P2006877 - Great Ormond Street Hospital Chiller Plant Installation

Overshadowing Assessment

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BDP.

Contents

Appendix

1 Introduction

1.1 This report presents an analysis of the overshadowing impact that the proposed Great Ormond Street Hospital (GOSH) roof-top plant development will have on the adjacent National Hospital for Neurology and Neurosurgery (NHNN). The proposed development is in green in image 1.1, opposite.

1.2 Calculations have been conducted to measure the potential for good daylight at window locations on the facade of the NHNN building that faces the proposed development across Powis Place (the facade is outlined in red in image 1.1, opposite).

1.3 Refer to the annotated building elevation in Section 4 of this document for more detail on which windows have been analysed.

1.4 The calculation results allow the existing and proposed conditions to be compared in terms of the *potential* for good daylight at relevant windows.

1.5 The calculations have been run using a CAD model built with reference to survey data produced by Chanton Group PLC on behalf of Balfour Beatty.

1.6 The calculation process is in accordance with guidance in BRE report 209: 'Site Layout Planning for Daylight and Sunlight: a guide to good practice.' This document is referred to as the 'BRE guidelines' in this report.

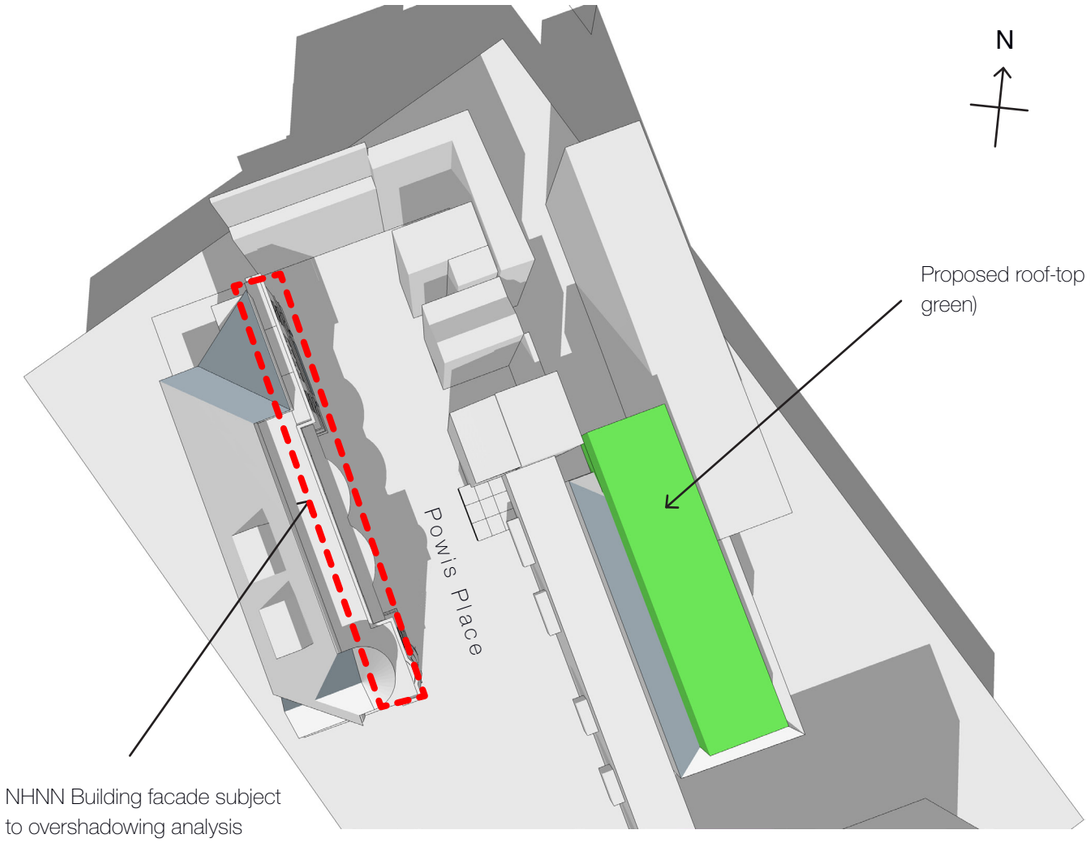

Image 1.1 Plan view of the development site and adjacent buildings

2 Methodology

2.1 To assess the overshadowing impact of the proposed development on neighbouring buildings, it is necessary to calculate vertical sky component (VSC) and annual probable sunlight hours (APSH) at a reference point at the centre of affected windows.

