

KING'S COLLEGE CHAPEL, CAMBRIDGE:

**A SUMMARY STATEMENT OF SIGNIFICANCE
AND**

VISUAL IMPACT ASSESSMENT

FOR A PROPOSAL TO INSTALL A PHOTOVOLTAIC ARRAY TO CHAPEL ROOF



JULY 2022

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I. INTRODUCTION AND PURPOSE

1.1 This Statement of Significance and Visual Impact Assessment (VIA) has been prepared by Caroe Architecture Ltd (CAL) following a pre-application submission to the DAC in September 2021 and concurrent engagement with the Local Planning Authority, for a proposal to repair the roof of King's College Chapel, and to install a photovoltaic (PV) array. The proposal seeks to explore the rare opportunity presented by the roof renewal project, to improve sustainability and move towards the net zero carbon target set forth by the Church of England, as well as local and national government policies.

In order to better inform the proposal, a PV trial has been recently installed. This array sample of nine panels, situated in bay 5 - near the centre of the south slope of the Chapel roof - will be used to inform and determine potential visual impacts in this report.

1.2 King's College Chapel is a Grade I listed building located on the west side of King's Parade, within the King's College grounds, near the banks of the River Cam. It sits within a Grade II* Registered Park and Garden, in the Cambridge Historic Core Conservation Area. The site is located at National Grid Reference (NGR) TL44765 58400. The site is surrounded by:

- King's College Front Court buildings, including Grade I listed Screens, Entrance Gateway, Gibbs' Building, and South Range, to the south and southwest.
- The Old Schools, Cambridge University, Grade I listed, to the north.
- Clare College, Grade I listed, to the northwest.
- The Senate House, Grade I listed, to the northeast.
- Great St Mary's Church, Grade I listed, to the northeast.
- Various Grade II listed shops and town buildings on the east side of King's Parade.

1.3 The Chapel is presently in use for both College and public religious services and events, as well as open to general visitors.

1.4 The current proposal aims to renew the Chapel's lead roof which is failed, and strives to make the most of the rare opportunity for full roof access to install a PV array system to both the north and south slopes of the Chapel roof. It is proposed to install a total of 492 panels (246 on each slope), which would provide a significant source of renewable, clean energy for the Chapel and College.

1.5 The ultimate goal is for the Chapel to reduce its carbon emissions and support the Church of England in meeting its net zero target of 2030, as well as the University of Cambridge's 'Cambridge Zero' targets of 2038 and 2048; the City of Cambridge Climate Change Strategy, and the national government's legislated target of carbon zero by 2050. All of these ambitious targets are entirely dependent on the combined efforts, delivery and execution of all local renewable electrical generation opportunities. We argue that King's College Chapel can – with care and good design – play a part in contributing to these local and national climate strategy goals and international commitments.

1.6 A Heritage Impact Assessment was carried out by Turley in April 2022 as part of the pre-application process. This has been expanded into a Planning / Heritage Statement to accompany this application and should be referenced along with this visual assessment. It is essential to document that we agree with the Turley assessment that, because the detailing is reversible, being affixed to the roof using new sarking boards, there is no harm to historic fabric. The main area of consideration, which is the focus of this report, are the significance of key viewpoints.

1.7 The primary purpose of this appraisal is to summarise the key views of King's College Chapel's roof, determine significance, and provide an evaluation of the potential visual impact a PV array might have on the significance of the key views. It will utilise the present PV trial array installed to the south slope of the roof to further inform impacts. This report will be submitted as part of the overall planning application and to further inform discussions with the DAC and statutory stakeholders (LPA, CBC, SPAB, Historic England, etc).

2. PLANNING POLICY CONTEXT

2.1 Local Planning Policy

King's College Chapel is situated within the Cambridge Historic Core Conservation Area (originally designated in 1969, updated in 2015), an area 'of special architectural or historic interest, the character or appearance of which it is desirable to preserve or enhance.'¹ *The Cambridge Local Plan* (2018) addresses specifically the City of Cambridge's vision of increasing renewable and low carbon sources of energy in the following policies:

Policy 29: Proposals for development involving the provision of renewable and/or low carbon energy generation, including community energy projects, will be supported, subject to the acceptability of their wider impacts. As part of such proposals, the following should be demonstrated:

- a. that any adverse impacts on the environment, including local amenity and impacts on the historic environment and the setting of heritage assets, have been minimised as far as possible. These considerations will include air quality concerns, particularly where proposals fall within or close to the air quality management area(s) or areas where air pollution levels are approaching the EU limit values, as well as noise issues associated with certain renewable and low carbon technologies; and*
- b. that where any localised adverse environmental effects remain, these are outweighed by the wider environmental, economic or social benefits of the scheme.*

4.14 While the Council wishes to promote renewable and low carbon energy generation, there is also a need to balance this desire against other objectives for Cambridge, such as minimising pollution, and protection and enhancement of the historic environment. Applicants are expected to have taken appropriate steps to mitigate any adverse impacts through careful consideration of:

- location, scale, design and other measures, including those necessary to minimise any noise impacts;*
- cumulative impacts;*
- impacts on the landscape, the built environment, cultural heritage and biodiversity.*

4.15 Other policies in the local plan relate to the safeguarding of the natural and historic environment and the protection of international, national or locally-designated sites and buildings, and these should be taken into account in applications for energy schemes.

¹ Section 69, Planning (Listed Buildings and Conservation Areas) Act 1990.

4.16 Potential impacts may be acceptable if they are minor, or are outweighed by wider benefits, including the need for energy from renewable and low carbon sources, which will contribute to reducing carbon and other emissions.²

2.2 National Planning Policy Framework

The proposal for a PV array on the roof at King's College Chapel is subject to policies set out in the NPPF, (in particular, Sections 14: Meeting the Challenge of Climate Change... and 16: Conserving and Enhancing the Historic Environment).

