All computer generated images / artists impressions have been provided for illustrative purpose only, and are subject to authority approval

APPENDIX D

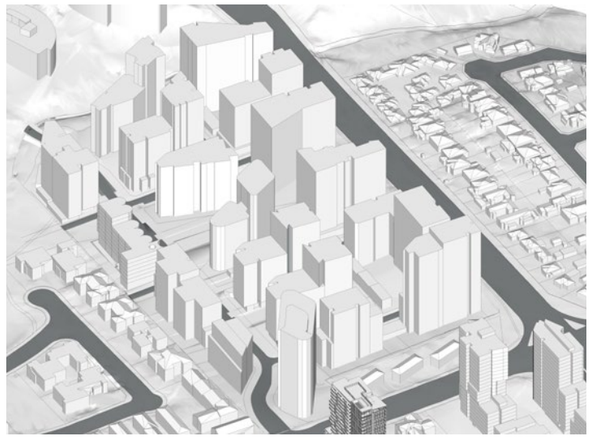
SOLAR ACCESS AND SHADOW ANALYSIS

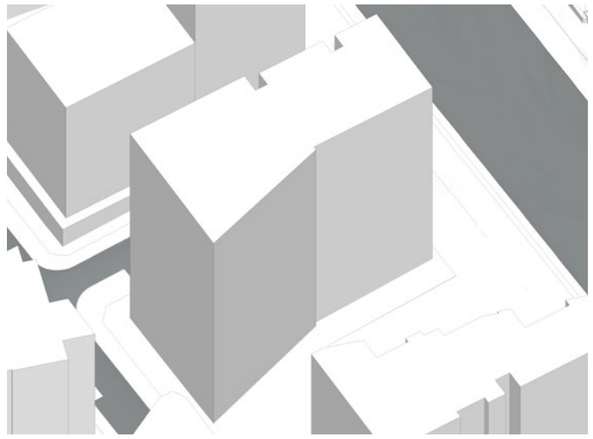
METHOD STATEMENT

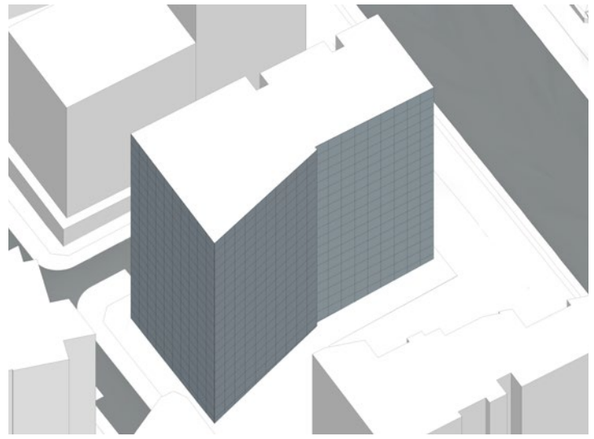
OVERVIEW

We have adopted a highly accurate parametric process to assess the solar access performance of the indicative reference scheme. The process has formed a vital tool in developing the masterplan design by allowing us to test the solar performance of numerous building configurations quickly while achieving highly accurate results which are able to be presented and understood in a very straightforward visual format.

The process involves the use of a propriety plug-in for Sketchup 2017 which calculates the number of hours a particular horizontal or vertical surface will receive solar access during a specified time window on a particular date and at a prescribed location. The results are then displayed both graphically and numerically.







METHODOLOGY:

The adjacent images illustrate the steps undertaken to assess whether 70% of apartments within the indicative reference scheme achieve a minimum of 2 hours of solar access to their living room and private open spaces between 9am and 3pm on 21st June in accordance with ADG requirements.

3D MODEL & CONTEXT:

A 3D aerial survey of the site and context area was purchased from the AAM group with a stated accuracy of 15 centimetres and was inserted into the context model using the inbuilt Geolocate function within Sketchup and cross referenced against 2D survey data to confirm the orientation of True North.

Our 3D model of the indicative reference scheme was then inserted.