2.2 For VSC calculations the reference point is in the external plane of the window wall.

2.3 For this overshadowing study, all the windows under assessment face more than 90 degrees from due south, therefore APSH need not be calculated (in accordance with the BRE guidelines).

2.4 Windows to bathrooms, toilets, storerooms and circulation areas need not be analysed (in accordance with the BRE guidelines).

2.5 VSC is a metric for light from the sky (referred to as skylight). It is the amount of skylight falling on a vertical wall or window.

2.6 VSC is a measure of the ***potential*** for good daylight at a window. It does not necessarily mean daylight conditions inside the room behind the window will be good or bad - because many other factors, such as room depth, height and glass transmission, also affect interior daylight conditions.

2.7 The following statement, from section 2.2 of the BRE guidelines, describes what VSC values mean for skylight conditions inside a room:

2.8 *'If this vertical sky component is greater than 27% then enough skylight should still be reaching the window of the existing building. Any reduction below this level should be kept to a minimum. If the vertical sky component, with the new development in place, is both less than 27% and less than 0.8 times its former value, then occupants of the existing building will notice the reduction in the amount of skylight. The area lit by the window is likely to appear more gloomy, and electric lighting will be needed more of the time.'*

2.9 The theoretical maximum VSC is 39.6%, not 100%.

2.10 To calculate VSC at the centre of relevant windows, a CAD model must be built which contains accurate geometry of all affected windows and any obstruction which comes between the window reference point and the sky (from the horizon upwards). Such obstructions include:

