Consent Applications: Comments and Queries tracker

Rev 1.01 (Updated 4 November 2022)

CAROE ARCHITECTURE

Reference (if applicable)	Comment	Response	Action (if not complete response)
Comments from Ely DAC Environmental Advisor. RECEIVED FROM DAC Secretary 23 August 2022			
	I would particularly refer the applicants to the CBC Guidance : Solar_Panels_and_Faculty_Guidance_0.pdf (churchofengland.org)	**Please be assured that the design team have given very close attention to the guidance. NOTE: DAC environment advisor has asked a further set of questions so that the sequence of steps in the guidance are recorded. See responses below.**	
1	Basics: As installing PV is seen as 'icing on the cake', the college needs to demonstrate all the prior actions it has achieved or are underway.	It is acknowledged that King's College Chapel is more akin to a cathedral in its usage and energy consumption than even a well used Parish Church. It also forms part of a much wider College estate and is therefore considered in context with the overall sustainability strategies for the College and University, as well as guidance from ecclesiastical policy and guidance. The Chapel has a new low-energy lighting system. There are good controls of the heating, which is underfloor. Renewal of the UFH is perhaps 10 years away. However de-carbonisation of the heating load for Chapel can only be delivered over a site-wide masterplan which looks at all the energy needs of the College. This holistic approach is already well in hand. Therefore the PV scheme is not just 'icing' but an intrinsic component of a strategy.	
1.1	In terms of the chapel itself		
	• Run through the Practical Path to Net Zero Microsoft Word - the practical path to net zero carbon for churches FINAL numbered October 2020 (churchofengland.org) and explain what has been done and what hasn't been done.	Clearly with a building of such high standing, it is the internationally significant fabric and actions to safeguard it which indefinitely determine how capital projects are programmed. By necessity, any major works also associate significant periods of development before they can be implemented. The condition of the leadwork as recorded in the QIR, meant that renewal of the lead roof coverings (Main roof and south side chapels) were of high urgency and essential to keep the building weathertight. It is the logistical infrastructure required to completed these works that provide the current and unique opportunity for the installation of PV arrays, which will not present itself again for the foreseeable future and certainly not before 2050. We have also been looking closely at essential climate change adaptation requirements – especially the capacity of rainwater disposal systems. The installation of rainwater harvesting infrastructure has also been considered but is not being taken forwards at this stage.	

		The chapel has recently benefited from a major new low-energy lighting scheme. The next major project within the Chapel will be to address the existing underfloor heating system which is still heated with (efficient, condensing) fossil-fuel burning heating plant. The following, are projects of a smaller scale which respond to needs set out in the QIR of 2018: - Repairs to address locally damaged glazing in the side Chapel windows (due to commence on site Autumn 2022) - Small scale initial stabilising repairs and investigation of the Organ screen and Quire joinery (due to commence on site Autumn 2022) - Access improvements to remove trip hazards from access stairs to side Chapel K (due to commence on site Autumn 2022). - Dust sampling and analysis to inform cleaning requirements - Light-touch masonry repairs to repointing and avert water ingress, coupled with small scale investigation of high-level stonework (completed 2021). - Replacement of an unstable high-level carving atop one of the north side buttresses (in progress).	
	• Particularly, is the chapel (and the college as a whole) using a renewable energy supplier for all its electricity?	Yes, as confirmed on the College website (https://www.kings.cam.ac.uk/a-greener-kings/sustainability). Suppliers: Opus Energy SmartestEnergy	
	• What thought has gone into shifting to heat pumps, using the PV electricity (including water-source heat pump)?	The Decarbonisation Report by MFP sets out sustainability strategies in principle for the College Estate, one of which includes a shift (where applicable) to meeting heating loads via electric power. The College are currently investigating the feasibility of large-scale ground-source bore-holes on college land. There is also a joint feasibility study in train for the colleges with River Frontages to investigate how the River Cam might serve for water source heat. Analysis of the energy load of river-contiguous buildings has been completed. Mott Macdonald are now instructed to implement monitoring equipment to measure energy capacity of the river flow.	
1.2	The guidance is aimed at parishes, which are likely to have just a church and a hall. Clearly the college will have a very diverse holding. What steps has it already taken generally to achieve net zero?		