In meeting the challenges of climate change, the NPPF provides this guidance:

152. The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure.

155. To help increase the use and supply of renewable and low carbon energy and heat, plans should:

- a) provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);*
- b) consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and*
- c) identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers.*

156. Local planning authorities should support community-led initiatives for renewable and low carbon energy, including developments outside areas identified in local plans or other strategic policies that are being taken forward through neighbourhood planning.

158. When determining planning applications for renewable and low carbon development, local planning authorities should:

- a) not require applicants to demonstrate the overall need for renewable or low carbon energy, and recognise that even small-scale projects provide a valuable contribution to cutting greenhouse gas emissions; and*
- b) approve the application if its impacts are (or can be made) acceptable. Once suitable areas for renewable and low carbon energy have been identified in plans, local planning authorities should expect subsequent applications for commercial*

² Cambridge City Council, *Cambridge Local Plan 2018*, p. 119-120.

scale projects outside these areas to demonstrate that the proposed location meets the criteria used in identifying suitable areas.

With specific regard to proposals affecting heritage assets, the NPPF states:

194. In determining applications, local planning authorities should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance. As a minimum the relevant historic environment record should have been consulted and the heritage assets assessed using appropriate expertise where necessary. Where a site on which development is proposed includes, or has the potential to include, heritage assets with archaeological interest, local planning authorities should require developers to submit an appropriate desk-based assessment and, where necessary, a field evaluation.

195. Local planning authorities should identify and assess the particular significance of any heritage asset that may be affected by a proposal (including by development affecting the setting of a heritage asset) taking account of the available evidence and any necessary expertise. They should take this into account when considering the impact of a proposal on a heritage asset, to avoid or minimise any conflict between the heritage asset's conservation and any aspect of the proposal.³

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.

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.*

201. Where a proposed development will lead to substantial harm to (or total loss of significance of) a designated heritage asset, local planning authorities should refuse consent, unless it can be demonstrated that the substantial harm or total loss is necessary to achieve substantial public benefits that outweigh that harm or loss, or all of the following apply:

a) the nature of the heritage asset prevents all reasonable uses of the site; and

³ Ministry of House, Communities & Local Government, *National Planning Policy Framework*, 2021.

b) no viable use of the heritage asset itself can be found in the medium term through appropriate marketing that will enable its conservation; and

c) conservation by grant-funding or some form of not for profit, charitable or public ownership is demonstrably not possible; and

d) the harm or loss is outweighed by the benefit of bringing the site back into use.

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.

2.3 Historic England – *The Setting of Heritage Assets*

This Visual Impact Assessment is guided by principles described in *The Setting of Heritage Assets* (Historic England, 2017), which states that the setting is defined as,

The surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate the significance or may be neutral. (NPPF, Annex 2: Glossary)... All heritage assets have a setting, irrespective of the form in which they survive and whether they are designated or not...The extent and importance of a setting is often expressed by reference to visual considerations. Although views of or from an asset will play an important part, the way in which we experience an asset in its setting is also influenced by other environmental factors such as noise, dust and vibration from other land uses in the vicinity, and by our understanding of the historic relationship between places.⁴

The design proposal must also take into consideration the townscape and views as a whole, understanding that they are often interlinked with heritage assets.

The numbers and proximity of heritage assets in urban areas mean that the protection and enhancement of setting is intimately linked to townscape and urban design considerations. These include the degree of conscious design or fortuitous beauty and the consequent visual harmony or congruity of development, and often relations to townscape attributes such as enclosure, definition of streets and spaces and spatial qualities as well as lighting, trees, and verges, or the treatment of boundaries or street surfaces.⁵

This assessment strives to apply these core principles to the views of King's College Chapel from the surrounding area, to assess significance and determine potential impact, whilst taking into consideration the need for meeting environmental targets.

⁴ Historic England, *The Setting of Heritage Assets* (Swindon: Historic England, 2017), p. 2.

⁵ Ibid, pp. 5-6.

3. STATEMENT OF SIGNIFICANCE FOR KING'S COLLEGE CHAPEL

This Statement of Significance for King's College Chapel has been produced in support of planning and Faculty applications for the full renewal of the Chapel's lead roof covering with the addition of a photovoltaic (PV) panel array. It is the PV array in particular, which will require special consideration and assessment for visual and heritage impact to this Grade I listed building and its significance. Thus, this summary aims to elucidate the significance of the Chapel so that views within its setting can be fully assessed. The historic summary and architectural description are based on previous published scholarship, reports, archival research and site survey.

King's College Chapel is a fundamental element of the original founder King Henry VI's intentions for his college as '*a place of education, religion, learning and research.*' The Chapel continues to play a vital role as part of the College's founding principles, making a valid contribution to the active life of the community and a significant contribution to the financial health of the College, derived from visitor income. Indeed, the Chapel's history and significance contributes not only to the overall spirit of place at King's College but to the College's reputation as an institution of exceptional significance with an international profile.

Beginning with the first stone laid by King Henry VI on 25 July 1446, King's College Chapel developed into a 12 bay, limestone building designed in the distinctive Perpendicular Gothic style of the late medieval period. It lies on the north boundary of Front Court and is oriented east to west, with its east façade of stained glass windows facing King's Parade. Its building history, which was marked by long periods of inactivity, reflects a politically turbulent era around the War of the Roses. For this reason the Chapel went through three phases of construction, under four separate master masons, and was not completed until 1515.

It has been said that its historical significance cannot be measured, '*a work in which the principles of the newest, and last, phase of Gothic architecture were, for the first time displayed upon an important scale.*'⁶ The Chapel has the largest fan vault in existence, at 289 feet long, 40 feet wide and 80 feet high.⁷ These dimensions were specifically detailed by King Henry in 1447, when he laid out his original plan that the Chapel, '*... shall contain in length two hundred four score and eight feet of assize without any aisles, and all of the wideness of forty feet.*'⁸ The end result is an impressive structure that is both an architectural and engineering marvel, and with a history and richness in detail that is as complex as its fabric and design.

