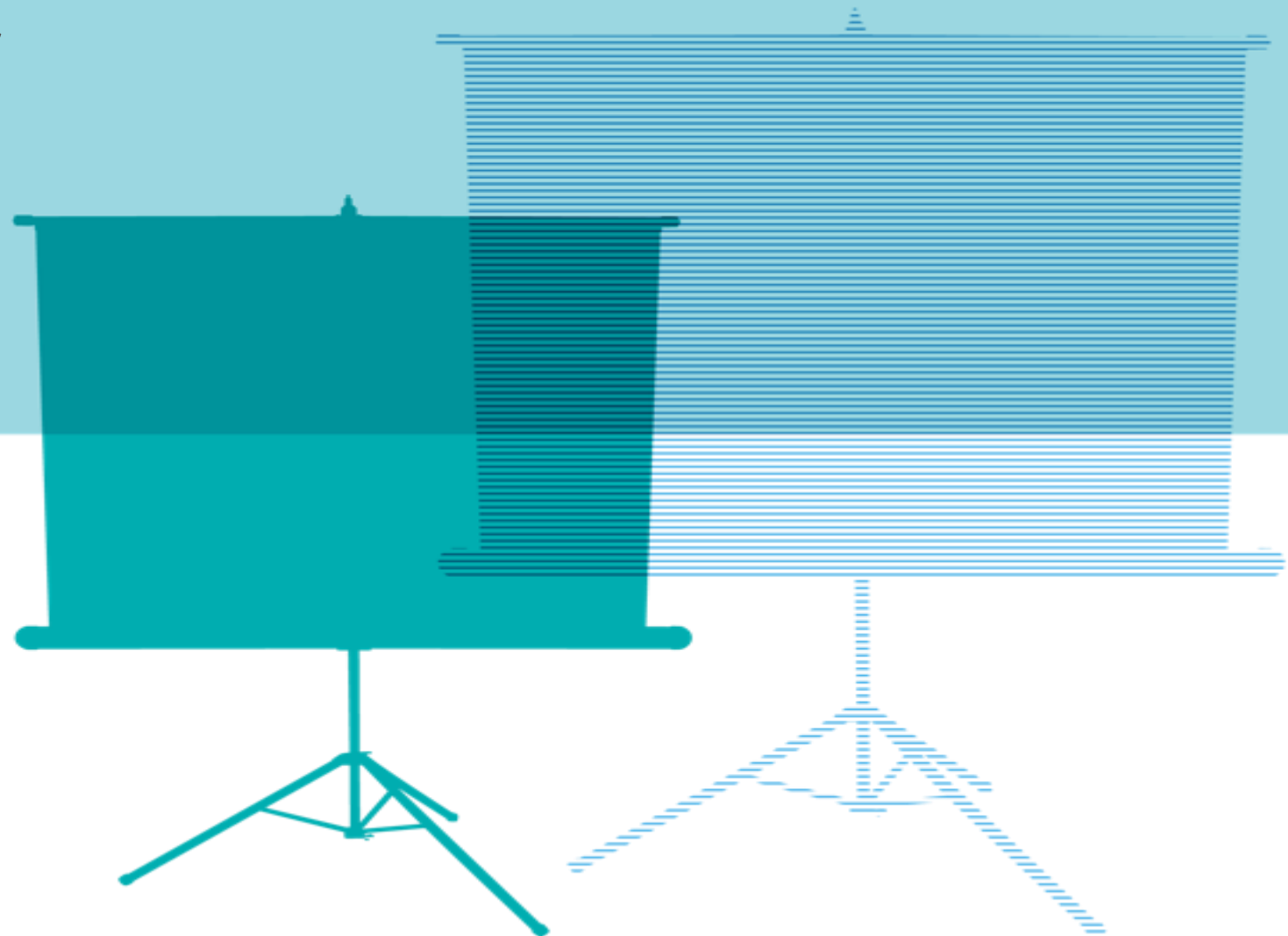


Vastern Court: Daylight and sunlight

Dr Paul Littlefair
BRE



‘Site layout planning for daylight and sunlight: a guide to good practice’ (CD7.20)

Gives guidance on loss of daylight to existing buildings. Based on two metrics:

- Vertical sky component on the windows of the existing building
- No sky line, a measure of the daylight distribution in the rooms

The guidance is based on national and international daylighting recommendations, NOT on a ‘suburban environment’.