	• Does it have a sustainability strategy – please supply if it does?	YES: The Decarbonisation Report by MFP sets the context for the College Estate and outlines overarching sustainability strategies. The Chapel is identified as one of the key PV opportunities and can have the largest impact on on-site renewable generation. The buildings estate has already made inroads on multiple fronts; however much of the Domus estate are hard-to-treat historic buildings with limited opportunities for deep retrofit. This serves to highlight the importance of the Chapel roof as an opportunity. The College's Sustainability Committee has a commitment to deliver an enduring programme that meets the College's sustainability vision, policy and strategy, producing and measuring against agreed targets in the meeting of aims and objectives in the areas of buildings, carbon and energy, food, procurement, recycling and waste, teaching and research, water, biodiversity, and travel and transport.	
	• What steps is it taking over the other college buildings?	See above. Following on from the Decarbonisation Report, steps are being taken to test and refine the high-level strategies for application. F+G has been appointed to start testing more accurately the potential gains through appropriate fabric upgrades, and this work will inform a programme of work to upgrade buildings to the point where they become less reliant on gas for heating. That will pave the way for the introduction of heat pumps to deliver the reduced demand for heating. This significant task should not be underestimated, noting the number of historical buildings in the College.	

		Completed Projects	
		The College have successfully completed a number of major works projects within recent years, carefully managing the sensitive repair and conservation with targeted upgrades where feasible and appropriate: The college has already implemented 2 PV installations: - Wilkins Hall – 21kWp roof mounted array - Old Garden Hostel – 12kWp roof mounted array Works to the Grade I listed Wilkins' Hall (1824-1828) were completed in 2021. Alongside careful stonework repairs, conservation works to the glazing and ceilings, these included replacement of the slate roof coverings with the sensitive addition of a photovoltaic array on the south-facing roof slope. In 2020, the restoration of Bodley's Court saw the overhaul of parapets and rainwater goods, and like-for-like replacement of failing stone slates where the opportunity was taken to upgrade thermal insulation. In 2021 the Keynes building was refurbished, including the installation of secondary glazing, reducing heat loss. Likewise, a recent refurbishment of the Old Gardens Hostel saw the upgrade and consolidation of the plant room and improved thermal linings throughout. Similar initiatives are being taken into the current refurbishment of the Spalding Hostel, on Peas Hill, where fabric improvements and the introduction of Air Source Heat pumps should reduce reliance on gas by 80%.	
		New buildings are constructed to high, PassivHaus standards and we are installing sustainable generation where possible. Such examples now include the College's new graduate accommodation on Cranmer Road which comprised the first major Passivhaus buildings in Cambridge and subsequent development on the Croft Gardens site on Barton Road. The buildings are designed with a long lifespan in mind, with incredibly low energy consumption and low space heating requirements. Heating is provided by point-of-use electric heaters, helping keep energy losses from distribution to an absolute minimum.	

		Examples of more initiatives which have been implemented	
		The College has been making significant efforts to cut its carbon emissions year-on-year. All of the College's electricity is from renewable sources. The College uses low-energy cookers and light bulbs, and have been replacing old boilers with energy-efficient ones. The IT department has used virtualisation software to mimic physical servers, and in doing so has cut the number of servers in the college from over 20 to just two. This has cut the electricity consumption in the server room by two-thirds. Low carbon meals: In the UK, a fifth of people's annual carbon footprint comes from the food they eat. The Conference & Dining department buy locally and seasonally, and avoid the use of paper except where necessary. Food is labelled so that it is easier to choose the meal with the lowest carbon footprint, taking into account the emissions caused by producing the food and the distance the food has travelled to get to Cambridge. A current proposal being considered is the delay to turning on heating in the Autumn and a reduction to the required heat temperature in rooms (likely from 20 degrees Celsius to 19 or 18) - this should reduce energy use by between 13% and 26% depending on the options accepted.	
	•What steps is it taking over other properties that it owns, both where it has substantial control and where it has little (e.g. agricultural tenancies)?	As noted in the covering paperwork there are no relevant agricultural tenancies which could be engineered to meet the energy needs of the Domus estate. The college has given consideration to removal of Grantchester Meadows from public access land and applying PV to the land, but the outcry would be huge and unsupportable and the social dis-benefit would be marked - even if technically feasible given the inflexibility of the grid.	
	• What steps is it taking over its investments? Has it divested from fossil fuel companies? Is it investing in renewable energy companies?	All investments are managed within the framework of trustee duties.	
	• What is its strategy over offsetting?	Offsetting is a chimera and a distraction from the core imperative of the Climate Emergency and taking steps to directly address a route to Net-Zero.	
1.3	In sum, with such an important building as the chapel, the college needs to demonstrate that the PV proposals are integrated into a thorough sustainability plan.	We feel that we have done so comprehensively in the application paperwork. The Chapel roof area is a large unmissable opportunity. Whilst overall meeting a relatively small proportion of college renewable and low-carbon energy needs - it is still large opportunity in the context of the overall goal and for the chapel particularly. ALL energy generated will be used on site and will not be exported. It is not proposed that this would be undertaken instead of anywhere else, but alongside every other feasible opportunity. This needs to be coordinated with urgently needed repair works/capital projects.	