The first phase of construction began in 1448 under master mason Reginald Ely, who laid out the plan and sections of the elevation.⁹ The original intention was for the Chapel to be one part of a wider scheme of adjoining buildings surrounding a principal college courtyard. However, this scheme was never realised and the Chapel was built as a solitary structure, separate from those that came later. The first phase of construction moved swiftly, working from east to west, with annual funding of £1000 per year provided by King Henry until he was overthrown in 1461.¹⁰ The progress achieved by this first period of construction can be seen in the predominant use of white Magnesian limestone, sourced from two quarries in Yorkshire: Thevesdale near Tadcaster and Ruddlestone,

⁶ George Gilbert Scott, *An Essay on the History of English Church Architecture Prior to the Separation of England from the Roman Obedience*, (London: Simpkin, Marshall and Co., 1881), p. 172.

⁷ John Saltmarsh, *King's College Chapel: A History and Commentary*, (Peterborough: Jarrold Publishing, 2015), p. 276

⁸ *Ibid*, p. 28.

⁹ Francis Woodman, *The Architectural History of King's College Chapel and its Place in the Development of Late Gothic Architecture in England and France* (London: Routledge & Kegan Paul, 1986), p. 3.

¹⁰ Saltmarsh, p. 33.

near Sherburn in Elmet.¹¹ After 1460, Oolitic limestone was sourced from several Northamptonshire and Rutland quarries such as King's Cliffe, Weldon, Barnack, Clipsham and Ketton.¹² Thus, this first phase of building work is visibly discernible. It reached its highest and most developed point on the north side of the east front where it rises 68 feet from the ground level, and continues at various, lesser heights throughout the rest of the building.¹³ Building accounts suggest that at least one, but possibly two spaces had been completed before work was halted, known as the Provost's chapel, with glazed windows, located on the north side of the east end.¹⁴

The second phase of construction took place between 1476 and 1485 after a lull of 15 years, supported by funding from Edward IV in 1480. For a very short period the Chapel master mason was John Wolrich, before the job passed a year later to Simon Clerk. It is believed that Clerk was responsible for changing the intended design of the Chapel vault from a lierne vault, which Ely had envisaged, to a fan vault design, a change made possible by reshaping the window arches.¹⁵ Other progress included completion of the first five eastern bays, with walls and a simple roof. However, with the death of King Richard III in 1485, funding ceased and building works once again stopped.

The third and final phase of construction began in 1508 under John Wastell, a mason who once worked for Simon Clerk and succeeded him after his death. With funding secured by Henry VII and subsequently Henry VIII, Wastell was able to complete the Chapel including the antechapel, vaults, towers, and battlements by 1515. This phase of work is perhaps most easily identified through the use of heraldic symbols and coats of arms carved into the buttresses and interiors. The master carver at this time was Thomas Stockton. The timber roof was constructed with 24 bays and built by Martin Prentice and Richard Russel between 1508-1515.¹⁶

The Chapel's twenty-six stained glass windows depicting Old and New Testament scenes was designed by the King's glaziers, Barnard Flower and later, Galyon Hone and designer Dirk Vellert of Antwerp, from 1515. A large number of glass painters were employed, many of them Flemish, to the consternation of the English Guilds. With the exception of the west window (which was not finished until 1879), all of the windows had been completed by 1547. They are a work of art in their own right and notable for having survived, 'largely intact, the biblical literalism and the iconoclastic ferocity of the sixteenth and the seventeenth centuries.' The north-east side chapel contains remnants of the most historic stained glass. Other historic fragments of considerable interest are found in chapels on both the north and south sides.

It is the fan vault that is the most striking architectural feature of King's College Chapel, constructed primarily of Weldon stone by John Wastell between 1512-1515. *'Mason's marks number the major pieces of each bay and line up with adjacent stones, suggesting that the stone locations were assembled and verified prior to their final installation in the Chapel.'* The end result is a feat of complex engineering that continues to astonish the public and amuse engineering professors and their students.

The original flooring of the Chapel varied slightly. The choir was laid with grey English marble, whilst the antechapel may have had a combination of tile and brick, with a processional path of marble and

¹¹ Ibid, p. 44.

¹² This belief has been challenged by Francis Woodman who argues that both types of stone were used during this first phase, with the finer, white magnesian used as facing in all visible areas of the choir, whilst the brown, less expensive oolite was used as backing. See Woodman, p. 44.

¹³ Saltmarsh, p. 45.

¹⁴ Ibid, p. 46.

¹⁵ Ibid, p. 54.

¹⁶ Archaeology Data Service, King's College Chapel.

<https://archaeologydataservice.ac.uk/archsearch/record?titleId=1153145> [Accessed 10 May 2022].

Ragg.¹⁷ There are reported to be fragments of brick paving under the choir stalls. Today the Ante-chapel is paved in smooth honed modern marble, with under-floor heating. The Quire is paved in a chequered design of black and white marble. The stepped high altar footpace and sanctuary paving is modern from 1968.

There are eighteen side chapels, which Henry VI's Will of 1448 referred to as 'closets,' or places for private worship. Only the two north-east chapels were vaulted by Reginald Ely prior to 1461. The rest were not finished until after 1513. These side chapels serve today as spaces of worship and remembrance: on the north side there is a sequence of spaces presented for visitor interpretation and the corresponding vaulted rooms on the south side serve as ancillary vestries.

