

Attachment A19

**Sky View Factor Report - 133-145
Castlereagh Street, Sydney**

Prepared for
Stockland

Date
23 September 2020

606

Sky View Factor Report for planning proposal

Stockland Piccadilly Complex

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Attachments

Piccadilly_SVF[v1.1].xlsx

1. Executive summary

This Sky View Factor (SVF) Report has been prepared by BIM Consulting on behalf of Stockland in relation to the site at Piccadilly. This report provides analysis of the extent of sky visible above various points in proximity to the site as a proportion of the total possible sky hemisphere above the point. SVF is calculated as the proportion of sky visible when viewed from the ground up. SVF is provided as value that ranges from 0 to 1, where SVF of 0 denotes no sky visible and SVF of 1 denotes that the sky is completely visible to the horizon in all directions.

A total of 5,577 test points were analysed at a distance 50m from the site boundary along Pitt St & Castlereagh St. The analysis finds there will be an increased sky visibility between the Draft DCP envelope and the proposed envelope when averaged across all test points. The Draft DCP envelope provides a SVF value of 0.103035395 and the proposed envelope provides a SVF value of 0.107163421, resulting in an overall SVF value difference (improvement) of +0.004128026.

2. Introduction

This Sky View Factor Report for planning proposal has been prepared by BIM Consulting on behalf of Stockland. It accompanies a planning proposal seeking to initiate the preparation of a Local Environmental Plan amendment for the land known as 'Stockland Piccadilly Complex' located at 133-145 Castlereagh Street, Sydney (the site) legally described as Lot 10 in DP828419.

The planning proposal seeks to amend the floor space ratio development standard applicable to the site, under the Sydney Local Environmental Plan 2012 (the LEP), in accordance with Section 3.33 of the Environmental Planning and Assessment Act 1979 (EP&A Act). In accordance with Clause 7.20 of the LEP, this planning proposal also seeks amendments to the Sydney Development Control Plan 2012 (the DCP) to establish site specific provisions to guide the future development, including establishing a building envelope for the site as well as other key assessment criteria.

The intended outcome of the proposed amendments to the LEP and DCP is to facilitate the redevelopment of the site for a commercial office tower development above a retail podium, including Wesley Mission facilities at lower ground level, together with basement car parking and associated facilities. Such a proposal aligns with the draft Central Sydney Planning Strategy to facilitate additional commercial floor space capacity in Central Sydney while also delivering improved public domain outcomes. Such outcomes will include a northerly aligned direct through-site link between Pitt and Castlereagh Street and enhanced pedestrian amenity and activation at the ground plane.

The planning proposal is supported by a concept reference design, but the final details of the development will be subject to a future design excellence process and a future detailed development application.

2.1 Purpose of assessment

The purpose of this Sky View Factor Report for planning proposal is to demonstrate compliance with *Central Sydney 2020 - Draft Sydney Development Control Plan 2012* regarding variation to side and rear setbacks, and to varying tapering provisions. This analysis has been prepared in accordance with the requirements of the *Attachment D6 - Draft Development Control Plan - Central Sydney* with specific reference to 'Procedure B' of Schedule 11 of the Draft DCP.

The site

This report relates to the site at Piccadilly, Sydney. The site is located centrally within the Sydney CBD, and is identified in **Figure 1** below.

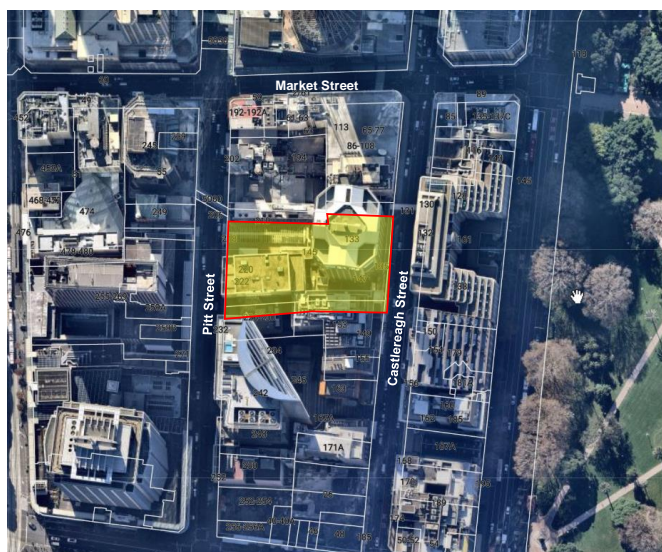


Figure 1 Subject site, Piccadilly.

