lighting scheme. Whilst the boilers are low-nox (efficient, condensing) gas boilers with underfloor heating, when these reach the end of their useful lives they will be replaced, probably with electric underfloor heating.

6.7 Back in 2019 and before this project was conceived, Max Fordham reported for the College on the potential for PV and solar thermal installations across its buildings. This showed the Chapel roof as a potential site.

6.8 Accompanying this application is a Decarbonisation Report of the College Estate also by Max Fordham. This report is a key strand of the argument as it looks at the current energy demand and opportunities for reducing energy loss. The report includes the numerous historic buildings, energy strategies and the potential for non-emitting energy generation to conclude on the overall operational carbon impact. This effectively rules out solar thermal and wind power for generation; solar PVs having the greatest potential.

6.9 The report concludes that '*the largest and most impactful current opportunity is the implementation of PVs in conjunction with the replacement of the lead roof of the chapel, which has the potential to reduce the college carbon emissions by an average of 23 tonnes a year over the next 30 years'*. For info, 22.48 tonnes/year would be achieved in the currently proposed position

6.10 As the repair of the Chapel roof is now urgent, there is the potential to seize this once-in-a-lifetime opportunity. The chapel architect and College conclude that it could be negligent not to respond to the opportunity as it will be 100 years (well beyond 2050) before works could return to the Chapel roof.

7. Impact on Heritage Significance

Impact on the Chapel itself

7.1 Section 5 of the Design Statement describes the poor and deteriorating condition of the Chapel roof. The Quinquennial Inspection in 2018 identified areas of water ingress and rot. Temporary repairs have been made over the last few years but these have done little to address the underlying issues and the lead continues to slip and split. The Lead Contractors' Association assessed the roof in 2021 and advised that complete renewal was needed. Whilst the leadwork and underlying boarding has been renewed countless times (often on a piecemeal basis), failure to address the leadwork issue puts the incomparable significance of the underlying roof structure at risk which is an important part of the evidential and historic interest of the building, whereas the leadwork itself (which has been subject to many re-roofing's in the life of the chapel) is not.

7.2 Carrying out such a repair and re-roofing project is a major undertaking. Whilst previous works seem to have been carried out in phases over 2-3 years, these were probably conducted without a temporary roof, with all the commensurate risks to fabric and water ingress. This approach has clearly not produced a satisfactory or enduring result. A prerequisite of these works is that worship should continue in the Chapel and to ensure safe working, full access scaffolding and a temporary roof are felt to be an absolute requirement now. This means though that the new roof can be installed with the right detailing and care and should be capable of lasting for 100 years plus – which is a major benefit and worthwhile investment.

7.3 The Chapel architect's view is that there is nothing intrinsically significant about this particular lead roof. Clearly, lead is a durable and malleable roofing material and has been used since antiquity. It has a finite life and, like any roof covering, its function is to protect the building interior and is a sacrificial element of the building, designed to be replaced to aid the longevity of the building overall. The leadwork of the Chapel has therefore been replaced numerous times over the centuries. The south slope appears to date mostly from 1958. The north slope is older, with lead being cast and laid between 1861 and 1863. As noted, both have been subject to more recent piecemeal interventions and targeted repairs.

7.4 Whilst sometimes, the roof covering itself may contribute to heritage significance, these are likely to be ones which show great craftsmanship (e.g. thatch), are particularly decorative (e.g. fish-scale tiles or slates), represent a local vernacular tradition (e.g. Collyweston stone slates) or are a key feature of a specific building period (e.g. glazed and coloured pantiles on 1930s buildings). None of these are considered to apply to unornamented and oft-replaced lead roofs. There are no evident features such as graffiti on the older leadwork that would ascribe any higher significance.

7.5 There appear to be no dissenting voices amongst those previously consulted that the repair works are necessary and that wholesale renewal of the leadwork, together with the necessary associated repairs, is needed. The form of the scaffolding and temporary

roof also appears to be agreed. This aspect of the work therefore meets the statutory tests in Section 16 of the Act and the relevant local plan policies and NPPF guidance.

7.6 In any case, the lead roof will to all intents and purposes be replaced by a similar lead roof, except in matters of technical detailing, which will avoid the errors of the fully nailed mini-roll, which has failed prematurely. The only difference in the scheme proposed is that the roof will be largely covered by PV arrays on both slopes. What needs therefore to be considered is whether the change to the view of a lead roof, or the fleeting and incidental sight of PV arrays instead are a change which affects the heritage significance of the building itself, the setting of other heritage assets or the conservation area as a whole.

7.7 The key consideration in terms of impact on the building is whether or not the PV Panels would draw the eye to such an extent that they would interfere with one's ability to understand and enjoy the architectural and historic interest of the building. From ground level, if the panels were reflective, this would be a distracting element and could be considered harmful. The chosen Panels will not be reflective.

7.8 This aspect of evaluation or impact is covered in the 'Summary Statement of Significance and Visual Impact Assessment' (VIA) produced by Caroe Architecture. This considers nine different viewpoints and assesses the impact on one's ability to appreciate the heritage significance of the Chapel based on why the view is significant, what the view reveals of the heritage significance of the chapel, how the chapel contributes to the significance of the wider historic environment and how that significance might be affected by the PV arrays (including consideration of reflectivity).

7.9 From **Trinity Lane** only a limited part of the roof can be seen and the report concludes that the arrays will be only partially visible through the open tracery of the parapet. Given the context the impact will be neutral.

7.10 From **Senate House Hill** the roof is partly hidden by the horse chestnut tree at the east end and by the roof of the Old Schools to the north. Given the distance and angle which one (barely) sees the roof through the tracery as existing, it is considered that any arrays would be barely visible and the impact is therefore neutral.

7.11 From the **Tower of Great St Mary's**, it is possible to look across to King's College Chapel and the present roof is visible above the tracery. As the array will have a consistency of colour and form it will continue to act as a backdrop to the turrets, pinnacles and traceried parapet. The assessment concludes, at worst, that there will be a minor detrimental impact from this view

7.12 From the **Corpus Christi Clock** (at the west end of Bene't Street), with the naked eye, the roof is hardly visible through the parapet. Following the adjustment of the position of the panels on the roof, the edge of the array is barely noticeable through the parapet. Given the distance and angle, the impact is therefore considered to be neutral.

