ADDENDUM

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Sydney Modern Project – Design Change to Heat Rejection System

This document outlines the likely change in sustainability impacts for the Sydney Modern project due to a revision in the design of the heat rejection system. The document summarises the design revision, the likely impact of the revision on the project's sustainability, and how the revision will impact the project's Green Star strategy.

The design of the heat rejection system for the Sydney Modern project has been revised from a seawater heat rejection system to a cooling tower system, comprising a series of cooling towers with condenser water loop to the internal chillers. Cooling towers are heat rejection systems that transfer waste heat from buildings to the atmosphere through evaporation of water. Seawater cooling systems, meanwhile, exchange heat between buildings and bodies of seawater by pumping seawater through heat exchangers. The revision of the heat rejection system design eliminates the seawater heat rejection plantroom and associated pipework, replacing this with cooling towers located in the landscaping to the east of the building, above the new loading dock. The cooling towers shall discharge warm air to the atmosphere, with makeup water likely to be drawn from rainwater harvesting.

A cooling tower system has been selected in place of seawater heat rejection due to a range of factors including operational, maintenance and environmental benefits, such as removing the need for chemical treatment of seawater. For further information on the rationale for the design change, please refer to the 'Heat Rejection Design Change Letter' from Steensen Varming, submitted as part of the Section 4.55[1A] Modification.

The energy and water consumption requirements of a cooling tower system and a seawater heat rejection system, to serve Sydney Modern, were compared in a February 2016 report by Steensen Varming ('*Consultant Advice Note14702 can014*'). The report concluded that a cooling tower system would have almost equivalent energy consumption to a seawater heat rejection system. The report also concluded that, of the two options, only cooling towers require potable water. However, through use of rainwater harvested on-site, the potable water consumption of a cooling tower system may be significantly reduced. Overall, the design revision to cooling towers offers close equivalency to a seawater heat rejection system in terms of energy and potable water consumption and greenhouse gas emissions. The design revision also achieves equivalency in terms of noise and visual amenity. The cooling towers

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will be located away from public pathways and the existing heritage building, integrated into an excavated zone above the loading dock.

Green Star Design & As-Built

The revision in the design of the heat rejection system will likely have an impact on the project's Green Star strategy, but not impact the project's overall Green Star rating. For the Green Star Round 2 Design Review submission the project was awarded 79.8 points, achieving a 6 Star Green Star rating. The threshold for a 6 Star Green Star rating is 75 points.

Credit 18B Potable Water: Under Credit 18B *Potable Water* (*Prescriptive Pathway*), all six (6) points were awarded in the Round 2 Design Review submission. Two (2) of these points will no longer be achievable as the revised heat rejection design will use potable water, and so the requirements of 18B.3 *Heat Rejection* cannot be met. This is the case even should the potable water demands of the system be met with harvested rainwater. The remaining four (4) points under the Prescriptive Pathway will remain achievable.

Note: Should the project be assessed under the Performance Pathway in future rounds, the number of points achievable will differ.

Credit 15E Greenhouse Gas Emissions: For Credit 15E Greenhouse Gas Emissions (Modelled Performance Pathway), it is anticipated that all eight (8) points awarded during the Round 2 Design Review submission will still be achievable. While the Steensen Varming report noted that a cooling tower system will consume slightly more energy than a flooded chamber seawater cooling system, the Green Star energy modelling undertaken for Credit 15E conservatively modelled cooling towers. Therefore, it is not anticipated that the design change will have an impact on the points achievable under Credit 15E.

Credit 28 Microbial Control: One (1) point was awarded to the project under Credit 28B Legionella Impacts from Cooling Systems (Waterless Heat Rejection Systems), during the Round 2 Design Submission. To achieve this point with a cooling tower heat rejection system the project must demonstrate measures for legionella control and risk management, in accordance with Credit 28C (Water-Based Heat Rejection Systems).

Credit 10 Acoustic Comfort: For the Round 2 Design submission, one (1) point was awarded for Credit 10.1 Internal Noise Levels and one (1) point for Credit 10.3 Acoustic Separation. While the Steensen Varming report noted that cooling tower heat rejection systems emit more noise pollution than seawater systems, it is not anticipated that the revised design will impact the number of points achievable under Credits 10.1 and 10.3. This is a result of the proposed cooling towers being integrated above the loading dock in the project's landscaping, and therefore not impacting internal noise levels.

Overall, it is anticipated that the revision to the project's heat rejection system will offer equivalency in terms of energy consumption and greenhouse gas emissions, with the potential to achieve water consumption equivalency through rainwater harvesting. It is anticipated that the design revision will impact the project's Green Star Strategy, with fewer points achievable under Credit 18B Potable Water. However, the project's total Green Star Design & As-Built rating will likely remain 6 Star, with 77.8 of the 79.8 points awarded in the last round remaining achievable. The project will far exceed the 5 Star Green Star rating originally targeted and has strong potential for achieving a 6 Star rating.

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