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2	Is the energy generated well-matched to the use of the chapel? What proportion of the electricity will be used on site and what proportion sold to the grid? If sold to the grid, on what other properties held by the college could a similar quantity of electricity be generated and sold?	The PV array proposed will serve the college exclusively and the energy will be used on site. Batteries are not appropriate and not needed. The baseload question is complex: the electrical energy for Chapel across the whole year (night and day) will be met by the PV array, but the PV generation loads are not matched to electrical load. The fossil fuel heating load for chapel is not taken into consideration but will have to be met by other means - which are likely to be heat-pumps at some future date.	
3	Environmental impact of the installation. The guidance asks for estimates of embodied carbon (this should be a lifetime figure, including dismantling and disposal/recycling). These should be set against the carbon saving from the generation.	Embodied carbon in typical roof mounted PV installation (including frame and wiring) is approximately 1500 kg CO2 / kWp. Annual generation for 1kWp PV on King's College chapel roof offsets approximately 170kg CO2/y, so carbon payback is approximately 9 years.	
3.1	• With such an important project, other sustainability issues also need to be addressed. These include environmental ones such as water consumption in manufacture and source and pollution of components, especially the rare metals. They should also include social sustainability issues such as the fair treatment of labour and guarantees against modern slavery. Different installations are likely to have different sustainability footprints and these should be explored.	Panels and components will be sourced from reputable suppliers. REC, the proposed panel manufacturer is based in Norway and has a published corporate ethics policy https://www.recgroup.com/sites/default/files/rec_code_of_conduct_revised_-_august_2015.pdf	
4	All roof locations considered. There is really only one roof for the chapel itself, but what about other locations in the college and its split sites in Cambridge?	Yes - all locations have been considered and all sites are taken within the holistic environmental strategy (see above). Refer to MFP solar study referenced in the Covering Paper and Design Statement and the Decarbonisation Report by MFP.	
5	Significance of the roof. The guidance is worded to focus attention to cases where the roof itself is of focal significance. This is not the case with the chapel. However, the roof does play a major role in the significance of the building by providing a very neutral backdrop to the roofline. The full significance of this needs to be explored.	Refer to CAL Covering Paper and Design Statement, and Visual Impact Assessment. Also the Planning and Heritage Statement by Turley.	
5.1	• The impact of the proposals on this significance then needs exploration. What difference will be made by the slight increase in height of the PV surface? What difference will the surfaces of the panels make? What about the impact of the panel edges, etc.?	Refer to CAL Covering Paper and Design Statement, and Visual Impact Assessment.	

6	Fixings and maintenance. In addition to discussing the fixings, much more information is needed on the maintenance that will be necessary, both to the panels and to the infrastructure like cabling. How will these be accessed and checked, for instance?	Maintenance arrangements are covered in the application paperwork. We have established the replacement strategy also. Electrical inspections will be undertaken in the usual cycles. Infrared camera surveys will be used to test for faults or hot-spots. Periodic cleaning is straightforward with easy access through turrets. Replacement panels can be carried up to roof.	
7	Reversibility. Although others in the future will be responsible for removal of the PV at the end of its working life, a realistic plan is needed for how this could be done. It would also be helpful to set out the likely periods when the appearance of the chapel will be compromised by construction, removal, maintenance and when it might be returned to a PV-free state.	Notwithstanding scepticism around future energy generation predictions to the National Grid, we acknowledge it is a real question that in 25-30 years, there needs to be a replacement strategy for the Kings installation due to longevity of the panels. At that juncture when renewal is needed due to inefficiency – which is a certainty – the College has to decide whether to renew the electrical infrastructure or remove it. We would refer you to Professor Julian Allwood's 'Real Zero Emissions' presentation at the National Cathedrals Conference in May 2022 - referenced in the CAL Covering Paper and Design Statement - which reports that the current National plans for zero emission are on track to fail and by some considerable margin. Our prediction is that the energy requirements will not be negated by that time and that when the panels reach the end of their serviceable life, it is more than likely the business case will be demonstrated for the viability of replacement with more sophisticated options as the technology improves - thereby improving the value of the installation infrastructure (the electrical systems and the support structures) that we are investing in now.	
		Should, at some point in the future, there be a point where there is ample non-emitting energy generation for the College and nation and thus these panels not be required, the design allows for the framing and fixings to be removed. The lead would be repaired by welding patches using traditional methods. This is a traditional, low-risk repair and employed often in lead detailing. There would be no weakness in the covering or compromise to the longevity of the lead as detailed. These patches would not be visible from the ground. It is important to emphasise in this summary and response that the detailed documentation gives the closest consideration to the lifecycles of the lead roof to the Chapel. We are designing for a 100 year design life for the lead (which the current south slope has not achieved). This is exactly why we have proposed the fixing post solution because this both preserves the leadwork and provides a future generation with the means to replace the PV panels with the latest technologies in future.	
		NOTE: The H&S file for this project will plan for replacement of panels at the end of their life. This should not detract from the current logistical opportunity brought by the roof covering renewal.	