The Chapel's Grade I listing marks it as being of exceptional architectural and historic interest. Only 2.5% of all listed buildings are recorded as Grade I. The connection as a royal Tudor chapel ultimately made this 'the jewel in Cambridge's architectural crown.'¹⁸ A 2016 analysis provided in the *Cambridge Historic Core Appraisal* evaluated the views from King's Parade as being of Very High Significance, stating:

*'King's College Chapel is 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.'*¹⁹

The Chapel has the potential for important evidential value, although further archaeological assessment would be needed to discern the extent of its significance. The Chapel is of substantial architectural and aesthetic value, as an exemplary example of Perpendicular Gothic style of the late medieval period, built on an extraordinary scale. This includes the Chapel's very fine details and craftsmanship, its collections, fixtures and fittings, as well as its intricate design and striking silhouette that for five hundred years has continued to make a compelling contribution to the surrounding setting from its location on King's Parade. It would not be an overstatement to suggest that King's College Chapel is the most iconic building in Cambridge, and most recognised internationally as a representation of the University itself. The Chapel is of significant historical value for its connections to Tudor Kings and Queens, its erection over the course of the War of the Roses and well after, its notable graduates and local residents, its role within King's College, and its long standing history as an important ecclesiastical and collegiate building over the past five centuries. The Chapel likewise holds a deep communal value, not just as place of religious worship within the local Cambridge community, but beyond, both nationally and internationally. Its annual televised BBC Christmas carol service performed by the King's College Choir, and its Christmas Eve service *Festival of Nine Lessons and Carols* is broadcast via television and radio to millions of homes worldwide.

Based on the assessment of King's College Chapel's evidential, architectural, aesthetic, historical and communal heritage values, the Chapel is considered overall to be of Exceptional (International) Significance.

¹⁷ Woodman, p. 197.

¹⁸ Cambridge City Council, *Cambridge Historic Core Appraisal: King's Parade and Senate House Hill* (2016), p. 1.

¹⁹ Ibid.

4.1 Methodology: Selection and Definition of Views

The key viewpoints were selected and analysed based upon direct and indirect visibility, the affects the proposed PV array would have on the significance of the Chapel, and the potential impact on key views within the historic setting (Figs 1 and 2).

The Chapel can primarily be seen from a selection of views within the King's College campus, from King's Parade and Trinity Lane, Great St Mary's Church and The Backs. We have also taken into consideration the more distant view from Castle Mound. Existing views and predictive, photomontage views (with illustrative panels) have been presented. These views will be considered and assessed for impact below. They include:

Viewpoint 1: From Trinity Lane looking south towards the north elevation of the Chapel.

Viewpoint 2: From Senate House Hill looking southwest towards the northeast elevation of the Chapel.

Viewpoint 3: From the tower of Great St Mary's Church looking southwest towards the northeast elevation of the Chapel.

Viewpoint 4: From the Corpus Clock on King's Parade, looking towards the south elevation of the Chapel.

Viewpoint 5: From the southwest corner of First Court inside King's College grounds, looking northeast towards the south elevation of the Chapel.

Viewpoint 6: From King's College Bridge looking at the west and southwest elevations of the Chapel.

Viewpoint 7: From the Backs, looking at the west elevation of the Chapel

Viewpoint 8: From Garret Hostel Bridge, looking towards the northwest elevation of the Chapel.

Viewpoint 9: From Castle Mound, looking from a distance towards the north elevation of the Chapel.

4.2 Note on the PV Trial Array

After two on-site meetings with stakeholders in September and October 2021, it was decided that a trial array would help to further evaluate any potential visual impact. This sample PV array was installed in April 2022 on the south slope of the Chapel roof, facing First Court. The south slope was chosen over the north, primarily due to it being the more visible side from the most locations and would give us the best understanding of visual impact. The trial array consists of nine panels affixed to a frame just east of centre and secured with direct fixings to the sarking boards. This has been used to test the balance between efficiency and visual impact. In May 2022 the array was modified slightly with the frame and panels moved down from the ridgeline as far as the existing fixing points would permit. This allowed the top edge of the mock-up array to be positioned 1250 mm below the ridgeline, with the panels set at 360 mm above the lead, for further studies of its visual impact.



(Mock-up in original position)

The results thus far have been positive and demonstrate that the visual impact is low to minimal. As the detailing is reversible, and the fittings attach to new sarking boards, there is no damage to the historic fabric of the roof. It is acknowledged that the trial has a shadow line that appears to be partially noticeable to the (highly focussed) eye wherever an edge is presented. This shadow – which is actually not the panel itself but the darker area below the panel - could potentially be mitigated by using a blanking plate along the bottom edge of the panels, but needs to be considered for visual impact.

The proposal for the full array is to locate the top edge at 1,300mm from the ridge line with the fixing points adjusted accordingly. There is also discussion that the distance between the panels and the leaded roof could be reduced by 100 mm, lowering the panels somewhat further relative to the roof, by installing a bespoke bracket. In addition, the final proposal may also plan to increase the distance between the frame and the ridgeline, by lowering the panels further down towards the parapet. Both of these modifications may help to reduce a shadow line at the lower edge.

With regard to panel colour, at the present time there is only a limited selection of options. The black monocrystalline silicon panels used in the trial array were determined to be the best standard as they have the greatest efficiency in electricity generation for the lowest visual impact. While there have been recent gains in alternative colouring options within the solar panel industry, so far, many have not been commercially tested in the UK and are still in the early stages of development. Currently, solar panels have a typical life span of 25-30 years, after which time their performance tends to decline. It is possible that as the technology improves, modern panels can be upgraded to more sophisticated options.

4.3 Visual Impact and Reflectivity

The overall visual impact of the proposal will be considered on the basis of the effect of the array on the significance of the Chapel and the potential impact on the value of the views. This includes taking into account the following questions:

- What makes the view significant?
- How does the view reveal the heritage values of King’s College Chapel?
- How does the Chapel contribute to the significance of the view within the historic environment?

- How might that significance be impacted by the introduction of a PV array to the Chapel roof?

