SQUIRE & PARTNERS

April 2020

Space House - Condition 14 a) - Solar PV Feasibility Assessment

Contents

This document has been prepared in response to Condition 14(a) of planning permission ref: 2019/2773/P, in respect of Space House. Condition 14(a) states: "Prior to discharge of the s106 Energy Efficiency & Renewable Energy Plan, a feasibility assessment with the aim of maximising the provision of solar photovoltaics should be submitted to the local planning authority and approved in writing."

1.0 Introduction

This assessment has been produced to discharge planning permission (Ref. 2019/2773/P) condition 14 (a).

It will begin with identifying the possible locations for solar PV panels, which will then be assessed by the project's MEP consultant (A10) for the maximum possible PV system size. The assessment will then review the solar PV access and maintenance requirements and their implications on the appearance of the roof-scape.

The Heritage Consultant for the project (Donald Insall Associates) has produced a heritage note (Appendix C) based on the findings from this feasibility study which assesses the impact that solar PVs will have on the building.

For this feasibility study the following has not been assessed:

- Wind loading and the implications on the fixings & supports of solar PVs.
- Structural implications from weights of PVs and additional access and maintenance equipment / fixtures.
- Electrical infrastructure sizing and location including risers, inverters, meters, switches, wiring etc.

2.0 Locations for solar PV assessment

We have identified the Kingsway extension roof and Tower extension roof as potential locations of solar PV panels based on the levels of sunlight that the site receives throughout the day. It would not be appropriate to locate solar PV panels elsewhere on the building due to the Building's Listed status.

A10 have produced a solar radiation map of the site and have concluded that due to its height, the Tower extension roof is the best location for PVs. PVs could also be located on the Kingsway extensions roof, however due to the height of the surrounding buildings, most of the time the roof will be overshadowed when there is maximum potential for sunlight received to generate solar power.

Note that there it is not enough space to locate solar PVs within the Tower external plant room. Refer to drawings in A10's technical note in Appendix A.

As such, this document goes on to assess the feasibility of locating solar PV panels on the roof of the Tower and Kingsway buildings at the site. Refer to A10's technical note in Appendix A.

3.0 Solar PV access and maintenance requirements and implications on building design

The solar PVs would need accessing for visual inspection two times a year to check for electrical faults, and once a year to clean the panels.

A10's layout in the technical note (Refer to Appendix A) shows the optimum arrangement of solar PV panels on both Tower and Kingsway extension roofs. The panels have been spaced out so that there is a 1200mm perimeter access route, and each array of panels are spaced 1000mm apart.

In order to safely access and maintain the solar PV panels a fall restraint system would be the preferred solution so that the maintenance worker cannot fall off the roof.

However, as the 1200mm perimeter access route is too narrow for a fall restraint to be safely used to access all of the solar PVs (with a long length of lanyard), a permanent fold-up balustrade is proposed to the perimeter of the roofs on both the Tower and Kingsway.

In order to erect the fold-up balustrades, the maintenance worker would need to clip onto a fall restraint system that runs around the perimeter of the building using a very short lanyard. This will prevent the maintenance worker from falling off the roof when erecting the balustrade. Only when all of the fold-up balustrades have been erected will it be safe for the maintenance worker to move around freely to maintain the solar PV panels without being attached to the fall restraint system.

To get onto the Tower extension roof, a cat ladder would be provided within the external plant enclosure. This ladder would only be provided for accessing the PVs and would not be visible from street level.

To get onto the Kingsway extension roof, a cat ladder will be provided on the face of the west façade. As there is no available space within the external plant room to Kingsway L08, the ladder has to be fixed onto the façade with the fixings going through the mosaic cladding to the masonry wall behind. The ladder would only be provided to access the PVs, and has been located in the least visible location.

The overall build-up of the Tower and Kingsway extension roofs will need to increase to allow for concrete pavers on top of the waterproofing and insulation to allow maintenance workers to access and move about the roof without damaging the waterproofing that is applied on top of the insulation.

Refer to Appendix B for the S&P drawings that illustrate the above implications on the building design.

For this feasibility study, wind loading has not been assessed. Due to the exposed condition of the Tower extension roof, it is likely that the wind load would pull on any PVs. Therefore, the PVs would require significant ballast to weigh the PV panels down so that they are unaffected by the wind. This would likely affect the build-up of the roof finishes, as well as the roof structure, which would need to increase in depth to accommodate the weight of the ballast.

4.0 Solar PV replacement requirements

A10 have advised that solar PV suppliers recommend a temporary lifting beam to remove/replace a panel (the panel is a fragile piece of equipment and should be removed as if it was a large piece of glass) – due to risk of working at height, specialised access equipment (e.g. scaffolds and hoists) is often required. All specialised access and replacement equipment for removing/replacing PVs would be temporary and would not require permanent fixings into the Listed building fabric.

5.0 Conclusion

Although solar PVs are feasible in technical terms, they are not considered feasible overall due to:

- The solar PVs would only generate 1.8% carbon emissions reduction, whereas the contribution of ASHPs as a renewable technology (for space heating only) achieves a 35.7% carbon reduction (Refer to Appendix A).
- The design, access and maintenance constraints (Refer to drawings in Appendix B).
- The harm this will bring in heritage terms as set out in the Donald Insall Associates' heritage note (Refer to Appendix C).

A significant heritage benefit of the approved scheme is that it reduces the existing rooftop clutter by consolidating the rooftop plant, which was previously identified as detracting from the Listed building's significance. The solar PVs would adversely affect the appearance of the roof scape for the following reasons:

- Solar PV panels would be visible from the surrounding buildings and could be visible from street level.
- The overall roof build up would need to increase to allow for concrete pavers for maintenance access, a zone for the PV fixings on top of the insulation that will not damage the waterproofing membrane, and permanent foldable balustrades to the perimeter of the building to facilitate safe maintenance and access. The foldable balustrade would be clearly visible when folded-down.
- A permanent ladder would be required on the side of the Kingsway extension to allow maintenance workers to access the PVs on a regular basis for inspection and maintenance.
- It is also important to note that although the PV fixings and ballast requirements are as yet unknown, due to the exposed nature of the roofs to both Tower and Kingsway, it is likely that the wind load will require significant structure and mass to keep the PVs firmly fixed to the roof. This will in turn affect the structure of the roof and finishes zone, which would also likely increase.

It is considered that this report fully satisfies the requirements of condition 14(a) and this part of the condition should therefore be discharged.