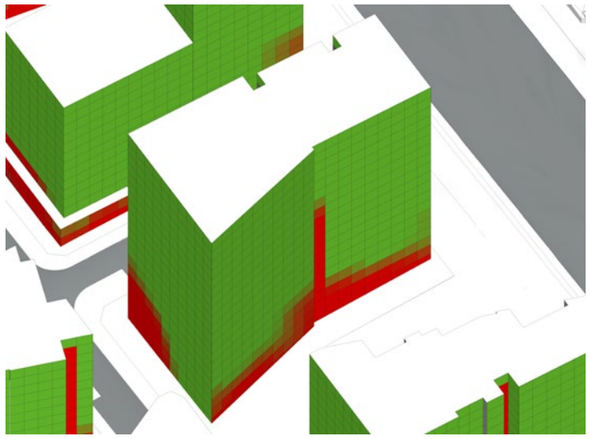
Settings for Sydney on 21st June are applied within the parametric tool to simulate solar access on the winter solstice during the hours of 9am and 3pm, the window specified within the ADG during which compliance is to be assessed.

BLOCK MASSING

The above image represents an example building, D3, as seen within the 3D site model prior to the test being undertaken. Building D4 is visble behind, and building D2 visible in the foreground.

GRID APPLIED

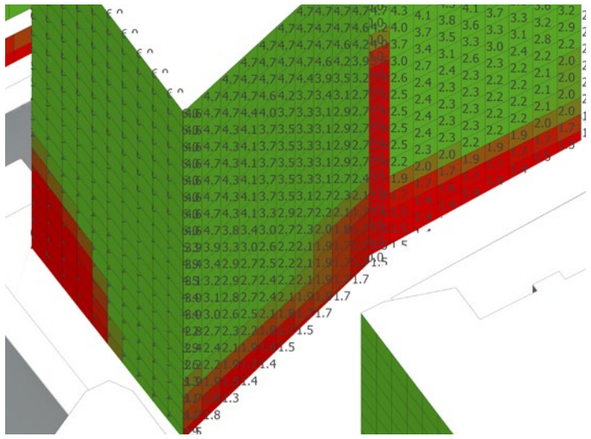
A 2 dimensional grid consisting of 3.1m x 3.1m squares is then applied to each building envelope to accurately reflect each storey height of 3.1m and a notional approximate room width of 3.1 metres.



VISUAL RESULTS

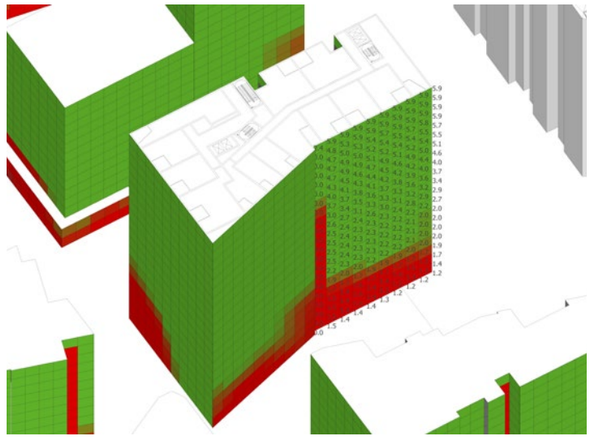
The parametric tool is then activated and solar access is simulated at 5 minute intervals between 9am and 3pm on 21st June, with a total of 72 measurements being undertaken on each square during the prescribed 6 hour window.

The results are shown in the above simple 2 dimensional graphic output. Squares which are coloured green are receiving in excess of 2 hours of solar access. Squares coloured red are receiving some solar access, but less than 2 hours. Squares shown as a mild red / green are achieving between 1.9 and 2.1 hours of solar access and require further investigation. Squares shown in grey are receiving no solar access on 21st June (not visible in the above view).



NUMERICAL RESULTS

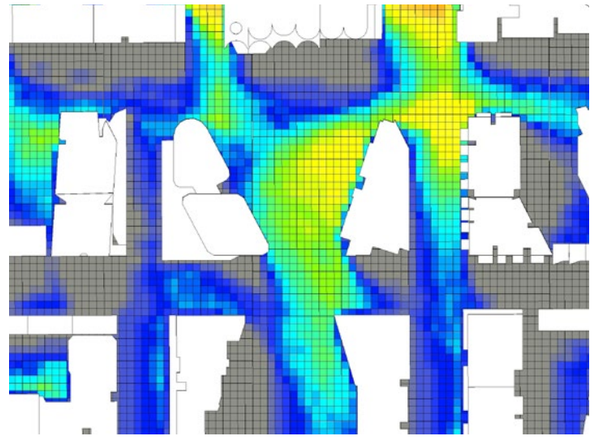
The graphical output is then supplemented by numerical output which indicates the actual number of sun hours being received by each square. This enables us to clearly distinguish between squares achieving 1.9, 2.0 or 2.1 hours and assess accordingly in the next step.