3. Planning context

This section outlines the planning context that has informed the methodology used to undertake this SVF analysis.

3.1 Planning context

This report has been prepared in accordance with the requirements of the *Central Sydney 2020 - Draft Sydney Development Control Plan 2012*: Procedure B of Schedule 11 of the *Attachment D6 - Draft Development Control Plan - Central Sydney*.

Table 1 Procedures for demonstrating compliance with Sky View Factor	
Schedule 11 – Procedures for demonstrating compliance with variation provisions for setbacks, separations and tapering in Central Sydney	
Procedure B: Equivalent or improved wind comfort and wind safety and daylight levels in adjacent Public Places	<p>In order to demonstrate compliance with Section 5.1.1.1(3)(b) and Section 5.1.1.3(5) in regards to varying Minimum Street Setbacks and Side and Rear Setbacks, Building Form Separations and Tapering provisions respectively, the following procedure must be followed:</p> <p>5) the average annual daylight level (which may be approximated by the average Sky View Factor)</p> <p><i>Note:</i> Sky View Factor (SVF) means the extent of sky observed above a point as a proportion of the total possible sky hemisphere above the point. SVF is calculated as the proportion of sky visible when viewed from the ground (as an abstract horizontal surface) up. SVF is a dimensionless value that ranges from 0 to 1. A SVF of 1 denotes that the sky is completely visible to the horizon in all directions; for example, in a flat terrain. When a locations has topography or buildings blocking view to any part of the sky, it will cause the SVF to decrease proportionally.</p> <p>7) Daylight levels or SVF must be measured within the existing city form (including developments under construction as if they were completed) and should exclude any elements within a Public Place e.g. trees and awnings to a distance of at least 50m from site boundaries.</p>

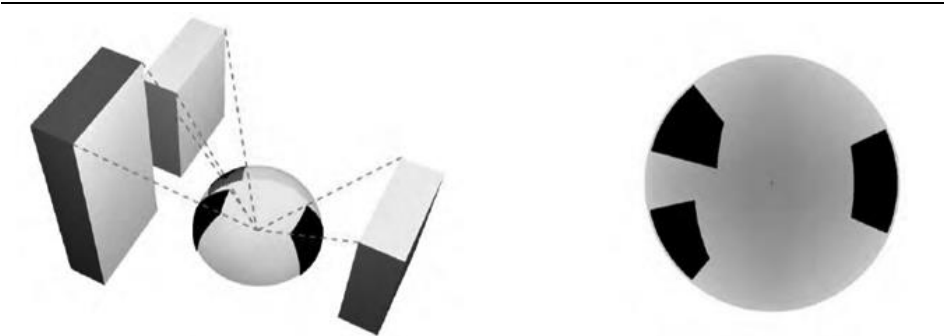


Figure 1.10: Sky View Factor means the extent of sky observed above a point as a proportion of the total possible sky hemisphere above the point.

Source: Schedule 11 of Attachment D6 - Draft Development Control Plan - Central Sydney

3.2 Building envelope

The *Attachment D6 - Draft Development Control Plan - Central Sydney* provides built form controls relating to: Minimum Street Setbacks (5.1.1.1); Side and Rear Setbacks and Building Form Separations (5.1.1.3); and Built form massing, tapering and maximum dimensions (5.1.1.4). The existing building that occupies the Hyde Park solar access plane, and the over-street pedestrian bridges are incorporated in the Draft DCP envelope for the purpose of SVF analysis.

Refer to the Draft DCP envelope and proposed building envelope at **Figure 32, 3, 4 & 5**.