It is important to note that a study concerning reflectivity has already been considered and an analysis carried out by Max Fordham LLP in late 2021. It was determined that a reflection from the array on the south slope would not be visible from any building or surrounding area, whilst the north slope might be visible from two viewpoints at ground level, given specific weather conditions – Trinity Lane (possible reflection visible in early spring around mid-day), and Garret Hostel Lane Bridge (around 10 am in the summer).²⁰ (See location map, Figure 2).

²⁰ Max Fordham, *North Slope PV Reflection Analysis Rev A* document, (2021) provided by Phil Armitage 23 November 2021.



Figure 1. Key views of the surrounding area as noted in the *Cambridge Historic Core Appraisal 2016*. (Cambridge City Council)

The selected key viewpoints will be assessed using the following basis of evaluating level of impact:

Level of Impact	Likely effect
High Positive	The proposed alterations or development will have a major positive impact, improving the character, setting and/or heritage values of the heritage asset(s). The change would have the potential to reveal and/or enhance several heritage values assigned to the building or setting as defined in the Assessment of Significance.
Moderate Positive	The proposed alterations or development will have a considerable beneficial impact, improving the character, setting and/or heritage values of the heritage asset(s). Moderate positive impact on the heritage asset(s) as a whole may be caused by the cumulative minor positive impact on the heritage values of several features. This effect can be direct or indirect.
Minor Positive	Minimal beneficial improvements to the character, setting and/or heritage values of the heritage asset(s) brought about by the proposals. This can be direct or indirect.
Neutral	There is no change incurred by the development or alteration on the character, setting and/or heritage values of the heritage asset(s).
Minor Detrimental	A minimal impact will be brought about on the setting, character or heritage values of the heritage asset(s). Localised, minor detrimental impact may be accepted should demonstrable mitigation be in place.
Moderate Detrimental	The proposed alterations or development will have a negative impact, adversely affecting the character, setting and/or heritage values of the heritage asset(s). This may be brought about to the heritage asset(s) due to the cumulative minor detrimental impact on the heritage values of several features. This affect can be direct or indirect. Detrimental impact of this nature should be avoided, but it may be possible to accept if demonstrable positive mitigation is in place.
High Detrimental	The proposed changes will have a seriously negative impact on the overall character, setting and/or heritage values of the heritage asset(s). Features that contribute to the overall heritage values, character or significance of the heritage asset would be disturbed. Major detrimental change should not be considered acceptable.

5. VIEWPOINTS

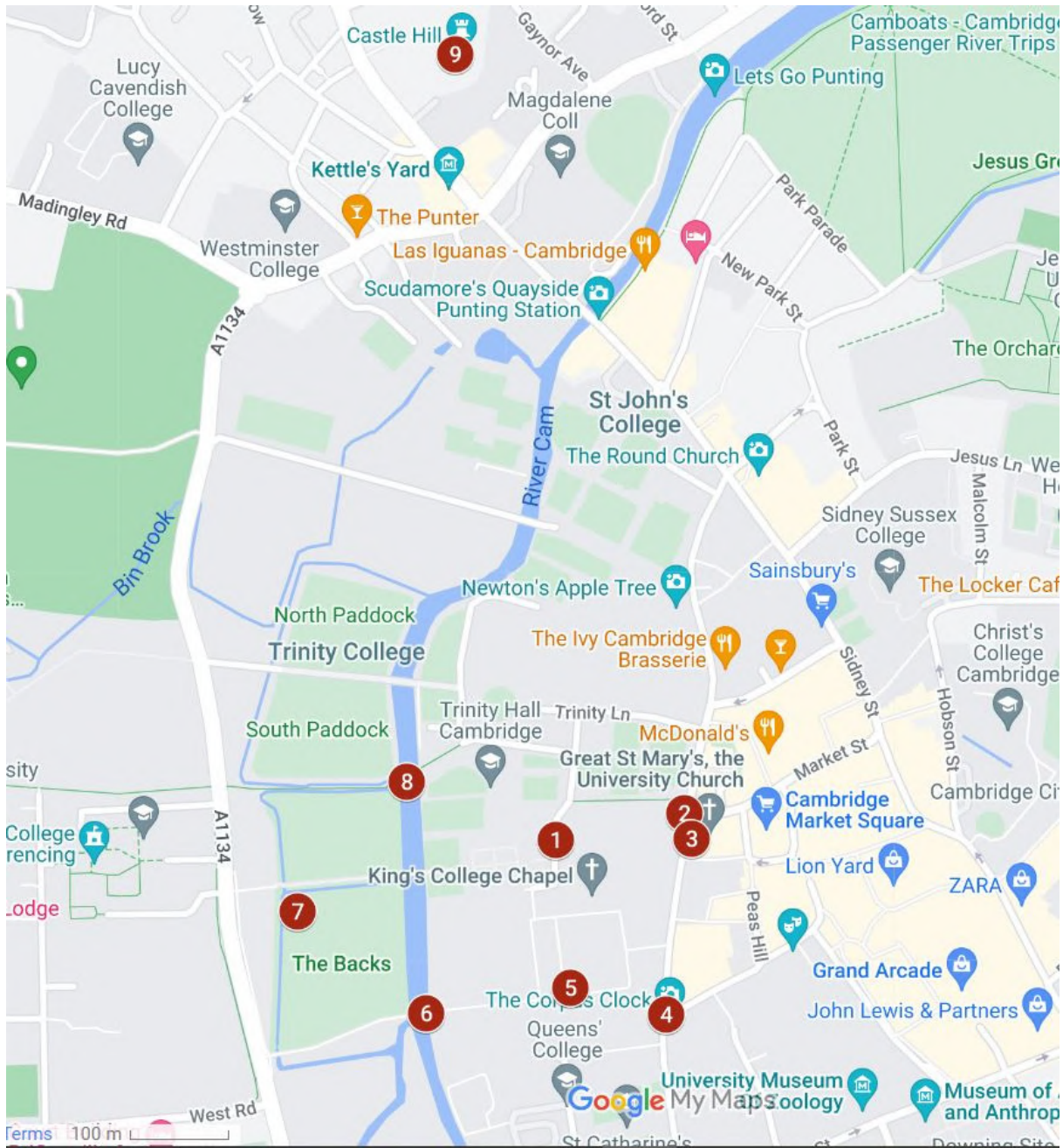


Figure 2. Location plan of each of the nine key views analysed in this report. (Google Maps)

VIEWPOINT 1: VIEWS FROM TRINITY LANE

Viewpoint location and direction: From Trinity Lane near Trinity Hall Porter's Lodge looking south towards the north elevation of King's College Chapel. This viewpoint is less than 50 metres from the Chapel footprint.

