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# ARUP

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Dear Gavin,

## **197 Church Street, Parramatta – Heliostat, Letter of Opinion**

This letter provides an opinion regarding the technical merits and ability of the proposed heliostat system to provide reflected sunlight into the Parramatta Square Overshadow Control Zone (OCZ) and is provided in accordance with the contractual terms set out in our email from Haico Schepers to Gavin Carrier dated 30<sup>th</sup> May timed at 9.02am.

This opinion is based on review of information regarding the proposed heliostat solution as provided by Holdmark to Arup by way of email on 26 and 27 May 2017 and discussion with Inhabit Group, the engineers who have undertaken the initial concept design work. Arup have had no involvement in the proposed heliostat system. We have not completed any analytical work and have relied on the approach taken by other experts as further detailed in this letter. We have only reviewed the approach presented in the information we have received from yourselves. Our opinion is based on a limited examination of the material provided to us, and our work should not be relied upon by any third parties. In preparing this letter of opinion, we have relied on the accuracy and completeness of the information provided to us and have not carried out our own independent assessment of the information. Without carrying on our own detailed evaluation, we are unable to guarantee the performance or outcomes of the heliostat system

We understand that the proposed development at 197 Church Street, Parramatta, will provide some overshadowing of the Parramatta Square OCZ between 12 and 2pm on 21 June. We also understand that no part of the OCZ will receive more than 45 minutes shading in this timeframe.

A heliostat system has been proposed to re-direct sunlight onto the OCZ during the periods through which the proposed development would otherwise overshadow sections of the OCZ. In the current design concept, the heliostat system would comprise a series of sun-tracking mirrors and a series of secondary reflectors on the roof of the proposed development at 197 Church St. These would act to capture sunlight incident on the roof of the proposed development, and re-direct it onto the section of the OCZ that would otherwise be shaded by the proposed development.

The proposed heliostat system has not been designed completely at this stage – it is currently a design concept which would require significant further design development at a later stage.

In Arup's opinion, the proposed heliostat solution is considered technically achievable, however a number of challenges will need to be addressed in the design development, including:

- Achieving sufficient intensity of redirected sunlight onto the OCZ
- Providing sufficient area of sun-tracking mirrors
- Addressing differences in quality of light between direct and re-directed sunlight
- Quality of mirror finish
- Precise aiming and control of the mirrors
- Incorporation of appropriate fail-safe controls
- Protection of the mirrors from high winds
- Providing access for maintenance
- Defining an appropriate maintenance regiment

While there are significant technical challenges to be addressed in the detailed design, installation and ongoing management of the heliostat system, it is our opinion that these challenges are not insurmountable based on precedents of similar systems achieving intended outcomes. The most relevant precedent is the Sea Mirror installation at One Central Park, Sydney. This system tracks and re-directs incident sunlight into a retail atrium directly underneath the secondary mirrors. It is our understanding that the Sea Mirror system was endorsed by the State Government appointed Design Integrity Panel.

In summary, the proposed heliostat system presents exciting possibilities for the proposed development and the surrounding area. It is Arup's opinion that the proposed system is technically feasible, but presents some challenging design issues, which would need to be addressed in later design stages. .

Yours sincerely



Phillip Greenup

Senior Lighting Designer