- balconies
- eaves
- other buildings

3 Overshadowing Conditions

3.1 The existing overshadowing condition is pictured below.

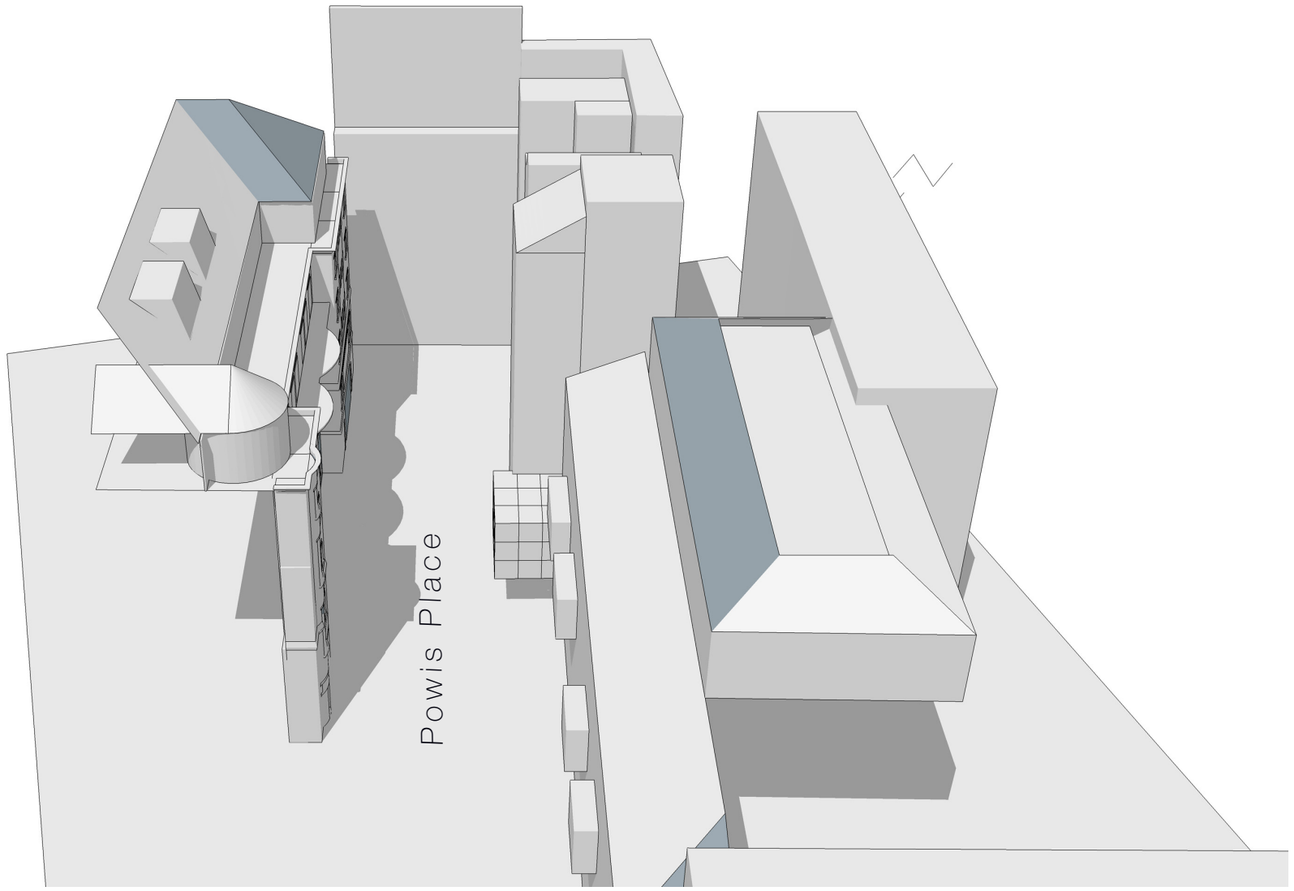

Image 3.1 - View looking North up Powis Place

3 Overshadowing Conditions

3.2 The proposed overshadowing condition is pictured below.

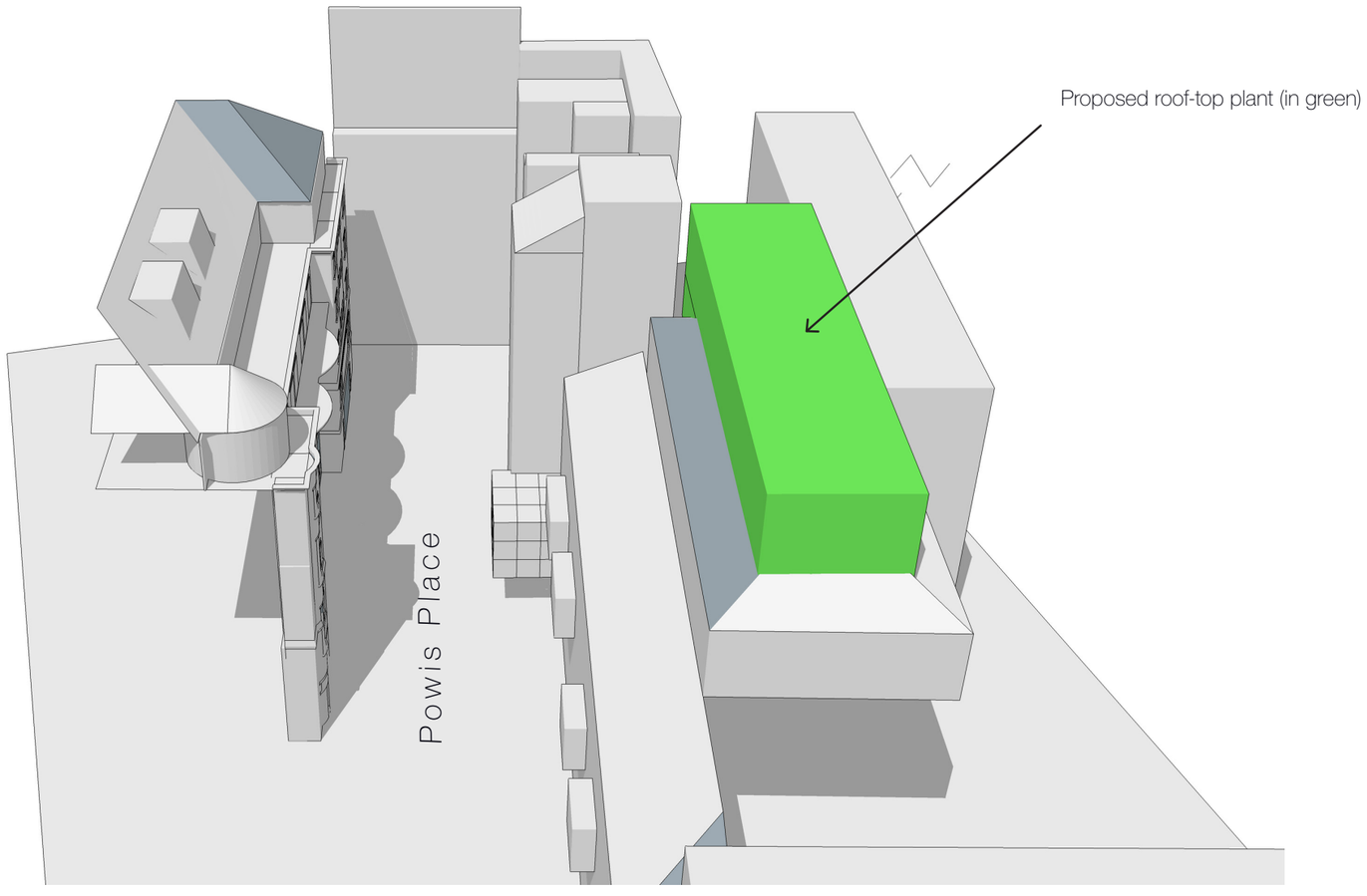

Image 3.2 - View looking North up Powis Place

4 Calculation Results

Image 4.1 Location and references for windows subject to VSC assessment.
Windows highlighted blue experience a reduction in VSC to at least 0.8 times the former value and have an occupied room behind.

Table 4.1. VSC Results table
Results highlighted blue experience a reduction in VSC to at least 0.8 times the former value and have an occupied room behind.
For these rooms, the function is indicated.

		VSC %			
		Existing condition	Proposed condition		
Level	Window	VSC (%)	VSC (%)	fraction of existing	
0	3	9.2	7.9	0.86	
	4	10.8	9.4	0.87	
	5	12	10.6	0.88	
	6	12.1	10.8	0.89	
	7	12.1	10.7	0.88	
	8	11.9	10.7	0.90	
	9	11.2	10.3	0.92	
	10	11	10.1	0.92	
	11	10.6	9.9	0.93	
	12	10.4	9.7	0.93	
	13	9.5	9	0.95	
	14	8.4	7.9	0.94	
1	1	16.5	14.4	0.87	
	2	16.3	14.1	0.87	
	3	11.5	9.6	0.83	
	4	13.6	11.6	0.85	
	5	14.7	12.8	0.87	
	6	14.7	12.8	0.87	
	7	14.4	12.7	0.88	
	8	14.3	12.7	0.89	
	9	13.8	12.5	0.91	
	10	13.5	12.4	0.92	
	11	12.9	12	0.93	
	12	12.6	11.9	0.94	