7.13 The **SW corner of First Court,** is the viewpoint from which the Chapel Roof is most visible. However the pierced parapet gives a very clear shadow line from this point and to a large extent this will be slightly amplified by the edge of the arrays (which were

adjusted for this very purpose). Overall, there is considered to be a minor detrimental impact to the Chapel's significance from this viewpoint.

7.14 From the **King's College Bridge** it is not considered that the arrays will be visible due to the angle of view, the parapet stonework and distance involved.

7.15 From **The Backs**, the array will not be visible.

7.16 From **Garrett Hostel Bridge** the Chapel roof can barely be seen and the arrays will have a neutral impact.

7.17 **Castle Hill** provides probably the best panoramic viewpoint in the City Centre and the Chapel is one of the real landmarks in this view. Given the distance involved, it is the silhouette of the building which illustrates the building's heritage significance and this will be unaffected by the arrays which will be barely noticeable given the distance involved.

7.18 In terms of the impact on the heritage significance of King's College Chapel, there is no direct heritage harm arising from the works. All the accompanying documentation shows that the installation of the arrays over the top of the traditionally-detailed newly replaced lead roof will not damage any underlying historic fabric and would be capable of removal at a future date with welded patching of the lead once the fixings are removed.

7.19 The VIA has shown that the visibility of the PVs is very limited in any of the main iconic and enduring viewpoints of the Chapel. Where the roof covering is seen it continues to form a consistent background with the pinnacles and decorative pierced balustrade and towers remaining as the eye-catchers, either in silhouette against the sky or in extremely limited situations, against the plain backcloth of the uniform surface of the roof.

7.20 The installation of the mock-up revealed that the only noticeable visual impact was from the edge of the arrays which, in some views, appeared as a more shaded tone, as seen through the pierced parapet. Without doubt, this shadow effect was more noticeable because the mock-up was only on a small area rather than consistently covering the whole roof and was noticeable because it contrasts with the adjacent unshaded leadwork. However, the panels have been moved down the roof and this means that the bottom edge now largely visually blends into the shadow / lower stonework of the parapet.

7.21 The VIA shows that the new arrays will have a very minor impact on views from one corner of First Court in King's College. Even from here however the viewer is struck by the majesty of the stonework and its vertical rhythms of towers, pinnacles and buttresses and windows with Perpendicular tracery. A PV array which gives a consistent darker backdrop, very similar in tone to the leadwork, will not affect the ability to appreciate this. Most of the views through First Court are kinetic views, with the viewer moving against the impressive setting. The movement of the viewer substantially reduces the focussing effect. The level of harm to the architectural and historic interest is therefore minimal and at a very low level of less than substantial harm.

7.22 Even from the tower of Great St Mary's where the lead-covered roof of the Chapel is more visible because of the height of the viewpoint, it will still be seen very much as a consistently coloured neutral backdrop to the intricacy of the stonework which decorates the roofline of the Chapel. As the VIA shows, the roof forms a very minor aspect of the view of the Chapel even from here and provided the array forms a consistent covering of the surface and the appearance is non-reflective and does not appear overtly contrasting (as the Max Fordham work shows) then again any change will result in only a very low level of less than substantial harm. The visual impact of the approved and installed solar panels on the lower aisle roof of Great St Mary's has a far-higher visual impact, which was deemed acceptable and approved.

7.23 From other nearby viewpoints, the chapel roof is only glimpsed and forms a small part of an oblique view in which other buildings in the foreground and the stonework forms of the chapel sit in the foreground of a uniform backdrop which the roof forms. Any change to this will be negligible and simply arises because of a slight change in tone of the roof colour. When the whole roof is covered, not a part of it as with the mock up, this will be barely perceptible with the naked eye.

7.24 In an arc, taken across the Backs, from the Kings College Bridge to Queens Road to Garret Hostel Bridge, the chapel roof can barely be seen and, whether it is covered by PVs or left as lead, will make no material difference to the architectural or historic interest of the building and how we understand and appreciate it.

7.25 In more distant views, e.g., from the Castle Mound, it is the silhouette of the college chapel which is seen. The ridge of the roof reads as a horizontal line, interrupted by the pinnacles. Neither the form of the roof nor the materials can be read with the naked eye and this does not contribute to our appreciation of the building's heritage interest. The addition of PVs would cause no harm to the heritage significance. Note: see detailed, hi-res photo for discussion.

7.26 In addition to assessing the impact on the heritage significance of the Chapel itself, it is also necessary to consider the impact on other heritage assets of which the chapel is part (e.g., the park and garden and conservation area) and the setting of other heritage assets (e.g., neighbouring listed buildings). These were identified in Section 3 of this report.

Impact on the College Registered Park and Garden

7.27 The impact of views from the SW of the College grounds is illustrated by Viewpoint 6 in the VIA from the College Bridge. From here the angle and height of the chapel and its parapet means that the roof is not apparent. As one moves north, the angle becomes more oblique until only the west gable is evident. From here, there would be no view and no impact of the PVs. Similarly as one moves east from the river to Front Court, the angle is too oblique to understand what the roof covering is and any change to it would have no effect on the park and garden.

7.28 The Chapel forms the north side of Front Court. The impact from the south side of the court looking north is illustrated by viewpoint 5. The chapel roof covering is not an

important aspect of this view and it certainly does not draw attention from any features which contribute to the heritage significance of the College grounds. The PVs will sit as a backcloth in these views and not distract the eye. They would not therefore harm the heritage significance of the registered park and garden.