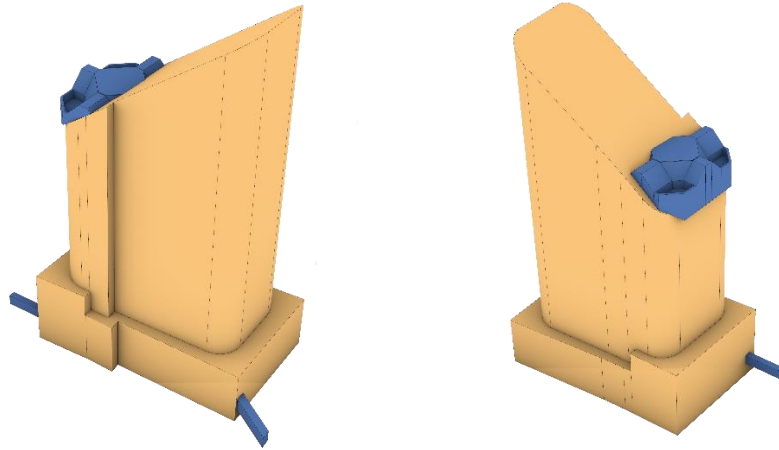


Figure 2 Maximum permissible Draft DCP envelope (with existing building and bridges)
Source: 3XN