8	Longevity. Are there useful protective measures that could be taken? Maintenance issues have already been mentioned above.	Already taken into consideration in the technical design - especially the post and cladding rail system which allows for any panel to be replaced whilst other panels remain operational. Longevity predictions are based on 25 years performance at efficiency levels. over time efficiency tails off. Failure of individual panels or components such as mico-inverters is addressed above.	
9	Fire risks. These need detailed reflection. What are they, both in terms of increasing the risk of fire and in terms of aggravating one already ablaze? What can be done to minimise them, and to control the impact of them (e.g. alarms or fire suppression systems). What is the level of risk over and above background once all these are in place?	The query of fire risk has been raised by a number of stakeholders and consultees. We understand that MFP's responses have satisfied the insurers. The use of micro-inverters (with no electrical equipment within the roof space) and detailing of electrical systems makes the proposal inherently safe. Lighting risk is dealt with in the application. There is already an augmented alarm and detection system within the roof space. There is no fire suppression system that would mitigate external PV.	
9.1	• There does not seem to be any proposal for batteries.	MFP have studied batteries: they are not required by Chapel and are not therefore part of the consent application: currently any surplus power is to be exported into the internal college electricity network. If for other reasons (i.e. connection methods and power demand curves, batteries were required elsewhere in the college network, these would not be material to this application for the Chapel.	
	Good design. This is still at pre-application stage, but for the full application details of the design of the panels will be needed, including option appraisals of different panels.	This scheme is not at pre-application stage. The formal application for a DAC recommendation has been live since March 2022!	
11	Statement of Significance. This needs to be a clearly identified document or section of a document. King's College Chapel is of global significance, being one of only a handful of buildings in Britain that is immediately recognisable by many people around the world. It is for this reason that the case for PV has to be made to the highest standard. If the faculty is granted, it will be for a building far and away more significant than any others that have so far had PV installed on roofs.	Agreed: hence the extensive paperwork and consultation on the paperwork that has been underway since September 2021. Refer to CAL Covering Paper and Design Statement, and Visual Impact Assessment. Also Planning and Heritage Statement by Turley.	
11.1	• The case for PV on the chapel roof is likely not only to be tested by the regulators, but quite probably tested in a Consistory Court.	Only if there are objections! Otherwise Noted.	
11.2	• The full range of impacts, such as those mentioned in the guidance, need to be considered.	We think they have been. The impacts assessments have been updated several times with further input from consultees. Refer to CAL Covering Paper and Design Statement, and Visual Impact Assessment. Also Planning and Heritage Statement by Turley.	

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12	Photographs. A forensic view sensitivity analysis may not be needed, but a more thorough set of photographs from more positions is needed, including telephoto details and taken at different angles of the sun.	We have done the homework. Further augmented images have been provided. Refer to CAL Visual Impact Assessment. MFP reflectivity risk analysis and physical review of on-site mock-ups.	
13	Options appraisals. Several of the issues raised in this list would benefit from individual options appraisals. These would range in scale from alternative options of specific manufactured panels, through alternative roof locations, to alternative methods of reaching net zero for the college.	Various panel options have been considered. MFP documentation explores alternatives including thin film options and coloured panel options. Alternative roof locations: Considered and tested through mock-ups and subsequent iterations thereof. Refer to the Decarbonisation Report by MFP which describes alternative methods of reaching net zero.	
14	Optional information. To support the application, it would be helpful to have information on conversations with Building Regulations officers, with DNOs, and with the insurers.	Building Insurers have been closely consulted. The college insurers may not wish their evaluation to be publically available. We are asking. Building Control discussions and confirmation in hand.	KCC/CAL
15	Benefits, Statement of Needs. In addition to the benefit of the generation itself, how does the college see the wider role of their proposals?		
15.1	• How will this not just be a 'token gesture'?	As per the data in the application and responses above. The PV array is sized as the most suitable for this roof, to harness the reasonable potential, without obtrusive or harmful visual impact. The array makes a material benefit to the overall college non-emitting energy needs. We have also observed as of interest and material to this application to direct DAC advisors towards para 158 of the NPPF which states: "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."	
15.2	• Can this be 'done well' to communicate the church's mission as well as the college's?	It has been the College's aspiration from the outset to undertake this to the highest standard and we hope to work in partnership, committing to shared goals of the College and Church towards net zero carbon targets - responding to the Fifth Mark of Mission: To strive to safeguard the integrity of creation, and sustain and renew the life of the earth.	
Request for further information from SPAB following meeting on 15.09.22 with Christina Emerson (Head of Casework) and Matt Fulford (SPAB Sustainability advisor)			
	1) an analysis of the carbon balance (embodied carbon vs carbon savings) of the north and south aside arrays respectively. 2) evidence to demonstrate that the total demand for electricity in the buildings served by the solar panels would be matched against forecast generation 3) a short paper explaining the College's carbon reduction strategy.	Please see Solar Summary by MFP.	