Impact on the Conservation Area

7.29 The chapel is acknowledged as an iconic building within the conservation area. This would be unaffected by sitting PVs on its roof, particularly when it is the building's unique silhouette which makes it such a recognisable feature. Even from the tower of Gt St Mary's Church, the chapel roof as an element is a relatively minor aspect of views; from ground level it is barely seen (Viewpoint 2). It is the chapel as a whole which dominates. Only at the corner of Bene't Street and King's Parade (Viewpoint 4) is a long view of the south elevation of the Chapel possible. From here, the chapel roof is very much a backdrop making no contribution to the positive role played by the profusion of Gothic detailing on the Chapel and Wilkins Screen / gatehouse.

7.30 From Trinity Lane, the King's College Chapel closes the view southwards. The west end of the roof can be seen but makes a negligible contribution to the significance of the conservation area compared to the Gothic splendour of the Chapel and the fascinating juxtaposition of this with the Classical east end of Clare College's Chapel.

7.31 As has been noted, viewed from the Backs the impact of the view and the chapel arises from the silhouette, which is a key component of the view east from Queen's Road, and the contrast between the rhythmic verticality and exuberance of the Chapel's Gothic detailing against the restrained Classicism of the Gibbs Building and Clare College. From the river and Garrett Hostel Bridge, less can be seen but the same contrasts are exciting and distinctive. From the bridge there is a contrast of materials and polite seen against vernacular architecture which is a key aspect of the conservation area.

7.32 In wider views, this visual consequence is amplified. For example from Castle Hill, the majesty of the church spires and College Chapels (especially St John's and King's) tower above the lower and usually humbler buildings of the town.

7.33 In none of these views would PVs on the roof of the Chapel cause any harm to the character and appearance of the Conservation Area,

Impact on the setting of King's College Listed Buildings

7.34 Important as the Chapel is to the quality of Front Court and the Back Lawn, as we have seen the Chapel roof is not a designed component or strong feature of any of these views; the roof is at best incidental. Covering a homogenous lead roof with a homogenous surface of PV panels would not draw the eye away from any other College building. Nor would it affect our ability to appreciate these assets[3].

[3] See Historic England's 'The Setting of Heritage Assets' (HEGPAP Note 3: Second Edition) (2017) para 9

7.35 The proposals are therefore not considered to harm the heritage significance of any of the other King's College Listed Buildings.

Impact on the University Listed Buildings

7.36 As Viewpoint 2 shows, when seen from the east, it is the juxtaposition of the Gothic Chapel with the Classical University buildings which contributes to the setting and significance of both. In that context, a largely invisible change to the chapel roof, as with 7.33 above, is irrelevant to the heritage significance of the University buildings.

Impact on Clare College Listed Buildings

7.37 This has been considered in 7.29 in terms of the impact from Trinity Lane and the front lawn. From Old Court the angle is so oblique that little other than the west end of the Chapel can be seen where the Gothic pinnacles and towers rise above Clare's gentle Classicism.

7.38 The proposed works will not affect the setting of Clare College.

Impact on Great St Mary's Church.

7.39 From Senate House Hill, the two Gothic edifices (almost) face each other defining the north end of King's Parade. This viewpoint is largely the same as Viewpoint 2.

7.40 The impact from the top of the tower is covered by Viewpoint 3. Here the viewpoint is away from the church, and so makes no contribution to the building's heritage significance. When one looks eastwards, there is a view across the roof of the nave, a view which does aid our understanding of the church's significance. In this view, PVs on the church's south aisle roof can be seen.

7.41 Another key aspect of the church's setting is its relationship with the buildings of 'the town' as opposed to the University. This is best understood with one's back to King's College Chapel looking towards the Market Square.

7.42 The PV arrays on the roof of King's College Chapel are considered to cause no harm to the setting of Great St Mary's Church.

Impact on other 'town' Listed Buildings

7.43 This has largely already been covered. Kings College Chapel largely impacts on the setting of the listed buildings on King's Parade because it provides such a striking contrast with the lower, humbler, vernacular buildings – in terms of height, form, materials and detailing. This is of course also an aspect of the character of the conservation area. In this context, barely perceptible changes to the roof of the Chapel will cause no harm to their setting.

General Comments

7.44 Inevitably temporary works will be required to allow the works to be undertaken which would follow on from the repairs to the roof. The scaffold design has been very

carefully planned to minimise the chances of physical damage being caused to the building whilst ensuring safe working. The hoardings are necessary to screen and secure the necessary plant and equipment and ensure safety particular for the 'hot' works. Inevitably these will appear incongruous on King's Parade, but the College is intending to use the external surface to inform people about the history of the building and explain what is going on.

7.45 Once works are complete, scaffolding and hoardings will be removed. There will therefore be no lasting impact on heritage significance.

8. Assessment against heritage policy and best practice

Introduction

8.1 A full list of relevant planning policy is provided in Annex 2 of this report.

8.2 The repair of the lead roof has been granted Faculty approval and does not require planning permission or listed building consent. This work will be carried out regardless of whether this planning permission is granted and Faculty approval gained for the provision of PV panels. Nevertheless, these works, which are a clear heritage and public benefit as they will ensure the longevity of this outstanding Listed Building, effectively provide the opportunity for the PV installation.

Impact on Listed Buildings

8.3 The Design Statement and accompanying drawings and specifications explain how the PV Panels will be carefully installed and so will cause no material harm to the historic fabric of the Chapel. As has been described, the lead roof, although a traditional way of covering historic buildings of great span, has been renewed and repaired several times throughout its life. It will be renewed again in an entirely appropriate way. Great care has been taken over the proposed method of fixing the panels to it. They won't damage it, make it prone to splitting and leaking and the PV panels will not increase stresses upon the lead. They will simply sit over it and largely hide it.

8.4 The roof form and covering material of some listed buildings is an important aspect of heritage significance. That is not the case here where the roof covering acts as a backdrop to the drama of the stonework detailing.

8.5 The supporting documentation has described how the panels have been chosen to not be reflective, to give a homogenous dark appearance and with dark frames to match. Following pre-application discussions during which the mock up was in place, the position relative to the ridge of the roof was adjusted and the gap between roof and panel reduced. Both were further mitigation to reduce the visual impact of the arrays.