SITE LAYOUT PLANNING FOR DAYLIGHT AND SUNLIGHT

A guide to good practice
SECOND EDITION

Paul Littlefair



bre press

bre trust

Vertical sky component is a measure of the amount of light reaching the window

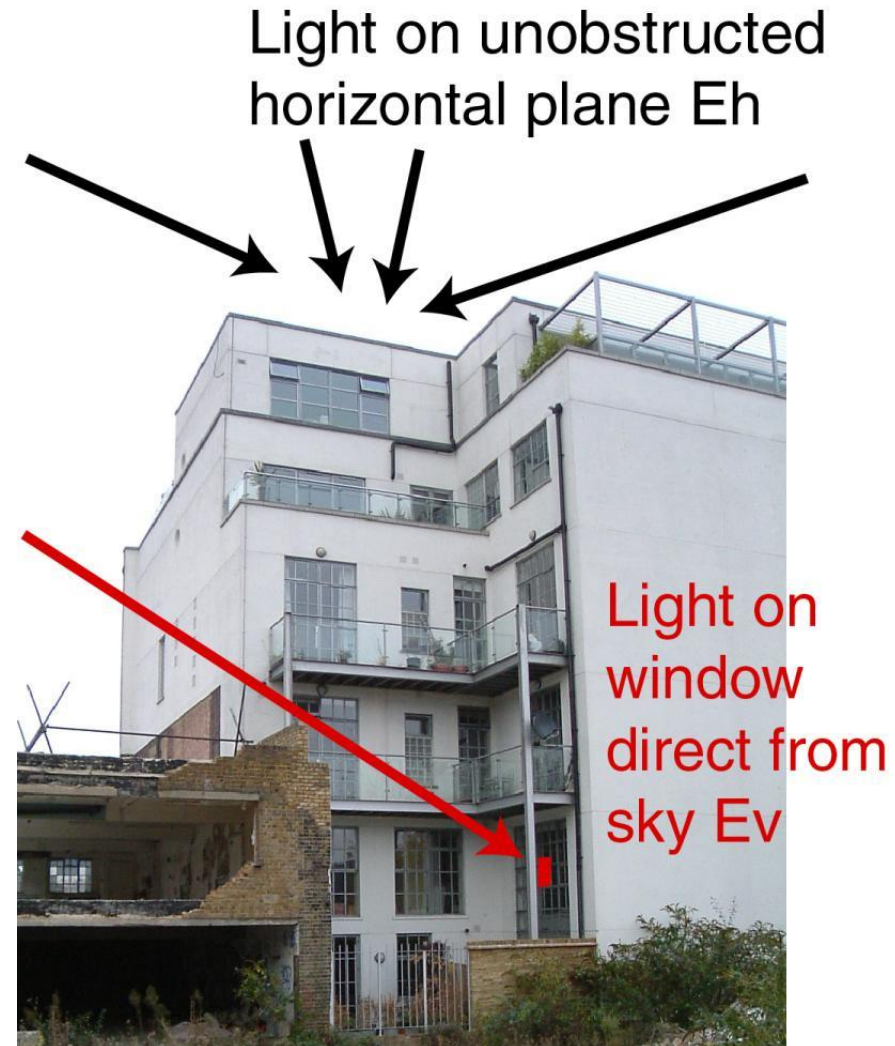
$$\text{VSC} = E_v / E_h \times 100\%$$

where E_v = direct sky light reaching window