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Information requests from Mary Collins (Senior Planning Officer) Greater Cambridge Shared Planning RECEIVED 20 October 2022			
	The Decarbonisation Report by Max Fordham, concludes the generation potential of the panels is 105,864 kWh/year with a carbon saving over approx. 23 tonnes of carbon per year for the next 30 years. A total of 1,227 tonnes would be saved each year over the main college site. The pv panels to the chapel roof would contribute a 1.87% reduction in carbon consumption across the entire measures proposed for the estate. Could this marginal benefit be achieved elsewhere with similar or greater benefit which is less harmful than the proposed pv panels on the chapel roof? Are there other suitable areas for renewable and low carbon energy sources, and supporting infrastructure, elsewhere in the college's ownership. If not, please can you provide justification as to why this can't be achieved elsewhere.	NOTE: The actual design has now been upgraded to 128,000kWh/y. We are curious about this question as there are, in our view, some preconceptions implicit in the question: The practical and technical answer to the question - 'is there any other surface or area within the College Domus estate that can deliver 128,000kWh/y of non-emitting solar energy generation' - the answer is no, not on any of the built estate and, given the landscape context and Registered parkland, there is little chance of finding an approved location for a ground-mounted array on this scale. If the question is phrased as 'what other opportunities are there to save 2% of the OVERALL estate carbon budget in a low-impact, less harmful way' - again we would respond that there are none immediately, but we would also query the premise of the question. The De-carbonisation report makes clear that the College has a plan, predicated on major capital investment over many years, to address the climate emergency holistically. BUT, the report also makes clear that, even with the most emphatic concentration on this problem, there will still be a carbon deficit. The Julian Allwood report suggests that historic estates need to make 6% reductions year on year, with each year getting progressively harder to achieve this general goal. It would be extraordinary if the College, when it has the opportunity to deliver a 2% reduction in 2023 with the Chapel PV project, would not prioritise this - remembering that most future investments are going to be harder and more costly. A 2% decrease in carbon is NOT a marginal benefit when seen across the whole estate carbon footprint. The justification for this position is straightforward: based on the numbers and the evidence, the college needs a strategy which seeks - sensitively and appropriately - to deliver all opportunities for carbon impact reduction. This is not an 'either-or' question: 'both-and' solutions are needed. continues in next box:/...	

	The Decarbonisation Report by Max Fordham, concludes the generation potential of the panels is 105,864 kWh/year with a carbon saving over approx. 23 tonnes of carbon per year for the next 30 years. A total of 1,227 tonnes would be saved each year over the main college site. The pv panels to the chapel roof would contribute a 1.87% reduction in carbon consumption across the entire measures proposed for the estate. Could this marginal benefit be achieved elsewhere with similar or greater benefit which is less harmful than the proposed pv panels on the chapel roof? Are there other suitable areas for renewable and low carbon energy sources, and supporting infrastructure, elsewhere in the college's ownership. If not, please can you provide justification as to why this can't be achieved elsewhere.	Please see notes comments from the Bursar when discussing the response to HE, to which this point also relates: *Historic England claim the benefit to College will be a circa 2% of annual spend on electricity. This figure (£15k) is now greater (£20k) per year against this year's energy budget of circa £500k. However, this is a part of a larger scheme to make our buildings in College thermally efficient (fabric improvements) and once there our draw on electricity should be smaller – thus increasing the % value of the panels on the chapel.* The Bursar's point is an important one: as the college buildings become more efficient, the relative worth of the Chapel PV array increases, even as grid carbon intensity reduces over time. As a portion of total electrical load, the Chapel PV will reduce the current overall estate-wide energy demand (gas and electricity) by - 1.3% year on year. When buildings are thermally improved as the decarbonisation report but still using gas for heating and hot water the PV delivers - 1.8% of the overall college estate energy needs When buildings are better thermally improved and heat loads met with heat pumps - the overal contribution of the PV is 3.3% We suggest that, in the context of the WHOLE estate this is a really meaningful input to a big problem.	
	With regard to the submitted documents, reference is made in the Max Fordham Decarbonisation Report and the Heritage Report to previous studies that have been carried out. Please can you provide further information as described below.	The 2019 report is in the papers - but has been superseded by further technical design and more detailed studies which underpin and justify this submission. The colour coding on the 2019 report is to be read carefully, because the rationale was only about payback, not about feasibility nor consentability	