	13	11.6	11.1	0.96	
	14	10.3	9.9	0.96	
	15	10.3	10.1	0.98	
2	1	20.9	17.9	0.86	
	2	20.8	17.8	0.86	
	3	14.5	11.8	0.81	
	4	16.7	13.9	0.83	
	5	17.1	14.5	0.85	
	6	16.8	14.3	0.85	
	7	16.5	14.1	0.85	
	8	16.3	14	0.86	
	9	15.2	13.6	0.89	
	10	14.7	13.3	0.90	
	11	14.3	13.2	0.92	
	12	14.4	13.4	0.93	
	13	13.9	13.2	0.95	
	14	12.6	12	0.95	
	15	13.7	13.4	0.98	Room behind window
3	1	25.3	21.8	0.86	
	2	25.2	21.8	0.87	
	3	11.1	8.4	0.76	Shower room
	4	12.2	9.2	0.75	Single room
	5	7.7	5	0.65	
	6	5.7	3.1	0.54	Single room
	7	5.1	2.5	0.49	
	8	6	3.5	0.58	
	9	5.6	3.8	0.68	Clean Utility
	10	3.9	2.5	0.64	Single room
	11	3.1	1.9	0.61	
	12	4.1	3.1	0.76	
	13	8.6	7.9	0.92	Isolation suit
	14	8.5	7.9	0.93	
	15	17.8	17.5	0.98	
4	1	29.6	25.8	0.87	
	2	29.5	25.8	0.87	
	3	25	21.9	0.88	
	4	28.1	25.3	0.90	
	5	27.8	25.3	0.91	
	6	26.4	24.8	0.94	
	7	25.6	24.5	0.96	
	8	22.6	22	0.97	
	9	22.7	22.4	0.99	

5 Conclusion

5.1 With the construction of the proposed GOSH chiller enclosure, 10 out of 66 windows assessed will experience a noticeable reduction in the potential for good daylight (measured as Vertical Sky Component (VSC)).

5.2 Of these 10 windows, two are for a shower and utility room respectively, therefore a total of **eight windows** are considered relevant. There are **three patient rooms** behind these eight windows. The plan drawing below (image 5.1) shows the rooms in question.