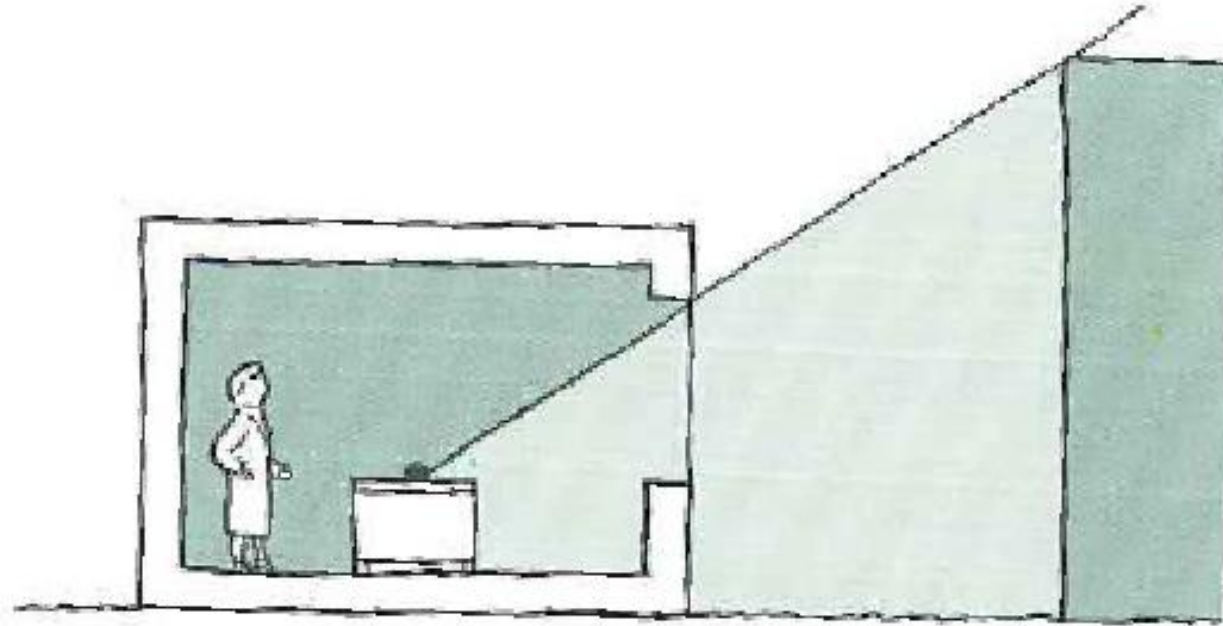
E_h = light on unobstructed plane

If the VSC 'after' is less than 27% AND less than 0.8 times the value before, loss of light is significant

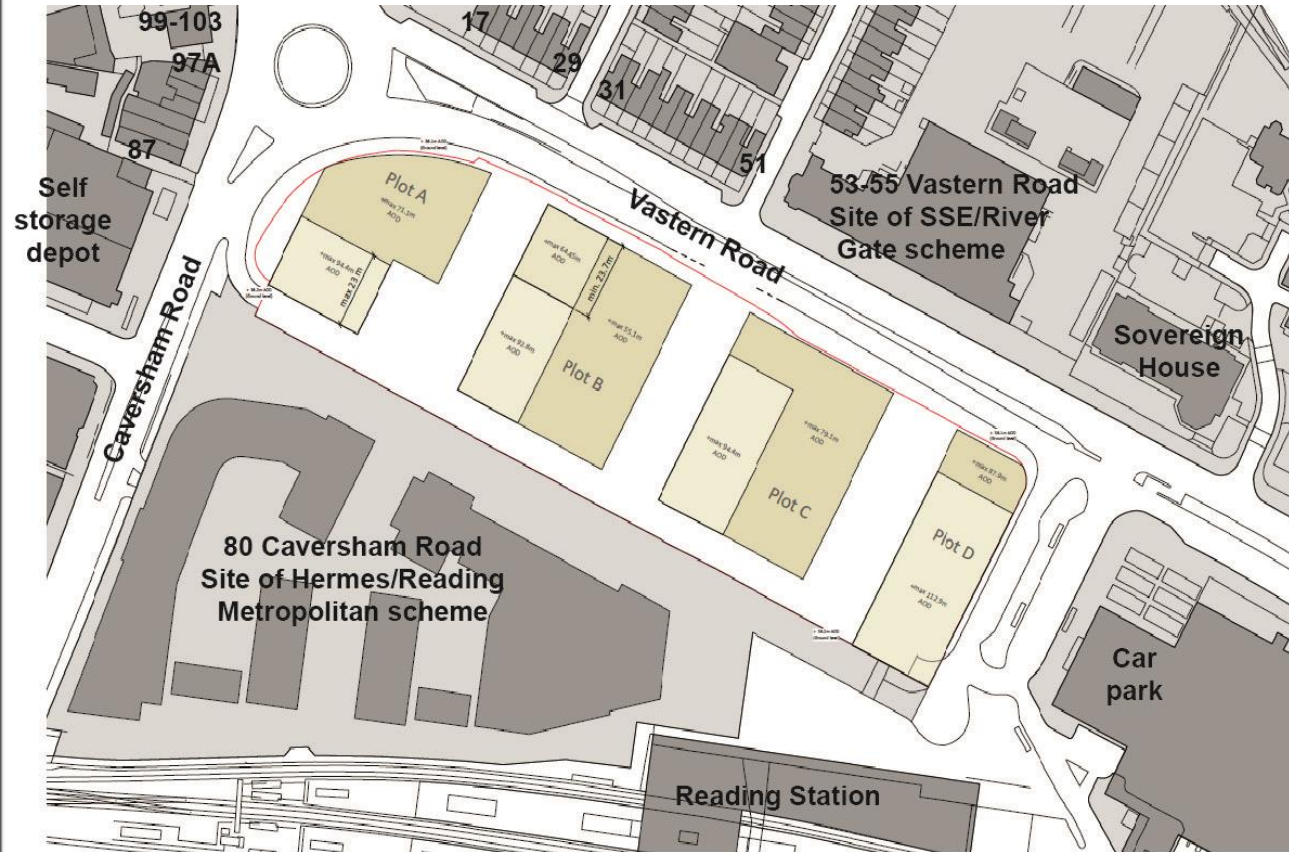
20% VSC, as suggested by James Crowley, is not in guidelines and could result in inadequate daylight