OVERLAY OF BUILDING PLAN

The 2D building plan of the indicative reference scheme is then applied onto the 3D model, identifying the location of each living room and private open space as visible in the above image. A manual count is then done to determine how many apartments per floor are receiving a minimum of 2 hours of solar access to both their living rooms and private open spaces, assessed by the colour of the facade interfacing with each plan and tabulated within a spreadsheet.

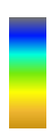
The output of our 3D parametric analysis for each building face is contained on the following pages.



MEASUREMENT OF SOLAR ACCESS ON GROUNDPLANE

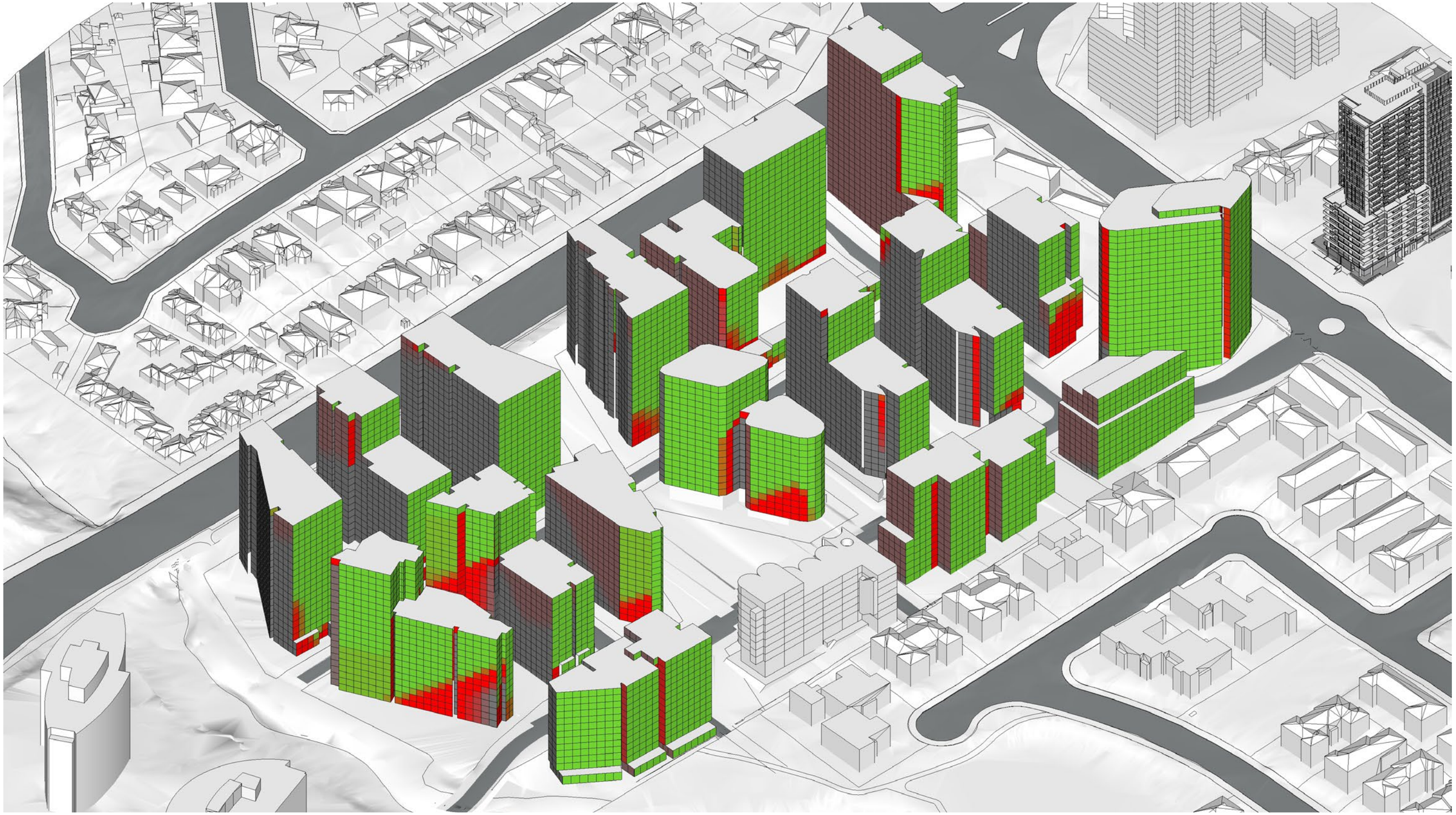
The same process has been adopted to determine the level of solar access received on the groundplane within the public domain. The 3.1 x 3.1m squares are mapped onto the groundplane and the parametric tool rerun. The output is displayed graphically, with colours identified in the key below reflecting the amount of sunlight received in each location. between 0 and 6 hours.