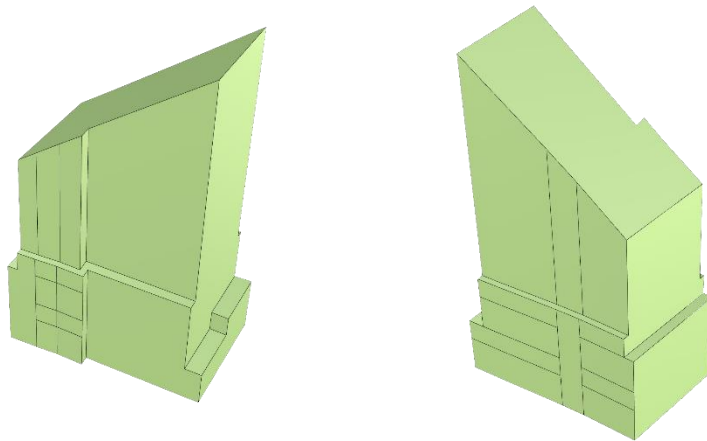


Figure 3 Proposed envelope
Source: 3XN

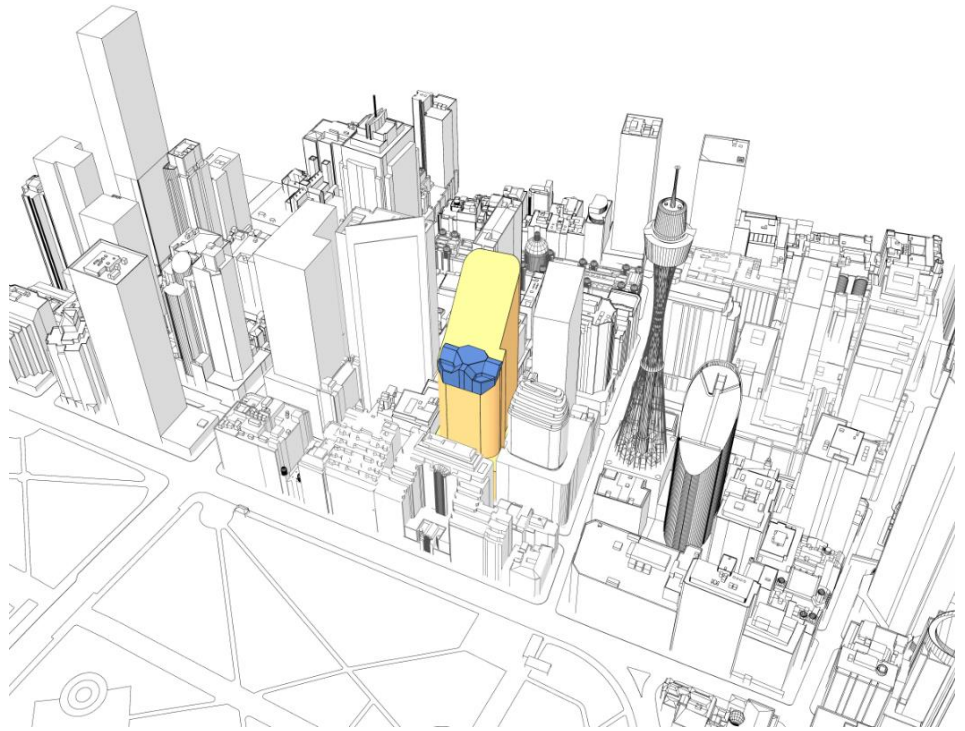


Figure 4 Maximum permissible Draft DCP envelope (with existing building and bridges)
 Source: 3XN

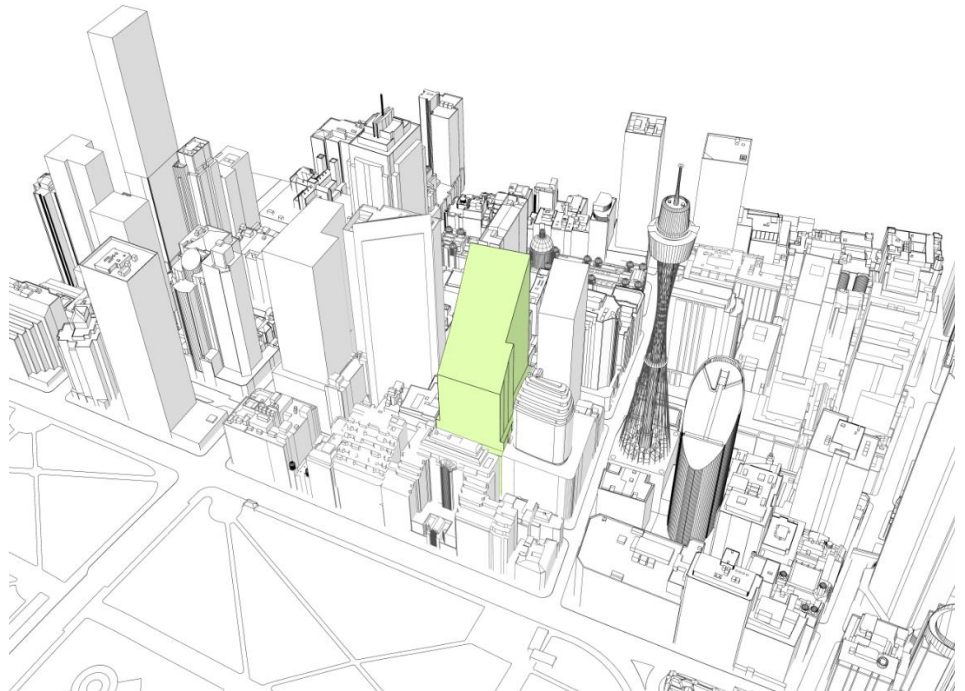


Figure 5 Proposed envelope
 Source: 3XN

4. Methodology

This section outlines the methodology applied to undertake this SVF analysis.

4.1 Testing methodology

SVF analysis was undertaken using the open source environmental plug-in 'Ladybug for Grasshopper' which adds-in to Rhinoceros 3D, available from Robert McNeel and Associates.

Figures 6 & 7 below indicate the methodology used to prepare this report.