No sky line (daylight distribution)



- Obstructions can affect the distribution of light in a space.
- More of the room will appear poorly lit if the area of room that can receive direct sky light is less than 0.8 times previous area
- An extra criterion, not an alternative
- Using a retained daylit area of only 50% of the room, as suggested by James Crowley, will result in a large gloomy area and is unlikely to be acceptable to occupants



- Loss of daylight to some windows and rooms at 87-97 Caversham Road would be outside the guidelines, though the retained levels would be only just outside the recommended values. This would count as a minor adverse impact.
- The worst affected dwellings would be at 17-51 Vastern Road and in the proposed developments at 55 Vastern Road and 80 Caversham Road.





17-19 Vastern Road



- Example taken from SoCG for the first two dwellings in Vastern Road
- Gives tables of vertical sky components for cumulative impact
- Other tables give impact on daylight distribution (areas receiving direct sky light)

17 Vastern Road

Level	Window	Assumed Use	Room	VSC		Loss	% Loss	Impact
				Existing	Proposed			
Ground	W2	Living Room	R1	37.2	23.6	13.7	36.7	Moderate
First	W1	Bedroom	R1	37.8	25.0	12.8	33.9	Moderate
	W2	Bedroom		37.9	24.7	13.2	34.9	Moderate
Second	W1	Bedroom	R1	38.3	25.8	12.5	32.6	Moderate

19 Vastern Road

Level	Window	Assumed Use	Room	VSC		Loss	% Loss	Impact
				Existing	Proposed			
Ground	W2	Living Room	R1	37.3	22.6	14.7	39.4	Moderate
First	W1	Bedroom	R1	37.8	24.3	13.6	35.9	Moderate
	W2	Bedroom		37.9	24.0	13.9	36.7	Moderate
Second	W1	Bedroom	R1	38.3	25.6	12.7	33.1	Moderate

Loss of daylight to 17-49 Vastern Road (1)

- Loss of VSC to all 57 windows analysed at 17-49 Vastern Road would be outside the BRE guidelines. 39 of these windows would have relative reductions of 33.0-39.8% and the other 18 windows would have relative reductions of 40% or more.



Relative loss in VSC		Relative loss in daylight area	
X	60-79.99%	○	60-79.99%
X	40-59.99%	○	40-59.99%
X	30-39.99%	○	30-39.99%
X	20-29.99%	○	20-29.99%

17-29 Vastern Road (Figure 4 in my proof CD10.4)

Loss of daylight to 17-49 Vastern Road (2)