	MAX FORDHAM REPORT Paragraph 9.1 Solar PV A study was carried out in 2019 to assess the potential of all the roofs on the College main site for solar thermal and PV energy generation. The study concluded that solar thermal heat generation was not cost effective for any roofs but that PV electricity generation was technically and economically viable for a number of roofs. Figure 39 shows a summary of the PV generation potential of all the roof areas. Please see that report for more detailed information of the analysis. Of all the roofs in the college, the chapel roof has the single largest suitable roof areas and the highest generation potential. Please could we have sight of this report - Solar PV A study carried out in 2019	The concluding plan was shown in CAL Covering Paper and Design Statement. Please see accompanying documents to this response for the full report. This high-level initial study, determined the south slope of the Chapel to be 'moderately suitable' and the north slope to be 'slightly suitable.' Further analysis undertaken as part of the roofing project development works, based on more accurate metric data and panel selection, determined that the roofs had greater potential for energy generation. Since the application has been submitted, the SPAB requested further solar analysis and review of the energy generation potential. Please see the accompanying Solar Summary by MFP which shows the latest data responding to the SPAB queries. This reflects recent technological improvements within the selected panels, which provides greater advantage and public benefit of the proposed arrays on the Chapel roof. Subsequent to the 2019 report the decarbonisation study highlights that ALL sites for non-emitting power are required, not least as other low-carbon sources for heat generation will be electrically powered. The roof areas for other PV opportunities considered most suitable are: - 02i, j (Gibbs Building – platform of south facing PVs constructed between roof ridges) - 06 (South edge of Chetwynd Court) - 07a (Wilkins Building – 17Kw array installed) - 09a (North edge of Webb's Court) - 10a, b, d (Keynes Building) - 11a, c (Webb's Building) - 19a, c (Garden Hostel)	
	A SUMMARY STATEMENT OF SIGNIFICANCE AND VISUAL IMPACT ASSESSMENT – CAROE ARCHITECTURE Paragraph 4.3 ……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). Please can we have sight of the study concerning reflectivity and an analysis carried out by Max Fordham LLP in late 2021.	Please see within the accompanying information. If further explanation of the diagrams provided to explain the conclusions please advise. NOTE: Please also read with the Turley letter relating to the Historic England queries about reflection and visual changes.	

	Aerodrome safeguarding With respect to aerodrome safeguarding perspective, Cambridge Airport has commented that the introduction of PV panels on the roof of the buildings may affect the operations at Cambridge airport. The PV reflections could have an impact on Airport operations due to glint and glare effects. As such Cambridge Airport requires a glint and glare assessment to determine full impact on pilots approaching the airport and air traffic controllers in the ATC tower and recommend this is required by condition. Given the comments made by Historic England in relation to reflectivity, and rather than have this information for consideration post determination, I am of the opinion that this report should be compiled and submitted pre-determination, so that this can be fully assessed.	The reflection analysis referred to above reviewed and modelled the potential for solar reflection below the horizon line to a ground-based observer - and concluded that the occasions are very rare and for short periods of time. It determined that any instance of reflection from the north slope would be below the horizon line. The Wilkin's Building provides a precedent for significant sized array on a south facing slope within the vicinity of the chapel. There have been no complaints nor accidents. The college is not on the approach flight path to the airport - in plan over 50 degrees from the axis of the runway. On the basis of geometry alone the risk to overflying aircraft must be insignificant. The City Council have a PV array on the Guildhall; there have been no concerns. The City Council did not undertake a 'glint and glare' analysis for its own planning application. Similar there are major ground-based solar arrays on agricultural lands around Cambridge - these do not hinder air-traffic. The question conflates the Historic England queries about perception to ground-based observers (addressed in the Turley letter) with a different question from Cambridge Airport. On the basis of precedent alone, but also a simple analysis of the map locating this application in relation to the airport, making a solar reflectance study for aircraft a requirement of this planning application (before or after determination) is disproportionate and unreasonable. Please confirm.	
Further Comments from Ely DAC Environmental Advisor. RECEIVED FROM DAC Secretary 27 October 2022			
1	It may feel like a box-ticking exercise, but going through the "Practical Path to Net Zero" and commenting on some of the key points would strengthen the case. For instance,		
	a. is the chapel floodlit?	No - and never will be	
	b. Is energy usage monitored against weather and events within the chapel? What can be learned from this data if it is collected?	No: there is a good understanding of electrical energy use, but the 'degree-days' for the heating of the Chapel are not monitored.	