8.6 In Section 7, we described how visually the roof covering is of little intrinsic heritage significance. Its value is therefore how it acts as a backdrop against which more important architectural and aesthetic elements can be read. This is particularly the case when from ground level it is seen through the pierced stone parapet. What is therefore important is that the material should not be reflective or catch the eye in any way. If it did, this could draw attention away from more important features of the chapel, blur our understanding of the building's heritage significance or in extreme cases draw attention away from other assets or features meant to be seen.

8.7 As we have described in the supporting material and above, the PVs will continue to act as a backdrop so as not to introduce new features at roof level. The VIA has described that there are very few places where the roof covering can be seen anyway, but even where it can just about be glimpsed, the effect will be neutral. In just two

locations is a change perceptible to the extent that it could be considered a very low level of less than substantial harm to the Chapel.

8.8 In terms of the impact on surrounding Listed Buildings, it will not affect their settings and will certainly not affect the extent to which their settings contribute to their heritage significance.

8.9 S66 of the Planning (Listed Buildings and Conservation Areas) Act 1990 (hereafter 'the 1990 Act') requires the decision-maker to have 'special regard' to the desirability of preserving listed buildings or their settings or any features of special architectural or historic interest which they possess when making decision on planning application. The Courts have held that this equates to 'great weight' which is now reflected in para. 199 of the NPPF.

8.10 As has been described, first and foremost, this project is concerned with making the roof wind and weathertight and so preserve the building for future generations. Although this aspect of the work does not require planning permission, it does allow the installation of the PV arrays to take place.

8.11 The VIA has shown a low level of harm to the Chapel. This is not physical harm but harm to the external appearance and therefore its heritage significance in terms of how it is perceived by those viewing it from two viewpoints.

8.12 This low level of harm (albeit with the 'great weight' attached) carries through to the planning balance.

Impact on Conservation Area

8.13 S72 of the 1990 Act imposes a similar test requiring, as it does, special attention to be paid to the desirability of preserving or enhancing the character or appearance of a conservation area. As we have described in Section 7 of this report, the appearance of the building would be slightly changed in two viewpoints, one of which is only available from high level viewers who have climbed the tower of Great St Mary's.

8.14 The Cambridge Central Conservation Area is large and covers a vast number of buildings and spaces. The viewpoints in which change is noticeable highlighted in the VIA could not be described as key views and the iconic status of the Chapel in the townscape and landscape of the conservation area would remain unaltered. From ground level, it is unlikely that anyone would notice the panels and if they did, they would be perceived as the roof covering. It is therefore not considered that any harm is caused to the area and S72 of the act is not offended.

Impact on other Heritage Assets

8.15 Registered Parks and Gardens are not covered by statute in the same way as Listed Buildings and Conservation Areas. They are however 'designated heritage assets' as defined in Annex 2 of the NPPF and consideration is therefore given in the section below. Nevertheless, the VIA and section 7 of this report have shown that there will be no material harm to the College RPG individually or in terms of its contribution to the wider 'Backs' RPG

Test against Local Plan Policies

8.16 Policy 61 of the Cambridge Local Plan 2018 is a multi-stemmed policy aimed at conserving the city's historic environment. Strand a) largely repeats the statutory and NPPF tests. Strand b) seeks the retention of buildings and features whose loss would harm the conservation area. Clearly this strand is met. Strand c) is concerned with the design of new buildings and is therefore of no relevance to this application. Strand d) requires a clear understanding of the asset(s) under consideration and thus is considered to have been met by the Design Statement, VIA and this report. Stand e) largely follows the NPPF guidance in requiring harm to heritage assets to be appropriately justified. This is the purpose of this and other supporting reports.

8.17 Policy 63 states that works to enhance the environmental performance of heritage assets will be supported where a sensitive and hierarchical approach to design and specification ensures that heritage significance is not compromised by inappropriate interventions.

8.18 The first part of the policy requires understanding of the building's heritage significance (as required by Policy 61). It also seeks an understanding of the building's environmental performance. Normally when considering works to improve the environmental performance of historic buildings, one would consider the impact of works to the windows or the provision of insulation. In this case, both would have a profoundly negative impact on the heritage significance of the building. As part of the pre-application material to the Diocese, Max Fordham provided information regarding the building's present environmental performance. The baseline is therefore well-understood.

8.19 The College has installed a low energy lighting system. When the low-emission boilers which heat the building reach the end of their useful lives, they will be replaced; probably by heat pumps. The only way the building can make any telling impact towards net-zero is by using the large area of lead roof, which is of no intrinsic heritage interest and is largely invisible from ground level, for non-emitting energy generation.

8.20 Rightly, the policy requires post-installation monitoring where interventions such as insulation could cause gradual, longer-term harm to underlying historic fabric. The condition of the lead roof beneath the PVs will be monitored (including informing the Quinquennial Inspections).

8.21 The supporting text to the policy quotes the Chartered Institute of Building Services Engineer's guidance on sustainability and heritage assets. The first aim of this is to preserve historic fabric. This will be achieved. The second is to prolong the life of historic buildings. Through the associated roof repairs, again that is the case. The third aim is to follow the energy hierarchy. As noted, the College have sought to reduce demand and to use energy more efficiently, but the extent to which further demand reduction is possible through fabric improvements is limited. This leaves renewable sources as the only achievable option for reduction in carbon emissions of the Chapel and college estate, once the other steps of the hierarchy have been followed. The fourth aim of the guidance is to source environmentally-conscious materials, which is of limited relevance here. The lead roof covering will however be recycled and re-cast.

8.22 We feel that we have followed the relevant policies relating to historic buildings and climate change as far as is achievable. This is demonstrated in the thoroughness of the supporting material, the level of consultation and willingness, at considerable cost, to install a mock-up to aid the pre-application considerations.

Test against NPPF

8.23 A noted earlier, paragraph 199 of the NPPF advises that '*when considering the impact of a proposed development on the significance of a designated heritage asset, great weight should be given to the asset's conservation (and the more important the asset, the greater the weight should be).'* This 'great weight' is a 'public benefit' to be considered in any balance of harms and benefits required by paragraphs 201 and 202.