5.3 All the affected windows are on level three of the building. All windows above and below this level **do not** exhibit a reduction in VSC classed as noticeable.

5.4 The facade of the NHNN building is quite heavily obstructed due to the close proximity of tall buildings opposite. Therefore for the **existing condition**, all windows on level 0 to 3 have a VSC below 27%. This is the value which, as a 'rule of thumb,' is considered as being 'enough skylight' incident at a window.

5.5 The eight affected windows on level three are generally showing a very low VSC in the **existing condition** (the average is 5.9%).

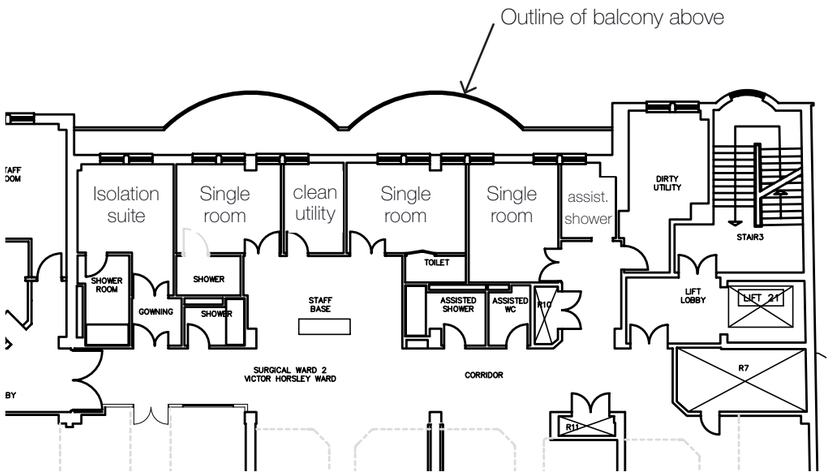

Image 5.1 - NHNN 3rd floor plan drawing (part). Room functions are labelled.

The balcony

5.6 The existing facade of the NHNN building has a feature balcony at level four which obstructs a substantial portion of sky that would otherwise have been visible to the windows at level three below. It is the reason why, of all the windows on the facade, those on level three are the only ones showing a noticeable reduction in VSC.

5.7 To demonstrate the affect this balcony has on VSC to windows below it, a series of sun path diagrams have been generated (images 5.3a, 5.3b and 5.3c, overleaf). They allow comparison between the amount of sky obstructed by the balcony with the amount obstructed by the proposed plant enclosure.

5.8 It may be reasonably asserted that the balcony is an unfortunate architectural feature because it inhibits daylight ingress to the windows below it and, in doing so, places a burden on any new neighbouring building development.

Image 5.2 - NHNN facade showing balconies above the level three windows.

5 Conclusion

5.9 The images on this page are stereographic shading mask diagrams for window 8, level 3. Refer to image labels for more detail.

5.10 In image 5.3c the red area is the shading due to the balcony on the NHNN building, and the blue area is the shading due to the proposed plant enclosure on the GOSH building.

5.11 The white areas are unobstructed sky.

5.12 Each 'pixel' on the diagrams corresponds to a 2° x 2° section of sky. The shading mask for any vertical window will always be at least 50% black due to the fact that it can only 'see' half the sky (the other half being behind the window wall).