	c. There are no plans to provide insulation to the roof, but the Turley report says, "Insulation for example is not possible as this would have a significant impact on its highly significant architectural and historic interest." But it doesn't explain why this invisible impact would be greater than the impact of the PV on the roof, which is visible. There are several possible explanations, but they need to be provided.	There are no further plans for making 'fabric improvements' to reduce energy consumption in the Chapel itself. The re-lighting scheme has used the latest low-energy LED technology and is a model of efficiency and control. Other energy reduction or insulation measures are not possible: Roof Insulation (main roof): the entire roofspace is open to the air; the 'landscape' of the vaults is one of the Chapels most extraordinary heritage significances; and even if insulated would offer no benefit to the occupied zone and would not reduce energy consumption at such a vast height above the people. The side chapel roofs similarly have stone vaults and a ventilated void - there is no beneficial location for insulation. Overall, the chapel is constructed of heavy masonry and the walls could not be insulated (inside or out) and in any case, the proportion of the surface area compared to the vast area of single glazing is the dominant factor. We are undertaking repairs to glazing and the small number of casement windows, so there will be some reduction in air-leakage, and thus comfort, but not materially affecting the energy demand.	
	d. Are there any 'office' or vestry areas where secondary glazing or wall insulation might be possible?	No. Sorry. (see above).	
	e. Has installing insulation under the wooden pew platforms been considered?	There are no pew platforms or pews…. The quire-stalls are not heated, so insulation would not reduce heat loss. Longer term the strategy will be to replace the LTHW underfloor heating for an electrical system, to remove the high efficiency gas-fired condensing boilers.	
		A note on the above questions: we have answered them in the spirit intended - i.e. to demonstrate that the guidance note 'fabric-first' approach and questions have been documented. However these issues relating to heat-loss do not affect the validity or case for the PV project. This project is not (yet) about decarbonising heat generation (which is currently provided by fossil fuel gas). The value of the output of the PVs is to serve the base-load electrical use of both the chapel and the wider college demand, and displace the carbon-intensity of the grid electricity. We would consider these PVs as justified whether or not there could be energy reduction measures in Chapel.	
2	The response says, "The College's Sustainability Committee has a commitment to deliver an enduring programme that meets the College's sustainability vision, policy and strategy". It would bolster the application if the college authorities themselves could provide texts along these lines rather than delegating it to their professional advisers to report second hand.	The overall policy and targets are described on the college website here: https://www.kings.cam.ac.uk/a-greener-kings There is a very active sustainability committee meeting 3x/year which has an overall programme and strategy. the committee has, for instance, just drawing up briefs for the next phases of building refurbishments. Alongside two major passivHaus new building projects, the College is now in site with its first major retrofit refurbishment of the ancient buildings, Spalding Hostel, which will run on electrical powered heat-pumps entirely and is being de-carbonised. First of the historic buildings. See the environmental pages on the Website! Link to add.	

3	The response says, "As noted in the covering paperwork there are no relevant agricultural tenancies which could be engineered to meet the energy needs of the Domus estate". This is not quite an answer to the question. It is unlikely that an agricultural holding, for example, will be near enough to supply electricity directly to the Domus estate - and putting a PV array on Grantchester meadows is obviously a non-starter. However, what is the college's strategy over promoting net zero carbon among its tenants, or biodiversity conservation?	Savills manage the College lands and tenancies in accordance with best practice and sustainability goals. But really, these commercial interests and management questions are not relevant to the PV case.	
	a. A search for the word 'agricultur*' did not uncover any text in the paperwork. It would be helpful if we could be directed to where this does occur in the covering documents.	We do not understand the question….	
4	"All investments are managed within the framework of trustee duties." This sounds like, "The answer is no." Of course, fiduciary duties have to be met, but there are several lines of argument these days that can support various investment strategies. Several charities have divested from fossil fuels without facing or losing legal challenges. If the college were to be financing oil companies alongside seeking to fit PV to the chapel, serious questions would need to be asked about the college's real commitment to sustainability. This is a matter for the governing body and not its professional building advisers, of course, but what is the college's sustainability policy for its investments?	The investment committee are constantly reviewing investments. The committee published a divestment policy in 2021 which is shared with these papers. The report states: *We do not hold, and have not held for a long period, any direct investments in fossil fuel companies..... The active funds that we currently hold all have ESG policies and, where we do not consider these are adequate, we have withdrawn funds. Additionally, we have invested in funds that aim to have a positive environmental impact, such as Impax Environmental Markets*	
5	Offsetting: the official CofE position largely agrees with the response, but it goes further and suggests that money that might be spent on offsetting is instead directed towards building etc. investments that reduce emissions. It would be good to know whether such a nominal offsetting calculation produces a sum that is much greater or less than the costs of the work the college is proposing to spend on upgrading its Domus estate.	Offsetting: just to clarify, the college is not buying offsets. However the team has calculated the investment needed to price the carbon saving as an offset instead of the investment in a PV array. Based on a carbon emitted value of £90-100/t over the life of this PV array, 410T of CO2 will be saved (calculated on predicted grid decarbonisation, or 820T at current grid carbon density. The cost on an equivalent carbon offset would therefore be £40,000-80,000. However the real value is social and economic: the PV array will save the college nearly £250,000 over the life of the project (at current energy costs; higher if prices rise further) and will add to the overall national non-emitting capacity, which is a public benefit. The college is investing across the whole estate now - and is looking at every option….	