8.24 The proposed PVs will not cause 'substantial harm' (as defined in NPPF Para 201). The VIA and Section 7 of this report show the level of harm to the Chapel to be at the very low end of 'less than substantial' harm metric and with no harm identified to other assets or their settings.

8.25 Paragraph 202 requires any less than substantial harm identified to be '*weighed against the public benefits of the proposal including, where appropriate, securing its optimum viable use.* We consider this balance in the section below. Clearly the roof repairs, which make the PV proposals possible, will safeguard the building in the use it has enjoyed since the C15.

Other Material Planning Issues

8.26 The accompanying preliminary bat roost assessment was produced to advise the roof repair works which already have faculty approval and do not require either Listed Building Consent or Planning Permission from GCSPS. The PVs would simply sit on top of the re-covered roof.

8.27 Regardless, the assessment notes that given the limited use of the roof void and the fact that the access and potential roosting sites would be unaffected by the works and that the installation of the arrays would be unlikely to affect bat populations in any significant way.

8.28 Precautionary mitigation works are therefore proposed as part of a 'Risk Avoidance Method Statement' which involves initial briefings and constant checking throughout the project to ensure there is no chance of bats not being detected, if they are present, and all operatives know what to do if they are.

8.29 The pre-application feedback from GCSPS asked for a site waste management strategy. As the roof re-covering works are not part of this application and it is no longer proposed to provide the below-ground water harvesting tanks, it is considered that this aspect should be capable of being covered by condition, should it be required.

8.30 GCSPS officers later asked for information about the College's other sites. We have explained in Section 6 why the Chapel roof is considered a necessary component of the College's sustainability measures in Section 6 of this report, with further details in Max Fordham's Decarbonisation Report.

8.31 Historic England asked what would happen in the future, should the PVs become obsolete. The first question is whether it is realistic to think that in the future enough energy can be generated by non-emitting energy sources to make the Panels unnecessary. Whilst there is nothing within current evidence to suggest that this could be the case (quite the opposite), we acknowledge (and hope) that one day it could be the case.

8.32 The simple response is that the PVs, supporting panels and the fixings could be removed. The lead roof would then be repaired in a traditional way using welded patches (as can be seen on the present roof). These would not be visible from the ground and would not weaken the roof.

8.33 The new lead roof has a 100 year design life. This why the fixing post solution has been proposed as it preserves the leadwork and means future generations could reuse them should panels be replaced by a more sophisticated or higher efficiency product in the future.

Public Benefits

8.34 The public benefits are of course the contribution the works will make towards renewable energy generation and its contribution to helping tackle the climate emergency. The importance of this is eloquently stressed in the Design Statement and the Decarbonisation Report and we trust that the importance is clearly understood by all.

8.35 In Appendix 2, we have set out planning guidance. It is very clear the importance which is placed on measures to tackle climate change and some examples of best practice In Appendix 3), where historic buildings rightly make an appropriate contribution to this vital aim, are set out.

8.36 Of course, installing two arrays of PV panels on the Chapel roof is not going to solve the issue on its own. However, as para 158b of the NPPF states '*even small scale projects provide a valuable contribution to cutting greenhouse gas emissions'.*

8.37 Given the importance placed on this issue by world governments at the COP26 summit, by the Church of England, by the City Council, by the University of Cambridge and by the Fellowship of King's College, we suggest that the public benefits of this proposal are great.

8.38 Of course, by contributing to energy generation, the PVs will help meet the Chapel's energy demands. The College are very clear however that financial issues are not a key driver of this project. The main aim of the overall package of works is to properly repair the roof, to a standard capable of enduring for 100 years. This is a very clear heritage and public benefit, though we acknowledge not one which directly relates to this aspect of the project.

8.39 There will be a minor economic benefit resulting from the works in terms of the employment of contractors and knock-on benefits to the local economy. This is a small, but tangible benefit of the works.

The Planning Balance

8.40 From the outset of this project, we have acknowledged that King's College Chapel is an exceptional historic building, one of the most iconic in the region. However, we do not accept that this means that it should be treated like a museum piece. When designed, the building was one of the greatest examples of constructional excellence and masons' skill and art. If it was 'cutting edge' in the C15 it seems appropriate that it is today at the forefront of how historic buildings can be sensitively adapted to help tackle the 'climate emergency'.

8.41 If the proposed installation was likely to damage underlying fabric, the College would not have proceeded with the project. If the roof covering was an important aspect of its heritage significance, the same would be true. If the PVs would be obtrusive or noticeable in any key views and spoil people's enjoyment of seeing the building in its historic townscape, similarly the College would not have proceeded.

8.42 None of these concerns or risks are borne out by the mock up and evaluation tests. The College and its design team have allowed this project to evolve, with full consultation. Detailed research has been undertaken to ensure the best, most covert PVs could be found which were non-reflective and have a suitable tonality to sit comfortably with the lead roof. Having done this, the College produced an on-site mock-up so all could see potential visibility and the siting was modified as further mitigation.

8.43 The PVs will just about be visible in two of the assessed viewpoints, one from the top of a church tower (from where PVs installed by the church itself can be seen) and one from King's Parade when only the most eagle-eyed would be able to spot them (and if they could, this would not spoil their enjoyment of understanding of the building's heritage significance). The most iconic views are unaffected,

8.44 The result is a very low-level of less than substantial harm. In our view, the benefits of helping meet climate change challenges outweighs this harm in the planning balance.

Conclusions

8.45 As a final point, it is recognised that some will consider that what are seen as overtly modern features have no place on historic buildings. If they were particularly visible or caused damage or hid important features of the Chapel, we would agree.

