

King's College Chapel, King's College, Cambridge – Installation of Solar Panels

Appendices to Historic England's advice

Appendix 1 – Reflectivity

1. The degree to which the solar panels which it is proposed to install on the roof of the Chapel would, or would not, be reflective is critical to the assessment of the impact of the proposed solar installation on the architectural interest and significance of the Chapel.
2. Historic England consider that the solar panels would be reflective, and that the proposed installation would form a reflective screen fitted above the Chapel roof's lead covering. The applicants' consultants state that "The chosen panels would not be reflective".¹
3. It is unusual for so apparently contradictory assessments to be made, and the purpose of this appendix is to provide further explanation of Historic England's assessment.
4. Our conclusion rests on our inspection of the sample installations which the College installed on both slopes of the Chapel roof. It was very clear, both when looking at the panels while standing on the roof and when looking at them from the ground, that they were reflective.
5. What we observed was that the panels "caught" the light from the skies above them. As the skies changed, so too did the panel's appearance. Sometimes they seemed the colour of lead – and barely discernible against the lead roof covering – and sometimes very dark, or almost black, or very light, or white.
6. We viewed the panels beneath changing skies, in which clear blue was combined with moving clouds ranging from deep grey to light grey or white in colour and tone. The changes in the panels' tone and colour were observed to take place rapidly – within a couple of minutes, for example – as the sky changed.
7. On the basis of what we saw, it was clear that were the roof slopes covered with an installation of the type proposed, the panels would form what we have called a reflective screen. On each slope, this screen would change in colour and tone as the sky changed. Each screen would – in changeable weather – be likely to appear – when visible – as a shifting pattern of tone and colour.
8. We can be confident that the changes from dark to light would be pronounced as we have seen them from the ground. It is less clear whether colour would also

¹ Turley report, page 25, paragraph 7.7.

be reflected. It is likely that blue sky would simply darken the appearance of the panels from the ground, but in the important view from the tower of St. Mary's Church one would see the blue of a blue sky reflected, at least to some degree. The view to the north slope mock-up demonstrates this.

9. The photographs reproduced here confirm these points. They comprise one photograph taken on the Chapel roof, and a number of photographs taken with magnification. Their purpose is to illustrate the effect of light on the solar panels, and not to illustrate what one would see with the eye from the ground (or from the tower of St. Mary's Church). The implications of the way in which the panels reflect light for the viewer's experience of the Chapel have been explored in our letter.
10. Finally, to return to the difference between our assessment of the proposed solar panel's reflectivity and that of the applicants, it may be that we have each understood the term "reflectivity" differently.
11. While it is for the applicants to explain their meaning, we understand, from discussion, that in stating that the panels would not be reflective, they are concerned with direct reflection of light from the sun, of the sort that would cause glinting, or even powerful rays of light reflected from the solar installation.
12. We have no reason to disagree with their conclusion that there would be no such reflection, with the minor exception of short periods early in the morning for a short part of the year, during which such reflections might be seen from Garrett Hostel Bridge.
13. If our understanding of the applicants' meaning is correct, this would explain why our assessment of the reflectivity of the proposed solar panels is so different to theirs.
14. It is our view that the sort of reflectivity we illustrate below is such that the solar panels should be considered to be reflective, and that the way in which they would reflect light justifies the conclusions about the impact of the proposed installation on the architectural interest and significance of the Chapel which we set out in our letter.

View 1 – The south slope mock-up seen on the roof. Note the reflection of the turret, white cloud and blue sky.



Views 2 and 3 – Views of the south slope mock-up taken within two minutes of each other. Note the darkness of the panels in the first image and their lightness in the second. (In both views there is also a shadow gap at the panels' foot.)



Views 4 and 5 – Views from King's Parade, illustrating the variability in the panel's colour. (These were taken on different days.)



View 6 – View of the mock-up on the north slope, from Trinity Lane, Lane, illustrating the way in which the panel’s “pick up” the brightness of a light sky.



View 7 and 8 – View from the tower of St. Mary's Church. The north slope mock-up is visible at the far right, and appears a little blue – the second image is an enlargement to make the colour clear. The image also illustrates how from this important vantage point, the viewer sees much of the northern roof slope. (As noted above, the view is magnified, so does not represent what the eye sees.)



Appendix 2 – Technical Considerations

1. Historic England's advice, as provided in our letters to the Diocese of Ely and Cambridge City Council, deals essentially with the visual impact of the proposed solar installation. The purpose of this appendix is to provide very brief observations on the physical and technical aspects of the proposals.
2. The proposed installation would not harm the historic fabric of the Chapel. We note the following points.
 - a) A faculty has already been granted for the renewal of the existing lead roof covering, which has reached the end of its life. The renewal of lead roof coverings is an ordinary part of the cycle of building conservation.
 - b) The works to the roof would include the repair of the boarding beneath the lead covering. A new layer of boards would then be added, and the fixings to the solar installation, as proposed, would be made to these new boards, rather than to historic fabric.
 - c) The scaffold required to protect the Chapel during the renewal of the lead roof covering and the installation of the solar panels would be fixed to the structure of the Chapel but would not entail harm to it.
3. The solar installation would require the installation of a large number of permanent fixings between the boarding below the lead and the solar panels themselves, and these would be through the lead. The creation of such fixings gives rise to a number of challenges. It is proposed to overcome these by means of propriety fixings which allow for the movement natural to a lead roof covering to take place without harm to the covering's integrity.
4. These fixings would be permanent in the sense that they would outlast the solar panels themselves. After the latter cease to be functional, the fixings could be retained to act as fixings for a further installation. Alternatively, they could be removed, and the roof patched by way of "hot works".
5. There have been some cases of fires associated with solar installations. Our understanding is that these are generally due either to poor installation or poor maintenance. These proposals have been carefully prepared, and we would expect King's College and their consultants to ensure the quality of the installation and to adopt an appropriate maintenance programme.
6. Historic England does not consider these matters to be determinative in this case, although we hope to continue our discussions of the detail with the applicants, in light of the exceptional significance of the Chapel and the ambition of the scheme.