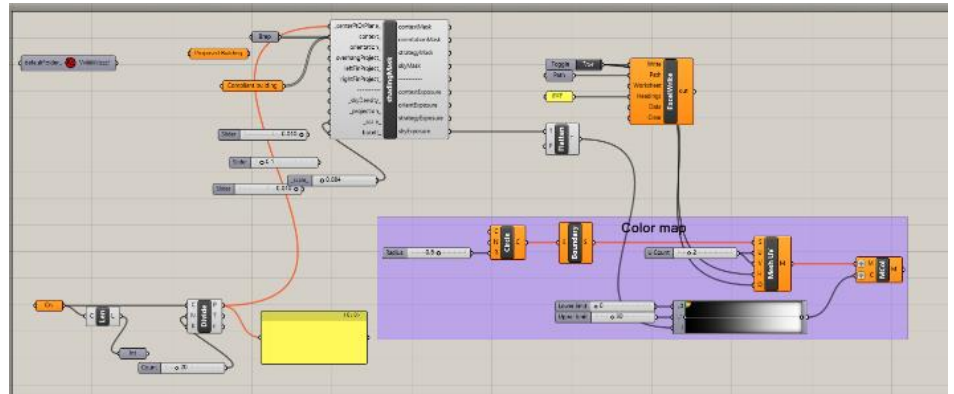


Figure 6 Parametric script

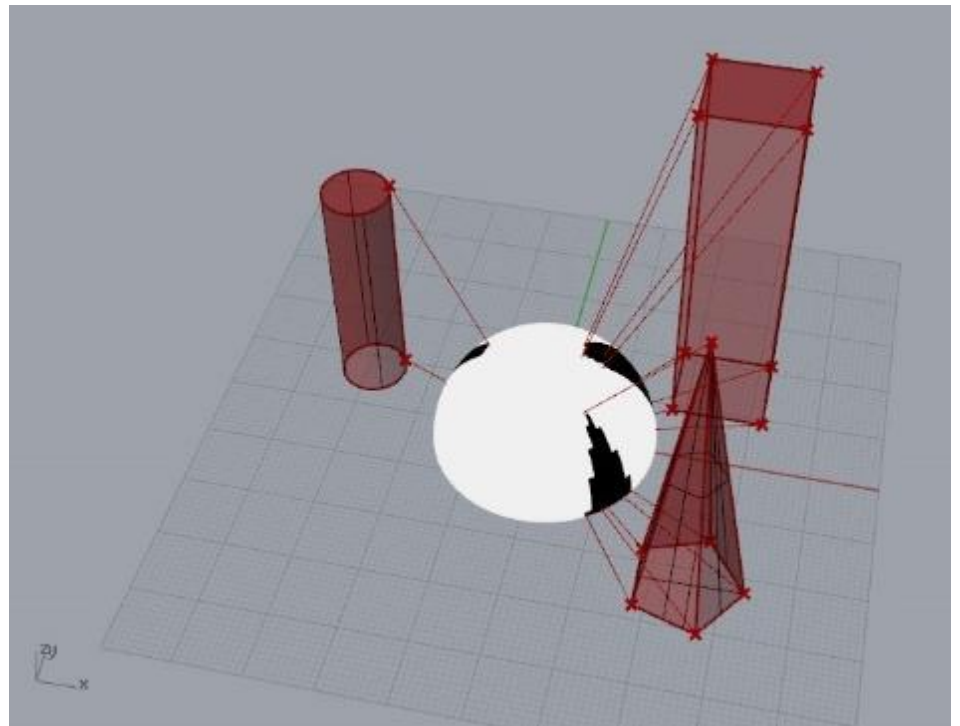


Figure 7 Test geometry 1

The proposed model envelope and Draft DCP model envelope were created using Rhinoceros 3D.

City of Sydney context models were brought into Rhinoceros 3D from a LiDAR scan. Refer to **Figure 88** below.