Studies for the entire masterplan are contained on the following pages and have been taken on 3 dates throughout the year, i) 21st June, the winter solstice, ii) 21st december, the summer solstice, and iii) 21st March / 21st September, the equinoxes which represent the average annual condition between the two solstices.



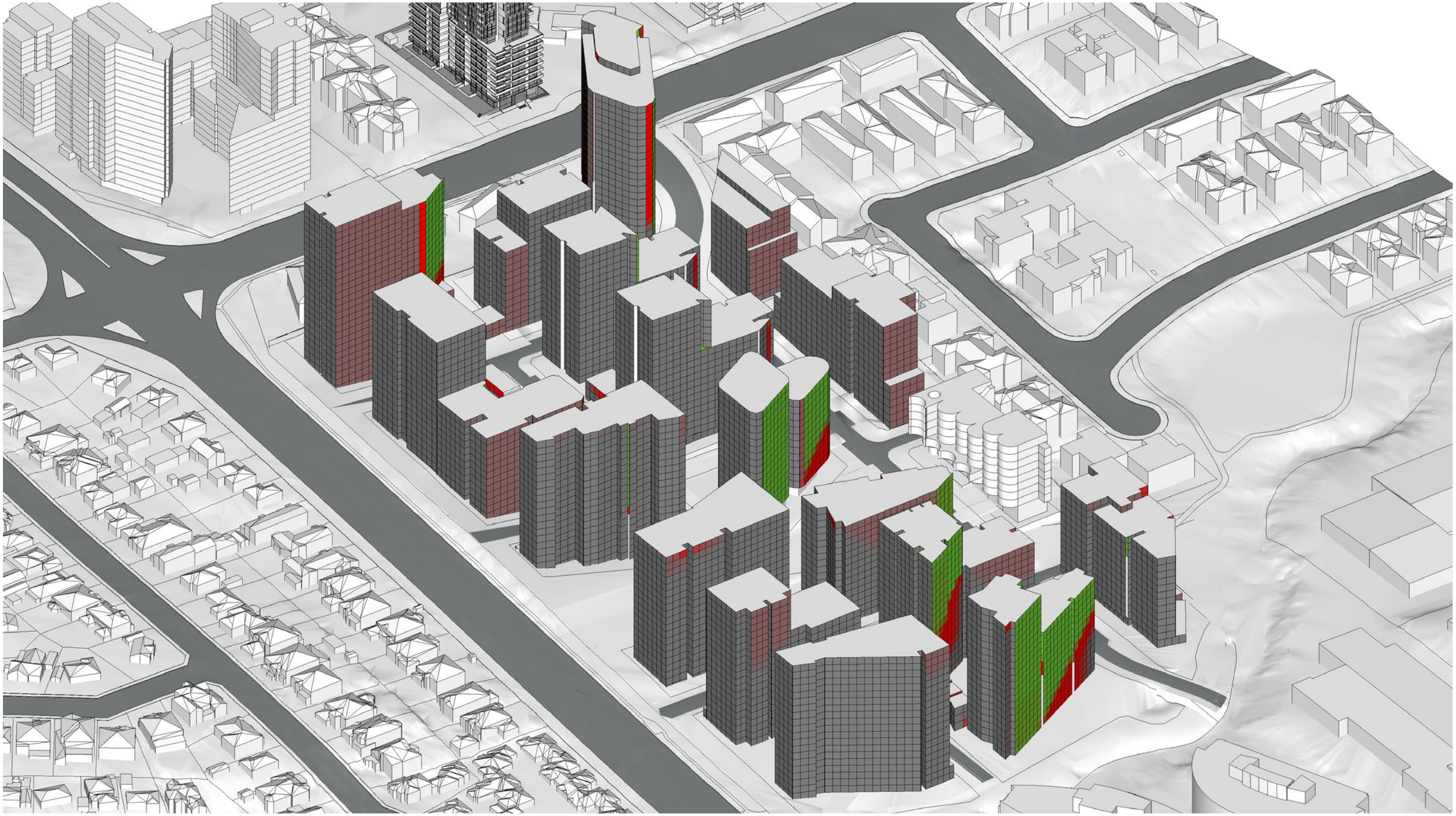
FACADE SOLAR ACCESS ANALYSIS: 21ST JUNE
VIEW FROM NORTH

No direct sunlight
2 hours
6 hours



FACADE SOLAR ACCESS ANALYSIS: 21ST JUNE
VIEW FROM EAST

No direct sunlight
2 hours
6 hours

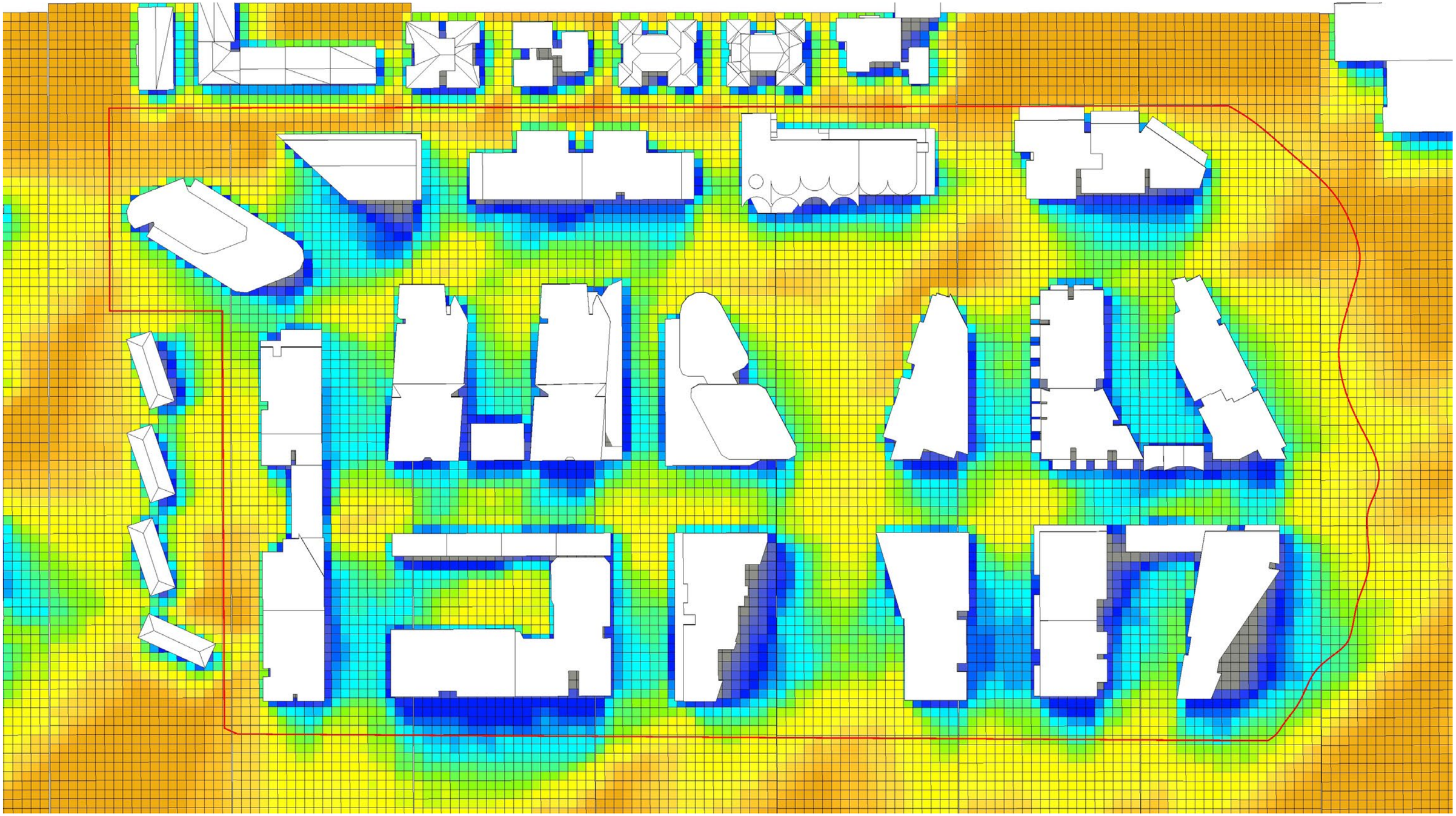