Summary: This view is surrounded by the Gothic buildings of Bateman Auditorium to the east, Trinity Hall to the west, and King's College Chapel to the north. It is a historic key view from Trinity Lane.

Significance: This view is considered to be **Exceptional** for its architectural, historic and communal values. It is a key part of the historic line of sight down Trinity Lane, framed by University buildings, and ending with the gothic North elevation of the Chapel rising up towards the skyline. It is significant for its design, its massing and scale, and its history as permanent feature on this site for the last five hundred years, and is listed as a key positive view in the Historic Core Conservation Area Appraisal.

Visual impact: A PV array placed on the north slope of the Chapel roof might be partially visible from the ground in this view due to the open tracery of the parapet. However, the view would be minimal considering the distance and height. The impact on the overall Significance of this view would therefore be **Neutral** due to the heavy balance afforded by the Gothic surroundings, which naturally as a whole composition dominate the view.



(Existing view)



(Existing detail view)



(Photomontage of proposed photovoltaic installation)

VIEWPOINT 2: VIEWS FROM SENATE HOUSE HILL

Viewpoint location and direction: Senate House Hill is located to the east of The Senate House near the start of Trinity Street and Gonville & Caius College. The view looks southwest towards the north façade and northeast corner of King's College Chapel, and is approximately 80 metres away in distance.

Description: This historic view of the Chapel takes in the north and east elevations, along with the Senate House Lawn, and the East range of the University's Old Schools building, designed by Stephen Wright in 1754-8. This area near the Chapel is the traditional location for the University's graduation ceremonies, held at The Senate House, throughout the year. This key view is a mixture of old and 'new' architecture: the medieval Gothic of King's College Chapel and the Classical frontages next door at Old Schools and the Senate House, which were built nearly three hundred years after the Chapel.

Significance: This view is considered to be **Exceptional** for its architectural, historic and communal values. It is a key part of historic grouping as seen from Senate House Hill at the very top of King's Parade. It is also a dynamic composition of Gothic and Classical buildings that contribute to the overall value of the historic setting, and listed as a key positive view in the Historic Core Conservation Area Appraisal. The Chapel, as seen in this view, is also significant for its design, massing and scale, and its history as permanent feature on this site for the last five hundred years.

Visual Impact: From this view, the north slope of the roof can only barely be seen through the tracery of the parapet. It is unlikely, due to the great height of the Chapel and distance from the ground, that an array could be seen from this viewpoint. Therefore a PV array panel from this viewpoint would be of **Neutral** impact.



(Existing view)



(Existing detail view)



(Photomontage of proposed photovoltaic installation)

VIEWPOINT 3: VIEW FROM THE TOWER OF GREAT ST MARY'S CHURCH

Viewpoint location and direction: This view is taken from the tower of Great St Mary's Church, looking southwest towards the north and east elevations of King's College Chapel. It is approximately 75 metres distant from the Chapel.

Description: This iconic and historic view of King's College Chapel can be seen by visitors scaling to the top of Great St Mary's church tower. It provides a near level view of the Chapel roof, and surrounding buildings, including Old Schools, Clare College, King's Parade, the Entrance Gateway, South Range and First Court of King's College. The view of the Chapel is obscured somewhat by a 200 year old horse chestnut tree located northeast of the Chapel. The Chapel is still however the dominate building in this view with its Gothic towers and roofline stretching into the skyline. Of note, Great St Mary's was built nearly concurrently with the Chapel. Although it has an early fourteenth century chancel, the Nave was begun in 1478 and not finished until around 1520. The tower was begun in 1491 and finishing in 1606.

Significance: This view is of **Exceptional** overall significance for its architectural, historic and communal values. It is a key part of historic arrangement of University and College buildings mixed with Town elements, as seen from Great St Mary's Church tower. The dominate and striking view of the Chapel contributes to the overall value of the historic setting and its development over time. The Chapel, as seen in this view, is also significant for its design, massing and scale, and its history as permanent feature on this site for the last five hundred years.

Visual Impact: From this view, which is nearly level with the roof line, the north slope of the roof can be seen rising above and through the tracery of the parapet. Thus, a PV array would be visible within this view from the church tower. There is the potential that a well-planned and designed PV array could be installed to blend into the view of the leaded roof – as has been done at Gloucester Cathedral, which would minimise the noticeability within this view. From this distance and vantage point, it is unlikely that a PV array would have a serious detrimental impact on the significance of the overall view. The leaded roof was intended to be a backdrop to the architectural features of the parapet and towers, which a PV array would continue to provide. Therefore a PV array panel from this viewpoint of the north slope of the Chapel roof may be of **Minor Detrimental** impact, but that is mitigated by design, placement, and the overall justification of providing the Chapel with a renewable energy source with the wider public benefit of lowering carbon emissions. (Of note, this location also has a view of the PV array installed to St Mary's aisle roof, which it views from above).