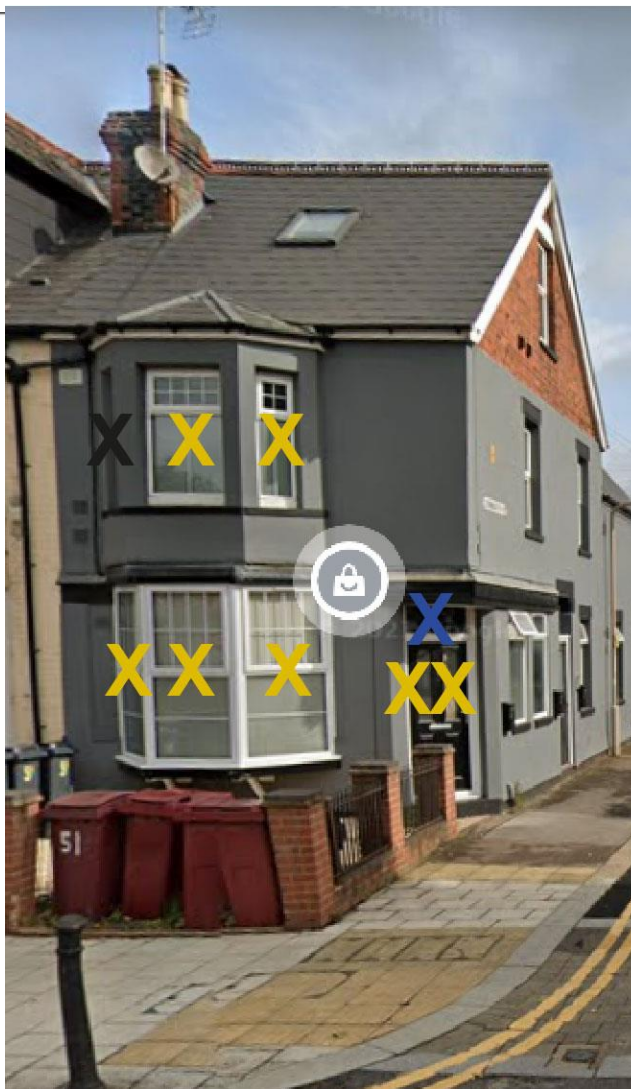
- Effects on daylight distribution would be outside the BRE guidelines for 36 of 50 rooms analysed in 17-49 Vastern Road. 11 of these would have impacts more than double the BRE recommendation.



Relative loss in VSC		Relative loss in daylight area	
X	60-79.99%	○	60-79.99%
X	40-59.99%	○	40-59.99%
X	30-39.99%	○	30-39.99%
X	20-29.99%	○	20-29.99%

31-49 Vastern Road (Figure 5 in my proof CD10.4)

Loss of daylight to 51 Vastern Road



Relative
loss in
VSC

X 60-79.99%

X 40-59.99%

X 30-39.99%

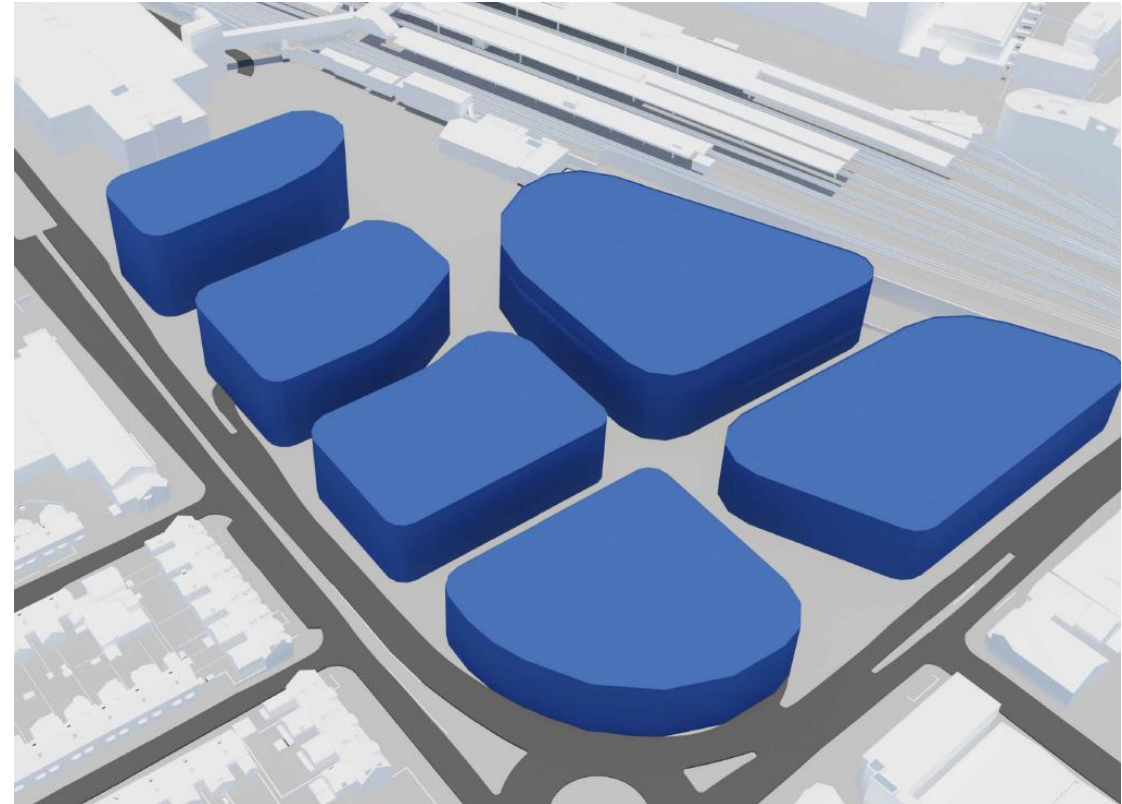
X 20-29.99%

Losses of VSC to nine windows at 51 Vastern Road would be outside the BRE guidelines.