8.46 We would argue that this project, given the rigour with which it has developed, shows how decisions should be made when approaching the tricky question of balancing climate change against heritage significance. In our opinion, we have shown that this project is an appropriate way of allowing an outstanding historic building to provide *'a valuable contribution to cutting greenhouse gas emissions'.*

Appendix 1: Church Buildings Council advice

Church Buildings Council

Poppy Crooks
Church Buildings Advice Assistant
Diocese of Ely

poppy.crooks@elydiocese.org

Jacinta Fisher
Church Buildings Officer

Our Ref: CARE/14/004
Your Ref:

22/12/2021

Dear Poppy,

Cambridge, Kings College Chapel (Diocese of Ely)
Proposed new lead roof and solar panels

Thank you for seeking the Church Buildings Council's advice over a proposed new roof and solar panels at Kings College Chapel. This was considered at the recent meeting of the Council following a site visit on 2 November 2021. Its advice is set out below.

The Council thanked the college for an informative and enjoyable site visit. The Council understands that the 2018 QI report for the chapel highlighted significant problems of continuing and rapidly worsening failure of the vast lead roof. The Council also understands that the college has taken steps to address carbon emission reduction within its built estate, with new buildings and refurbishment projects of existing buildings now required to make improvements in energy performance.

The current proposals for the chapel involve the renewal of the failing lead roof as well as the installation of PV panels on the north and south slopes. The Council was happy to defer the proposal to replace the lead roof and any associated repairs to the DAC. The Council was also content to defer the details of the scaffolding and temporary roof to the DAC.

The Council was impressed with the aspirations of college with respect to its commitment to net-zero carbon and supported the principle of the installation of PV panels on the chapel roof. It noted that the prominence of the college, not only in the United Kingdom but worldwide, places it in a strong position to showcase its commitment to net-zero carbon and to lead by example. The successful installation of the panels could potentially give other organisations the confidence to investigate their own similarly bold initiatives. As the climate crisis worsens, there will be an increasing need to install energy saving and energy producing devices within historic building stock and these interventions should be perceived as positive. The Council

suggested that the chapel may wish to consider some type of interpretation showing the positive implications of having the solar panels, this could include a counter showing how much energy they generate. This would also further highlight their importance.

Currently, the lead roof and its lead rolls are visible from the ground both in the college and from the busy street below. It was acknowledged, at the site visit, that the panels will also be visible, through and above the perforated parapet from ground level. However, the glimpses of the panels from the ground level should not have to dominate the views of the chapel, particularly if the panels are made from non-reflective materials and the scale of the lead bays is maintained.

The Council noted that the College is up to date with the rapidly changing designs and concepts for energy capture via PV panels and suggested that a detailed mock-up be created once the appropriate panels had been chosen. The mock-up would show the details of the panels including the proposed ridge detail, at least one horizontal lap and two side vertices laps, and the formation of the gutter. The fixing details for the rails proposed for the fixing of the solar panels also need to be shown on these models to ensure that the fixings will not cause long term damage to the lead covering. The Council suggested that once the full-scale model is agreed, at least one bay should be constructed or laid over the existing lead roof which will help to assess the impact of the panels on the views from ground level. The Council indicated that the most prominent view is from the south cloister and Kings Parade which runs to the east of the chapel and college. The mock-up panel should therefore be placed on the eastern most area of the south roof slope. If successfully implemented, the Council would anticipate that this scheme would be presented as an exemplar for PV panels on ecclesiastical and other historic buildings.

The Council agreed that the best place for the PV panels is on the college roof, due to its height and surface area, and not elsewhere on the estate. However, it asked for further information on the benefits of having panels on the north slope and whether it would generate enough energy to justify it. It also highlighted the Council's guidance on solar panels which can be found here: https://www.churchofengland.org/sites/default/files/2021-09/Solar_Panels_and_Faculty_Guidance_0.pdf

The Council noted that there is also a proposal to harvest rainwater from the roof and praised the college for thinking about future higher rainwater levels. It noted the Chapel's Ecclesiastical Exception only includes the footprint of the chapel and does not include surrounding land. However, depending on the means for storage of the rainwater, the Council may have a view on the potential impact on the setting of the Chapel. It is understood that the details of this have not yet been decided and that an underground tank may also be an option.

The Council asked to see the case again once the college has had time to consider its advice and develop the proposals.

Yours sincerely

Jacinta Fisher

Appendix 2: Planning Policy and Guidance

Planning (Listed Buildings and Conservation Areas) Act 1990

8.1 **Section 16 –** 'the local authority…shall have special regard to the desirability of preserving the building or its setting or any features of special architectural or historic interest it possesses'.

8.2 **Section 66 –** as above when considering whether to grant planning permission for development which affects a listed building or its setting**.**

8.3 **Section 72 –** (general duty in the exercise of planning functions) 'special attention shall be paid to the desirability of preserving or enhancing the character and appearance' of conservation areas.

The National Planning Policy Framework (NPPF) 2021

8.4 **Policy 189 –** 'Heritage assets…are an irreplaceable resource, and should be conserved in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life of existing and future generations'.

8.5 **Policy 197** – 'In determining applications, LPAs should take account of:

(a) the desirability of sustaining and enhancing the significance of heritage assets and putting them to uses consistent with their conservation;

(b) the positive contribution that conservation of heritage assets can make to sustainable communities including their economic vitality; and

(c) the desirability of new development making a positive contribution to local character and distinctiveness.

8.6 **Policy 199 -** When considering the impact of a proposed development on the significance of a designated heritage asset, great weight should be given to the asset's conservation (and the more important the asset, the greater the weight should be). This is irrespective of whether any potential harm amounts to substantial harm, total loss or less than substantial harm to its significance.

8.7 **Policy 200 –** Any harm to, or loss of, the significance of a designated heritage asset (from its alteration or destruction, or from development within its setting), should require clear and convincing justification. Substantial harm to or loss of:

(a) grade II listed buildings, or grade II registered parks or gardens, should be exceptional;

(b) assets of the highest significance, notably scheduled monuments, protected wreck sites, registered battlefields, grade I and II* listed buildings, grade I and II* registered parks and gardens, and World Heritage Sites, should be wholly exceptional.

8.8 **Policy 202 –** Where a development proposal will lead to less than substantial harm to the significance of a designated heritage asset, this harm should be weighed against the public benefits of the proposal including, where appropriate, securing its optimum viable use.