FACADE SOLAR ACCESS ANALYSIS: 21ST JUNE
VIEW FROM SOUTH

No direct sunlight
2 hours
6 hours

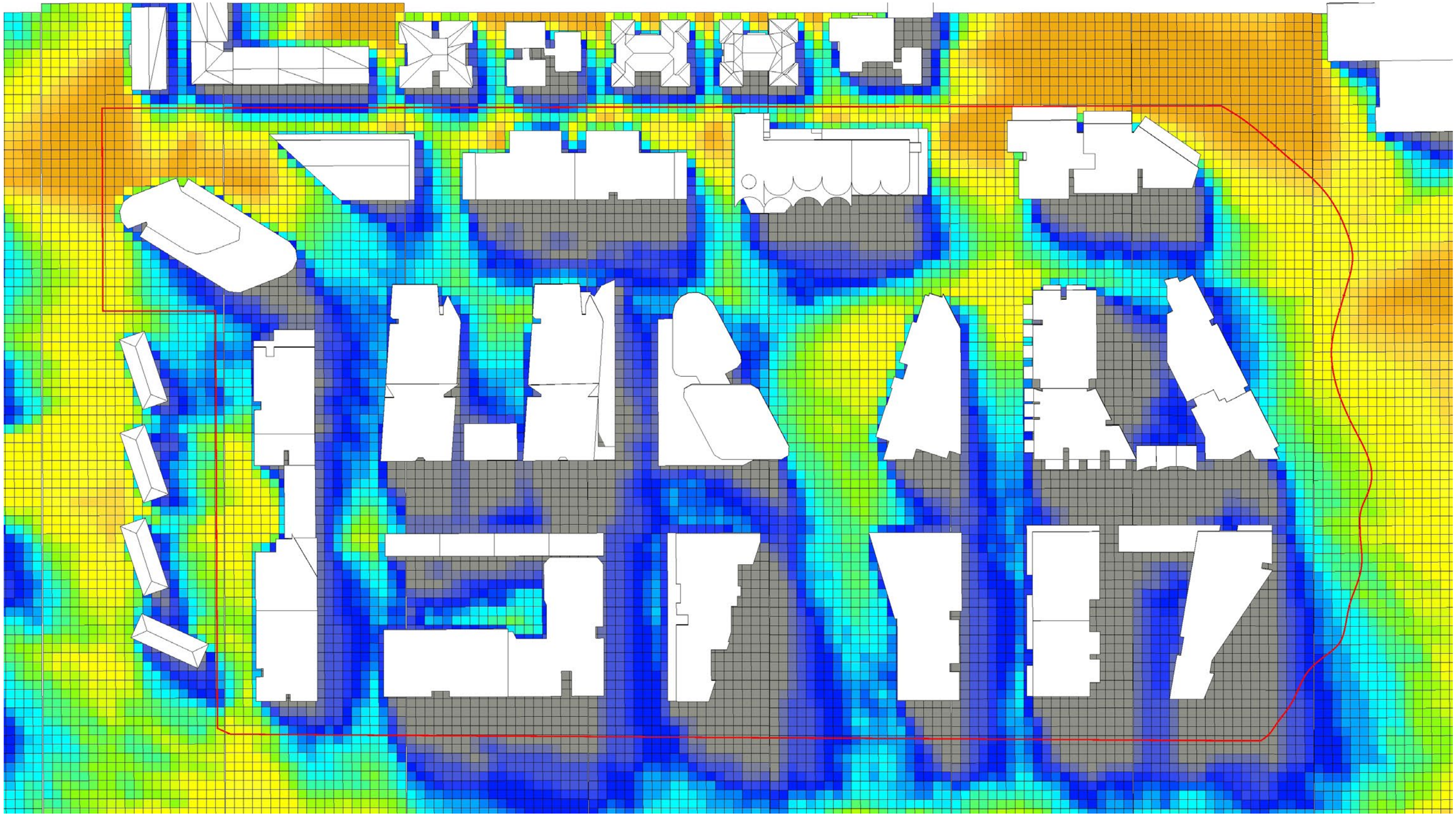
FACADE SOLAR ACCESS ANALYSIS: 21ST JUNE
VIEW FROM WEST

No direct sunlight
2 hours
6 hours



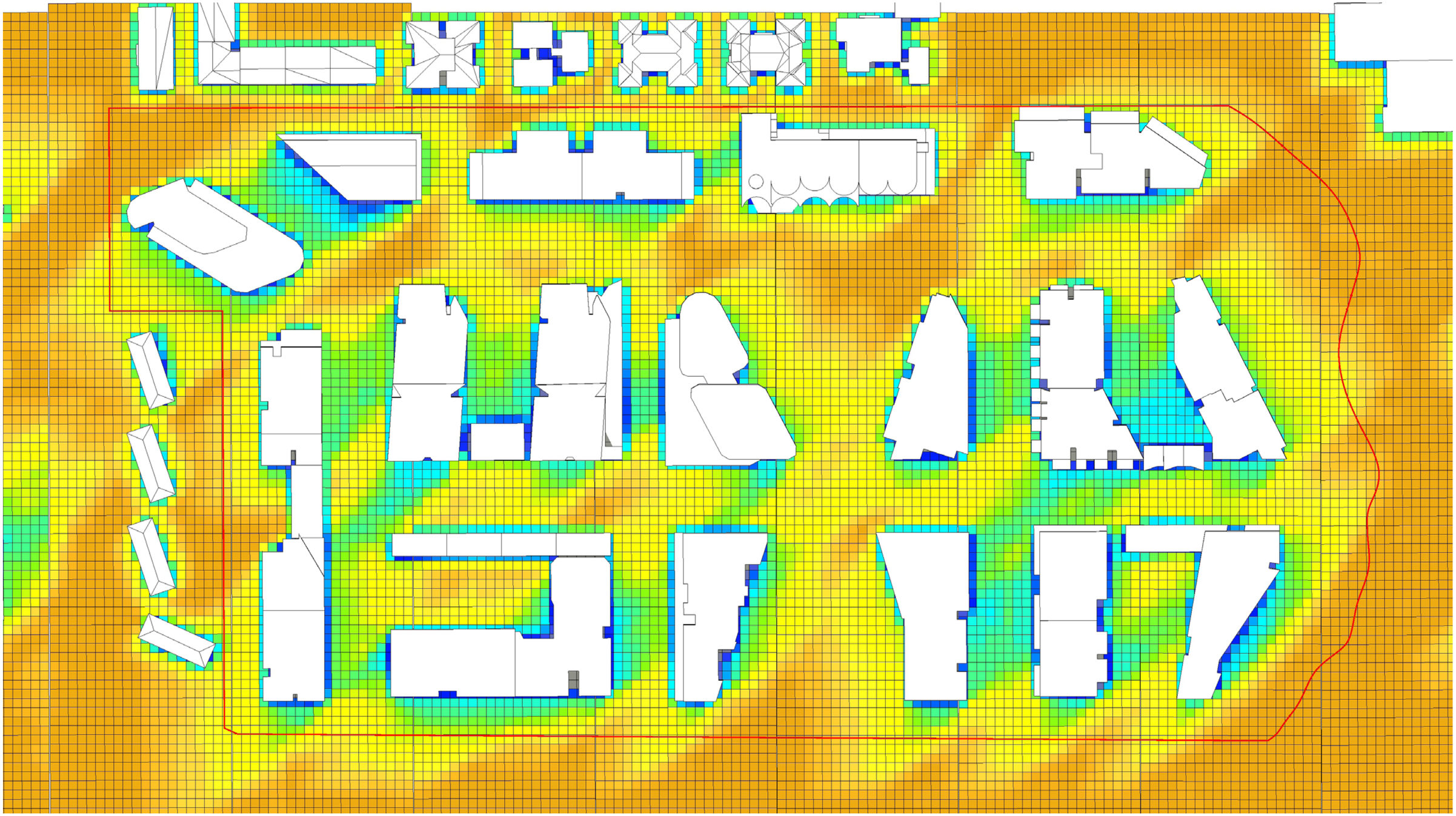
GROUND PLANE SOLAR ACCESS STUDY
21 MARCH / SEPTEMBER

No direct sunlight
0 -1 hour
1- 2 hours
3 - 4 hours
5 - 6 hours
6+ hours



GROUND PLANE SOLAR ACCESS STUDY
21 JUNE

No direct sunlight
0 -1 hour
1- 2 hours
3 - 4 hours
5 - 6 hours
6+ hours



GROUND PLANE SOLAR ACCESS STUDY
21 DECEMBER

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