(Existing view)



(Photomontage of proposed photovoltaic installation)

VIEWPOINT 4: VIEW FROM THE CORPUS CLOCK ON KING'S PARADE

Viewpoint location and direction: This view was taken from the southeast corner of Bene't Street and King's Parade where the Corpus Clock is located. It looks towards the south elevation and southeast corner of the Chapel and its roofline. It is approximately 125 metres distant from the Chapel.

Description: This is a quintessential local view most seen and enjoyed by residents, students and visitors. It takes in the exceptional Gothic Revival screens and Entrance Gateway to King's College (designed by William Wilkins in 1824 to match the architecture of the Chapel). Although it is the screens and gateway seem to dominate this view, it is the overwhelming stately presence of the Chapel in the background that lends the heaviest weight to the heritage value of the viewpoint.

Significance: This view is of **Exceptional** overall significance for its architectural, historic and communal values. It is the dominate view on King's Parade – indeed the site gives the road its name. Even before the nineteenth-century screens and gateway were added, the Chapel would have still been the most striking element of this view; it contributes to the overall value of the historic setting and is listed as a key positive view in the Historic Core Conservation Area Appraisal.

Visual Impact: This viewpoint, upon close inspection, reveals sight of the south slope of the leaded roof and the shadow line of the trial array, although the tracery and pinnacles do somewhat obfuscate it. Thus it is possible a full PV array could be seen from this viewpoint, but given the distance and angle, it would be barely visible. Thus, this would be of **Neutral** impact, further helped by a well-placed design that sits slightly lower down from the ridgeline. The shadow and ridge lines visible on the mock-up have been reduced by moving the panels lower on the slope, towards the parapet. The permanent array will be slightly lower and closer to the lead, mitigating this further, as shown in the photomontage. It is worth noting that it is only in the detail view (below) that, that one can only see a shadow line from the trial array if one knows it is there. The many pinnacles and towers provide a striking silhouette against the sky, which distracts the eye, as does the verticality of the Wilkins screen in the foreground.



(Existing view before installation of mock-up)



(Detail view with mock-up in original location before adjustment to lower position)



(Photomontage of proposed photovoltaic installation)

VIEWPOINT 5: VIEW FROM THE SOUTHWEST CORNER OF THE FIRST COURT

Viewpoint location and direction: From the southwest corner of First Court looking northeast. This view was captured approximately 84 metres distant from the Chapel.

Description: This view of the south elevation of the Chapel is taken from King's College First Court adjacent to the Fellows Building (also known as Gibbs' Building, built 1724-31 by architect James Gibbs). The Chapel essentially forms the north range of First Court. This is a key view on the King's campus: it frames the composition of the nineteenth century cast-iron lampposts; the First Court lawn, the clean lines of the eighteenth century Gibbs' Building, and the Gothic drama of the Chapel with its enormous stained glass windows, ogee-carved doorway, and soaring pinnacles and towers. The parapet is framed against the sky with the south slope of the roof just visible through the tracery.

Significance: This view is of **Exceptional** overall significance for its architectural, historic and communal values. The Chapel is the key focal point within this view with its overwhelming massing, scale and design.

Visual Impact: This ground level view point reveals glimpses of the Chapel's south roof slope although this is minimised and obfuscated by the visual distraction of tracery and pinnacles. Upon zooming into the detail view (below), the PV trial array can be seen from this viewpoint, which would potentially be considered of **Minor Detrimental** impact, although this is mitigated by a thoughtful and well-placed design, and will be less noticeable when covering the full roof, as opposed to the distinction of a small trial array. Overall, any minor detriment is greatly offset and diminished by the complexity of the view, and justified by the provision of a renewable, clean energy source, and reduction in carbon footprint.



(Existing view before installation of the mock-up)



(Existing view with mock-up in modified position)



(Photomontage of proposed photovoltaic installation)

VIEWPOINT 6: VIEW FROM KING'S COLLEGE BRIDGE

Viewpoint location and direction: This view is taken from King's College Bridge, which crosses the River Cam, approximately 155 metres southwest of the Chapel. The view takes in the west elevation of the Chapel and the upper portion of the south elevation.

Description: This historic viewpoint from King's College Bridge (Grade I listed, designed 1818 by William Wilkins) draws together the bucolic view of the landscaped back lawn of the College, together with the rear of the Gibbs' Building and south elevation of Clare College. In terms of size and massing, the Chapel dominates this view.

Significance: As it is in other viewpoints, this view is of the Chapel is of **Exceptional** overall significance for its architectural, historic and communal values. The Chapel is the key focal point within this view due to its sheer massing, scale and design. However, it may be the most striking feature of this view is the roofline: the pinnacles, towers, and parapet all creating a dramatic visual scene against the skyline, making the buildings around it look dull by comparison. The wider view from Queen's Road is listed as a key positive view in the Historic Core Conservation Area Appraisal.

Visual Impact: From this view, the south slope of the roof can barely be seen through the tracery of the parapet. The trial array is not visible. It is unlikely, due to the great height of the Chapel and distance from the bridge, that a full PV array could be seen from this viewpoint. Therefore a PV array from this location and view would be of **Neutral** impact.



(Existing view)



(Photomontage of proposed photovoltaic installation)

VIEWPOINT 7: VIEW FROM THE BACKS

Viewpoint location and direction: This view is taken from The Backs, approximately 240 metres west of the Chapel. It looks eastward and affords an excellent view of the Chapel's west elevation.

Description: This viewpoint shows the stark contrast between the medieval, Gothic Chapel and the clean, simple lines of the Gibbs' Building, which looks much smaller in comparison. The intricate design of the Chapel's west parapet and towers stand out against the backdrop of the sky.

Significance: This is a key view, much photographed and instantly recognisable, not just of King's College but of Cambridge itself. It is of **Exceptional** significance.