8.9 **Policy 206 –** Local planning authorities should look for opportunities for new development within Conservation Areas and World Heritage Sites, and within the setting of heritage assets, to enhance or better reveal their significance. Proposals that preserve those elements of the setting that make a positive contribution to the asset (or which better reveal its significance) should be treated favourably.

Cambridge Local Plan 2018

8.10 **Policy 61** – To ensure the conservation and enhancement of Cambridge's historic environment, proposals should:

(a) preserve or enhance the significance of the heritage assets of the city, their setting and the wider townscape, including views into, within and out of conservation areas;

(b) retain buildings and spaces, the loss of which would cause harm to the character or appearance of the conservation area;

(c) be of an appropriate scale, form, height, massing, alignment and detailed design which will contribute to local distinctiveness, complement the built form and scale of heritage assets and respect the character, appearance and setting of the locality;

(d) demonstrate a clear understanding of the significance of the asset and of the wider context in which the heritage asset sits, alongside assessment of the potential impact of the development on the heritage asset and its context; and

(e) provide clear justification for any works that would lead to harm or substantial harm to a heritage asset yet be of substantial public benefit, through detailed analysis of the asset and the proposal.

8.11 **Policy 63** – Proposals to enhance the environmental performance of heritage assets will be supported where a sensitive and hierarchical approach to design and specification ensures that the significance of the asset is not compromised by inappropriate interventions.

Any works should be undertaken based on a thorough understanding of the building's historic evolution and construction (where these matters relate to the heritage significance of the asset), architectural and historic significance, and demonstration of the building's environmental performance. Applications should be accompanied by an assessment of the building's current fabric and energy performance. For relevant planning applications, details of post-construction monitoring in the form of a building monitoring and management strategy will be required to be submitted in order to assess the ongoing impact of the implemented measures on the asset's historic fabric. Monitoring requirements will be proportionate to the significance of the asset and the

scale and scope of works undertaken. Where monitoring shows that interventions are causing harm to the significance of the asset, appropriate remediation works will be required.

Greater Cambridge Sustainable Design and Construction SPD (2020)

8.12 This links to the Sustainability Checklist questions: Ha.1, Ha.2, Ha.3 and Ha.4 (see below).

8.13 **Para 3.10.1** 'The Councils aim, therefore, is to ensure that a heritage asset is maintained in a good state of repair and that its significance and continued potential for adaptability is maintained by ensuring that alterations to address climate change or reduction of carbon emissions are sensitive'.

8.14 **Para 3.10.2** 'Due to the nature of construction of historic buildings, it would be difficult to match the performance of modern structures. However, vernacular design and traditional construction have evolved over time and deal with local conditions. Adaptive re-use of a building gives significant carbon savings in terms of embodied energy in the fabric of the building, so the focus will be on enhancing the performance of traditional buildings as much as practicable without damaging their significance. Acceptable levels of intervention will vary dependent upon the impact on the significance of the heritage asset in question. Works should avoid harm to a building's integrity or significance. Listed buildings, buildings in conservation areas and scheduled monuments are exempted from the need to comply with energy efficiency requirements of the Building Regulations where compliance would unacceptably alter their character and appearance. Special considerations under Part L are also given to locally listed buildings, buildings of architectural and historic interest within registered parks and gardens and the curtilages of scheduled monuments, and buildings of traditional construction with permeable fabric that both absorbs and readily allows the evaporation of moisture.

8.15 **Para 3.10.3** 'When considering ways to reduce a building's carbon footprint, it is important that the energy hierarchy (see Section Four, figure 3)[4] is adopted. Prior to looking at alternative means of generating energy, it is important to investigate and put into practice all possible means of conserving energy. The Chartered Institution of Building Services Engineers' (CIBSE) guidance on building services in historic buildings sets out four principal aims when seeking to enhance the sustainability of heritage assets:

- *Aim 1 – preserve historic fabric;*
- *Aim 2 – extend the beneficial use of older buildings;*
- *Aim 3 – reduce carbon emissions, using the hierarchical approach; and*
- *Aim 4 – specify environmentally conscious materials.*

[4] Should be Section 3 figure 3.

8.16 **Para 3.10.4** 'Applications for works to heritage assets will need to demonstrate a thorough understanding of the building in question via the submission of the following information:

- *surveys of existing construction, to include walls, floors, ceilings and roofs;*
- *submission of baseline energy consumption data before and after improvements have taken place (submission of data post improvement would be secured via a planning condition);*
- *measured data of existing environmental performance of the building's fabric;*
- *an indication of any national performance standards being targeted as a result of works; and*
- *recommendations on the environmental performance measures to be implemented in order to achieve the standard.'*

Sustainability Checklist:

8.17 **Ha 1:** Where works to a heritage asset to address climate change are proposed, have you undertaken studies to ensure that your proposals are based on a thorough understanding of the building's historic evolution and construction (where these matters relate to the heritage significance of the asset), architectural and historic significance?

8.18 **Ha 2:** Have you undertaken an assessment of the building's existing environmental performance, and how have your proposals been informed by this work?

8.19 **Ha 3:** Have you developed a building monitoring and management strategy in order to assess the ongoing impact of the implemented measures on the asset's historic fabric?

8.20 **Ha 4:** How have you factored in the potential for remediation works should ongoing monitoring identify that measures are leading to harm to the heritage asset?