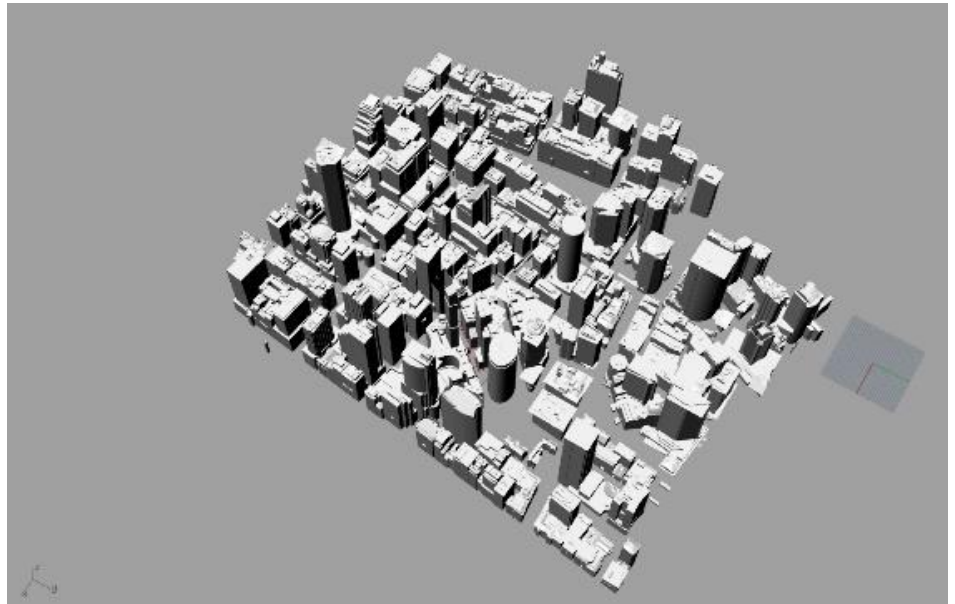


Figure 8 Sydney LiDAR model

A comparative analysis was run with test geometry in a grid of one (1) meter spacing extending 50 meters from the site. Sky density (the resolution of the imagery generated by the analysis) is set to 3,000 patches (pixels) per test point. A total of **5,577 test points** were analysed. Grid spacing and sky density criteria is not specified in *Attachment D6 - Draft Development Control Plan - Central Sydney*.

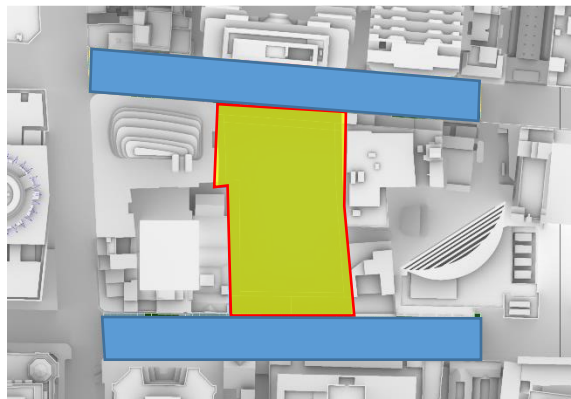


Figure 9 Analysis points (5,577 test points analysed) with proposed envelope
Test points are identified by the area in blue

5. Sky View Factor Analysis

5.1 Results

A total of 5,577 test points were analysed at a distance 50m from the site boundary along Pitt St & Castlereagh St. The analysis finds there will be an increased sky visibility between the Draft DCP envelope and the proposed envelope when averaged across all test points. The Draft DCP envelope provides a SVF value of 0.103035395 and the proposed envelope provides a SVF value of 0.107163421, resulting in an overall SVF value difference (improvement) of +0.004128026. Computation time: 280 hours.

A validation process was undertaken on a total of 690 test points on a 3m grid at 500 pixel sky density, at 50m from the site boundary. The analysis finds there will be an increased sky visibility between the Draft DCP envelope and the proposed envelope when averaged across all test points. The Draft DCP envelope provides a SVF value of 0.103208175 (0.103035395) and the proposed envelope provides a SVF value of 0.107123504 (0.107163421), resulting in an overall SVF value difference (improvement) of +0.003915328 (+0.004128026). Computation time: 10 hours total. This validates the testing criteria and demonstrates that higher sky densities and smaller grid spacings have negligible impact on the results at SVF difference of 0.00021269. This assessment criteria should be considered for future assessments with exponentially higher computation time required with negligible improvement in margin of error.

Data has been compiled into a spreadsheet where totals and averages can be extracted. The SVF values and overall averages are submitted with this report in Excel format.

5.2 Conclusion

The SVF analysis demonstrates compliance of the proposed envelope based on testing criteria provided in Attachment D6 - Draft Development Control Plan - Central Sydney.