6	Section 3.1 is about the other sustainability aspects of the installation. The response directs attention to the ethics policy of the supplier, REC. However, this policy uses only about forty words to address sustainability and gives the impression of being bland. Section 3.1 asked if the environmental impact of a range of possible suppliers could be explored. Instead, there seems little evidence that the sourcing of the chosen PV panels was considered. Was it? There are serious questions around the manufacture of PV panels, e.g. in terms of water consumption, pollution and modern slavery. What can be said about this?	The question is actually very hard - there is a manufacturing process which is more or less universal across the world. REC are reputable and there are not comparable data across all manufacturers. Therefore we have specified a reputable supplier who has an evidenced policy. We have asked for more details. The answer is that we have selected the panels looking first at ethical production, which is the gateway; then we have looked at generation Density (i.e. performance) and suitability (i.e. appearance) and REC have the answer and product.	
7	"We understand that MFP's responses have satisfied the insurers." And "The college insurers may not wish their evaluation to be publically available. We are asking." The insurers may not wish the details of their evaluation to be available, but that they have been satisfied in the end seems to be of little commercial sensitivity, unless they were not satisfied. Planning regulators like the DAC cannot undertake such a detailed analysis themselves, but might reasonably hope for evidence that the applicant's calculations etc. have been checked by those who can assess the details of the risks.	Insurers have been closely consulted and we can confirm that there is no proposed increase in premium arising from this PV proposal on a risk evaluation. Insurers are fully supportive of this scheme.	
8	"MFP documentation explores alternatives including thin film options and coloured panel options." A search for these options in the documentation failed to discover them. Please could we be directed to the relevant parts? As mentioned under 6 above, an options appraisal of PV panels from different manufacturers would also be helpful.	See the follow up slides prepared in response to SPAB for the options.	
9	Addressing these points should enhance the excellence of the application and of the installation itself.	Hope answers above are satisfactory!	

	PUBLIC BENEFIT - discussion from DAC members circulated 27 October. Broadly the question raised was 'is it helpful to claim as a public benefit the leadership and exemplary effect of this PV project to encourage others'.	We are really grateful for the DAC in sharing this question; quite intrigued and stimulated too! Because of the sensitivities of this project in the minds of some of the consultees and regulators, we have always sought to focus the case for the project on evidence and within the terms of the Regulators own self-defined paradigm's. For this reason we have chosen to been wary of bringing forward what might be judged to be 'emotive' arguments. (When the CBC delegation were talking about the ethical case for this project, it was clear that Historic England's representative was discomforted). We have argued in the paperwork that we would want the example and leadership of the College to an exemplary process, rooted in the statutes of the College tradition of academic excellence, to be seen in the high standard of justification. We have not advanced arguments that it is a 'public benefit' to be visibly leading by the installation of PV on the Chapel. If we can share our experiences in support of other suitable cases; if we can also share our data, then we will be glad to. But there are 'emotive' arguments that are also rooted in the science. After all, this is a climate CRISIS and an emergency. Given our perception that the harm to the chapel by this PV scheme is (to most people) imperceptible, we feel that the case and justification is easily established by be public benefits, and it really does not need a campaigning ethos to make the case, because the tangible evidence of benefit is clear. That said, we are also mindul of the Duffield Tests; and here we do feel that the case before the DAC should consider *"pastoral well-being, opportunities for mission, and putting the church to viable uses that are consistent with its role as a place of worship and mission".* In all these respects, the PV project can make some tangible beneficial contribution, as the DAC will judge.	

	Why should a church seek to generate non-emitting energy on site, if it is already buying 'green' electricity?	National Policy position: The projections for Grid de-carbonisation are predicated on ALL possible forecast renewable and non-emitting energy sources being delivered. There is no policy or financial strategy for achieving the theoretical decarbonisation curve. Therefore ALL opportunities for non-emitting sources are needed. Therefore investing in PV is a wider public good as the Grid's renewables capacity is increased (or made available to another customer). As shown in the Dr Julian Allwood graph that we shared in our application; based on current COP 'zones of policy' targets, compared with potential or actual Carbon Capture and Storage and non-emitting capacity the world is way-off the landing zone needed. All non-emitting sources should therefore be considered. Given the capacity constraints to connect PV to the grid, which is a major national issue and limitation to progress, PV arrays that are sized to the needs of the user on site are a vital part of stretching that connected capacity Church and parish reasons: The 5th mark of mission suggests that we all, as individuals and organisations, should own the ethical and moral responsibility for stewardship, if we reasonably can. Therefore generating one's own non-emitting power is also about taking personal accountability . Cost: at a (temporary) price cap of 34p/Unit a PV array will potentially payback in 2-3 years (subject to cost and complexity); the economic benefit to the Parish for the remaining 25+ duration of the investment is therefore evident, which will serve mission and viability. Owning a funded PV array also de-risks crippling cost price inflation and helps deliver resilience of supply (in the face of possible power cuts). Both factors are good reasons to invest.	