Visual Impact: From this view, the roof cannot be seen. It is unlikely, due to the great height of the Chapel and distance from the Backs, that a PV array could be seen from this viewpoint (unless it was installed at a substantial height above the roofline, in which case it would be detrimental to the viewpoint). At this early proposal stage, a PV array from this viewpoint would be of **Neutral** impact. However, it would be necessary to confirm design height to ensure it wouldn't be visible through the parapet tracery of the west elevation.



(Existing view remains unchanged)

VIEWPOINT 8: VIEW FROM GARRETT HOSTEL LANE BRIDGE

Viewpoint location and direction: This view is taken from the Garret Hostel Lane Bridge, adjacent the Jerwood Library of Trinity Hall, located approximately 175 metres northwest of King's College Chapel.

Description: This view is from the Garret Hostel Lane Bridge which was built in 1960 (by Timothy Morgan), however, it is the sixth bridge at this location and so this is considered as another key historic viewpoint. Although partially obscured by trees and buildings of Clare College, the pinnacles and towers of the Chapel can be seen beyond.

Significance: This is a historic viewpoint that students, locals and visitors continue to appreciate when crossing from the Backs, over the River Cam and into the City Centre. It is a view that is central and allows orientation – to see the towers of King's College Chapel one can instantly orientate themselves to where they are in the City. It is also a view that is so distinctive to the character of Cambridge. It is of **Some** significance.

Visual Impact: From this view, the north slope of the roof can just barely be seen through the parapet tracery. It is hidden by the many pinnacles, chimneys and gables that interrupt the view. It is unlikely due to these obstructions and the distance from the bridge, that a PV array could be seen from here. Thus, a PV array from this viewpoint would be of **Neutral** impact.



(Existing view)



(Existing detail view)



(Photomontage of proposed photovoltaic installation)

VIEWPOINT 9: FROM CASTLE MOUND ON CASTLE HILL

Viewpoint location and direction: This view is taken from Castle Mound located on Castle Hill located approximately 800 metres north of King's College Chapel. It looks southwards towards the north elevation of the Chapel.

Description: Castle Mound is all that remains of Cambridge Castle (built circa 1068 and demolished around 1842) in the area of Castle Hill. Although this view is partially obscured by trees and buildings, the pinnacles and towers of the Chapel's roof can be seen beyond in the far distance.

Significance: This is a historic viewpoint that would have been appreciated from the Castle and Hill while the Chapel was constructed and upon its completion in 1515. Since then, the Chapel has become a key landmark in this view, even though it is quite distant. It is of **High** significance - listed as an important positive view in the Castle and Victoria Road conservation area appraisal, and as one of the Key Strategic viewpoints from Appendix F of the 2018 Local Plan.

Visual Impact: From this view, the upper portion of the north elevation of the Chapel can just be seen over the rooftops and trees. In the detail view, the north slope of the roof can be seen. Under this magnified lens, a PV array would possibly be visible. It was not feasible to provide a predictive, photomontage view of how the panels might appear due to the distance. With the naked eye, it is unlikely a PV array would be obvious from this position. Any discernible impact created to the magnified, detail view, would be low and justified by the provision of a renewable, clean energy source for the College, and reduction in overall carbon footprint for the City. Overall, a PV array from this viewpoint would be of **Neutral** impact.



(Existing view with King's College Chapel in the distance).

CONCLUSION

The proposal to install a PV array to the north and south slopes of King's College Chapel does not impact on the significance of the Cambridge Historic Core Conservation Area, the Grade II*-listed park and garden of King's College, or on the significance of any other surrounding listed buildings. The proposal would however be a progressive step towards reducing carbon emissions and establishing a renewable source of clean energy for King's College. By extension, it would aid the collective climate change policies set by the University of Cambridge, the Church of England and the City of Cambridge, as well as the national government, who have all established carbon-zero targets in the coming years. Finally, it could indirectly be seen as example for the student population and public on the importance of stewardship and investing in ways to protect the environment.

However, it is also important to understand how a PV array may or may not affect the significance of the heritage asset, along with key views within the surrounding area, so for each viewpoint this report has considered:

- What makes the view significant?
- How does the view reveal the heritage values of King's College Chapel?
- How does the Chapel contribute to the significance of the view within the historic environment?
- How might that significance be impacted by the introduction of a PV array to the Chapel roof?

Each viewpoint is significant for its visual accessibility to the exceptional scene created by the architecture of King's College Chapel. The leaded roof of King's College Chapel is by intention, indistinct to these views: It acts as a natural backdrop to the dramatic architectural features of the parapet, pinnacles and towers. The chapel roof was furnished with a pierced decorative parapet to create a skyline effect – the roof itself was the neutral backdrop. The installation of a PV array can essentially be seen as visually substituting one backdrop for another. But it cannot visually distract and must be muted, constant and uniform.

On a whole, the majority of key viewpoints would be of **Neutral** impact due to the sheer distance and height of the Chapel from surrounding buildings and the obfuscation created by the pinnacles, parapet and towers. These views include Trinity Lane, the Corpus Clock, Senate House Hill, King's College Bridge, The Backs, Garret Hostel Lane Bridge and Castle Mound.

However, there are two key views of those selected, which could potentially be of **Minor Detrimental** impact to the significance of the view. Of these, the view from First Court looks towards the south slope of the Chapel roof. The view from the tower at Great St Mary's Church is an oblique view of the north slope.

The potential impact created by a view of an array to the roof has been mitigated by careful consideration of colours, a thoughtful and well-placed design that visually blends the array into the lines of the leaded roof, uniformly extending across the entirety of the roof length, whilst sitting well below the ridgeline. It is also mitigated by the Max Fordham evaluation of reflectivity and choice of panels. The Chapel has the benefit that the many pinnacles, parapets and towers provide a visual distraction from the background of the roof. Overall, any minor detriment would be diminished by the sheer complexity, massing and distinctive design of the view of the building as a whole, and justified by the long-term provision of a renewable, clean energy source, and the public benefit of reducing carbon emissions.