Sources of further guidance:

Historic England:

8.21 Historic England (2017). Energy Efficiency and Historic Buildings - Application of Part L of the Building Regulations to historically and traditionally constructed buildings. Available online at: https://historicengland.org.uk/images-books/publications/energy-efficiency-historic-buildings-ptl/

8.22 Historic England (2018). Energy Efficiency and Historic Buildings: Solar Electric (Photovoltaics). Available online at: https://historicengland.org.uk/images-books/publications/eehb-solar-electric/

Others:

8.23 CIBSE (2002). HIST Guide to Building Services for Historic Buildings. Available online (for a fee) at: https://www.cibse.org/Knowledge/knowledge-items/detail?id=a0q20000008I7ocAAC

8.24 Sustainable Traditional Buildings Alliance (2015). Planning responsible retrofit of traditional buildings. Available online at: http://www.sdfoundation.org.uk/downloads/Guide-1-Planning-Responsible-Retrofit-2015-08.pdf

8.25 Sustainable Traditional Buildings Alliance Responsible Retrofit Guidance Wheel. Available online at: http://www.responsible-retrofit.org/wheel/

8.26 British Standards Institute (2013). BS 7913:2013. Guide to the conservation of historic buildings. Available online at: https://shop.bsigroup.com/ProductDetail/?pid=000000000030248522

8.27 CPRE The Countryside Charity (2016). Ensuring Place-responsive design for Solar Photovoltaics on Buildings. Available online at: https://www.cpre.org.uk/resources/ensuring-place-responsive-design-for-solar-photovoltaics-on-buildings/

8.28 Church Buildings Council (2021). Solar Panels and Faculty Guidance. Available online at: https://www.churchofengland.org/resources/churchcare/advice-and-guidance-church-buildings/renewable-energy

'White Paper: Planning for the Future' MHCLG (August 2020)

8.29 One of aims of this paper (para 1.12) is to: 'promote the stewardship and improvement of our precious countryside and environment, ensuring important natural assets are preserved, the development potential of brownfield land is maximised, that we support net gains for biodiversity and the wider environment and actively address the challenges of climate change.'

8.30 In seeking a new focus on design and sustainability (para 1.18) it aims to:

- Facilitate ambitious improvements in the energy efficiency standards for buildings to help deliver our world-leading commitment to net-zero by 2050
- Protect our historic buildings and areas while ensuring the consent framework is fit for the 21st century

8.31 **Para 3.30**: We also want to ensure our historic buildings play a central part in the renewal of our cities, towns and villages. Many will need to be adapted to changing uses and to respond to new challenges, such as mitigating and adapting to climate change. We particularly want to see more historical buildings have the right energy efficiency measures to support our zero carbon objectives. Key to this will be ensuring

the planning consent framework is sufficiently responsive to sympathetic changes, and timely and informed decisions are made.

8.32 **Para 3.31:** We will, therefore, review and update the planning framework for listed buildings and conservation areas, to ensure their significance is conserved while allowing, where appropriate, sympathetic changes to support their continued use and address climate change. In doing so, we want to explore whether there are new and better ways of securing consent for routine works, to enable local planning authorities to concentrate on conserving and enhancing the most important historic buildings. This includes exploring whether suitably experienced architectural specialists can have earned autonomy from routine listed building consents.

Appendix 3: Best Practice

Both Historic England and Church Buildings Council (CBC) in their respective advice notes (that issued by the CBC is statutory guidance) are clear that when assessing the impact of PVs, the impact is often measured against inter-visibility and views of the asset where they would be visually prominent. Where they are not visible, both sets of guidance state that if the application follows the other guidelines set out in the advice notes, then it is likely that the installation will be acceptable. The CBC advice states that even if visible, it is still possible that the solar installation will be acceptable provided that the other guidelines are followed and the application can clearly demonstrate the benefit of installation would outweigh any harm.

Historic England's 2018 advice note on photovoltaics notes that 'Places of worship with large south-facing slopes present opportunities to generate electricity through solar electric panels or solar 'slates'.' It also notes that 'Where a building has a shallow-pitched roof which is largely hidden from view by parapets, or internal roof slopes which cannot be seen from ground level, solar electric panels may be accommodated more easily.'

Since the General Synod set a target for the Church of England to be Carbon 'Net Zero' by 2030 (at its February 2020 meeting) there has been an increased effort by Churches and Cathedrals to combat climate crisis. Even before this, there was a recognition that churches needed to tackle this issue and in 2016, Gloucester Cathedral installed 150 PV panels on the south nave roof. This is a Historic England case study (https://historicengland.org.uk/research/heritage-counts/2019-carbon-in-built-environment/case-studies/gloucester-cathedral/) and there are many striking similarities with the proposed installation of solar panels at Kings College Chapel. The impetus to undertake solar panel installation at Gloucester arose from the need to repair/replace the lead roofing. The pitch of the roof and relatively high parapet created the opportunity which was supported by evidence that the solar panels would not be visible from various sites in and around Gloucester. The project has been very well received.

Other prominent cathedrals and churches have also installed PVs including Salisbury in 2020 where they were installed on seven sites, including the Cathedral cloisters. Great St Mary's in Cambridge also has solar PVs on the roof of its south aisle. The Church of England has a number of case studies of work undertaken by churches around the country to cut their energy use, see: https://www.churchofengland.org/about/environment-and-climate-change/towards-net-zero-carbon-case-studies

The installation of PVs is becoming more commonplace and many of the case studies at the above link have installed them as part of works to reduce their energy use and associated carbon emissions. (The St Michael and All Angels case study is of particular relevance, https://www.churchofengland.org/media/21677.) The installation of solar PV is also a suggested option for busy churches with high energy uses (see 'A practical path to "net zero carbon" for our churches' by the Archbishops Council, April 2020 https://www.churchofengland.org/sites/default/files/2020-04/the-practical-path-to-net-zero-carbon-for-churches-FINAL-April-2020.pdf). This guidance was produced to support the Cathedral and Church Buildings Division's 'Statement on Sustainability and the Environment' (April 2020) which sets out how environmental issues will inform its decisions and guidance.

All the guidance is clear that the installation of solar panels should be the culmination of an integrated package of measures; the 'icing on the cake' when heat loss has been tackled and other systems have been made more efficient. The importance of the Chapel's architectural design means that there are limits to what measures can be taken without damage to its heritage interest. Insulation for example is not possible as this would have a significant impact on its highly significant architectural and historic interest. However, the Chapel has recently benefitted from a major new low-energy lighting scheme. The consideration of rainwater harvesting as part of the package of proposals is another step towards Net Zero for the Chapel with PVs providing a counterbalance to the existing efficient, condensing, fossil-fuel burning heating plant.

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