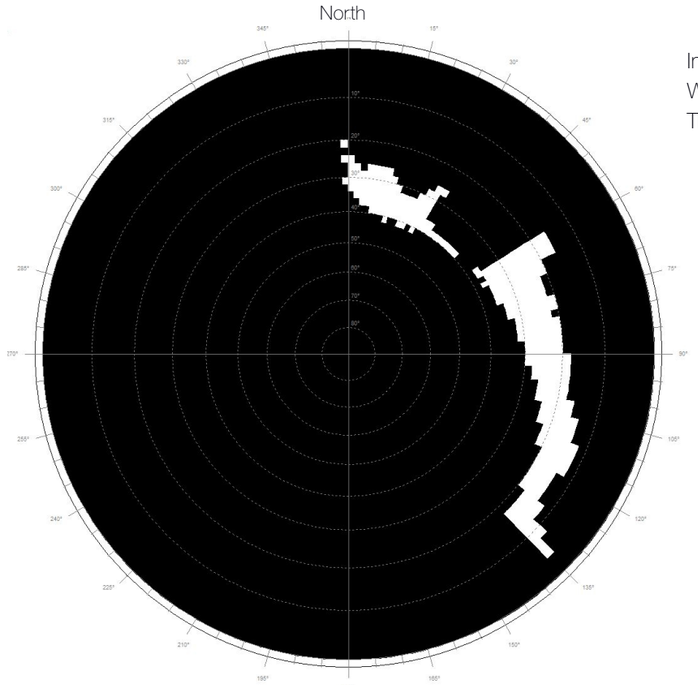

Image 5.3a
Window 8, level 3
The **existing** shading condition

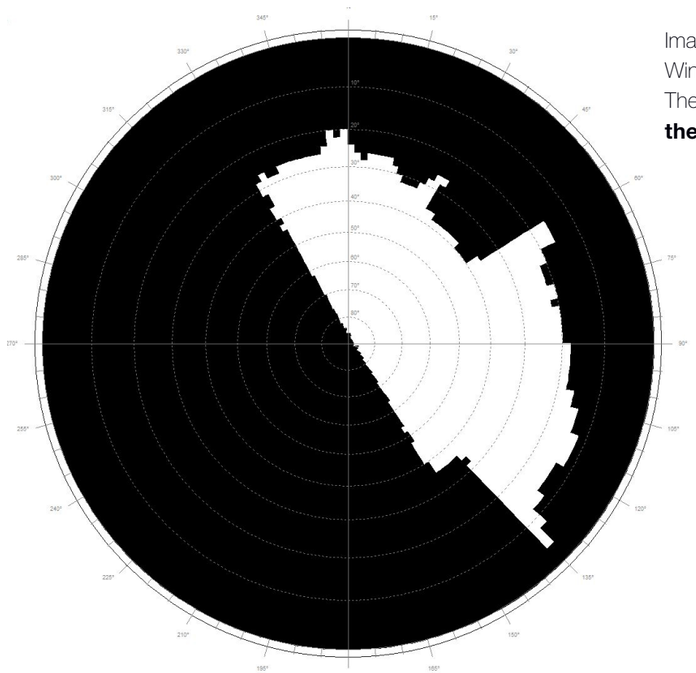

Image 5.3b
Window 8, level 3
The existing shading condition **if the balcony were removed**

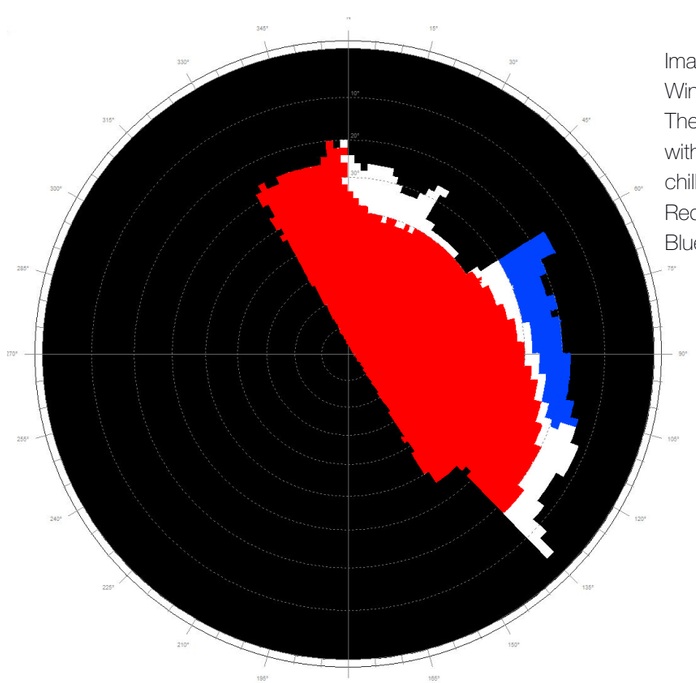

Image 5.3c
Window 8, level 3
The **proposed** shading condition with the balcony and GOSH chiller enclosure in place.
Red = balcony shading
Blue = chiller plant shading

Appendix

1. Site Parameters

- Location: Central London
- Latitude: 51.52 North
- Longitude: 0.121 West
- Time Zone: GMT

2. References

BS 8206-2:2008 Lighting for buildings – Part 2: Code of practice for daylighting
British Standards Institution, 2008,

Site Layout Planning for Daylight and Sunlight: a guide to good practice (second edition),
P. Littlefair.
Building Research Establishment, 2011,