Eight of these windows would have relative reductions of 26.7-36.5% and one window would have a relative reduction of 73.9%, though this is a secondary window lighting the doorway and it has an overhang above it.

51 Vastern Road (Figure 6 in my proof CD10.4)

- The Applicant's Position Statement gives examples where lower daylight standards may have been accepted. These are not comparable because they are in denser urban areas or there are other factors to be taken into account, such as the dwellings in Hertford being houseboats.
- Vastern Road is unusually wide and residents could expect to retain decent levels of daylight.
- A more appropriate comparator is the Reading Station Area Framework. This would have a much lower impact on daylight to these dwellings. Only 16 of the windows analysed would not meet the BRE VSC guidelines, compared to 57 with the Appeal Scheme.



RSAF as modelled in Environmental Statement Technical Annex 10.1 (CD1.9.31)

- For 17-19 Vastern Road, all windows would meet the vertical sky component guidelines with the RSAF scheme.
- However there would still be impacts on daylight distribution

17 Vastern Road

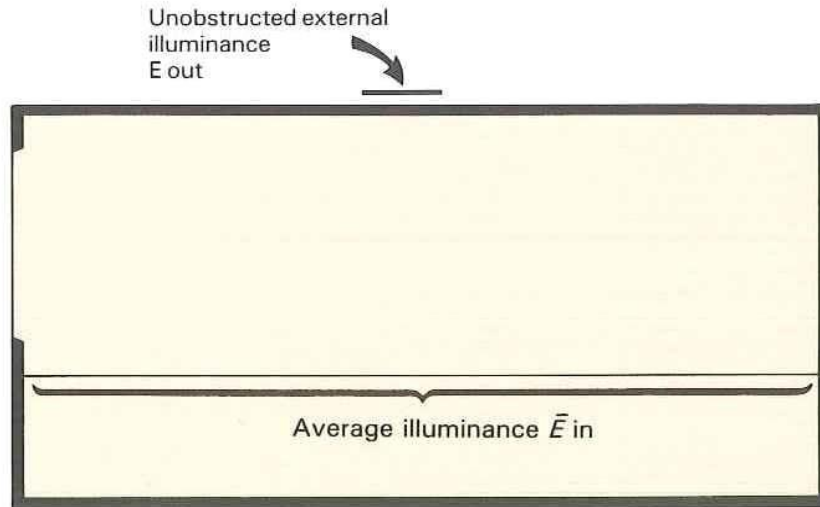
Level	Window	Assumed Use	Room	VSC		Loss	% Loss	Impact
				Existing	Proposed			
Ground	W2	Living Room	R1	37.2	23.6	13.7	36.7	Moderate
First	W1	Bedroom	R1	37.8	25.0	12.8	33.9	Moderate
	W2	Bedroom		37.9	24.7	13.2	34.9	Moderate
Second	W1	Bedroom	R1	38.3	25.8	12.5	32.6	Moderate

19 Vastern Road

Level	Window	Assumed Use	Room	VSC		Loss	% Loss	Impact
				Existing	Proposed			
Ground	W2	Living Room	R1	37.3	22.6	14.7	39.4	Moderate
First	W1	Bedroom	R1	37.8	24.3	13.6	35.9	Moderate
	W2	Bedroom		37.9	24.0	13.9	36.7	Moderate
Second	W1	Bedroom	R1	38.3	25.6	12.7	33.1	Moderate

LEVEL	WINDOW	ROOM	VSC		LOSS	% LOSS	IMPACT
			EXISTING	PROPOSED			
<u>17 Vastern Road</u>							
Ground	W2	R1	37.2	28.1	9.2	24.6	Negligible
First	W1	R1	37.8	30.1	7.7	20.4	Negligible
	W2		37.9	29.9	7.9	20.9	Negligible
Second	W1	R1	38.3	31.9	6.5	16.9	Negligible
<u>19 Vastern Road</u>							
Ground	W2	R1	37.3	27.5	9.7	26.1	Negligible
First	W1	R1	37.8	29.7	8.1	21.5	Negligible
	W2		37.9	29.6	8.3	21.9	Negligible
Second	W1	R1	38.3	31.7	6.6	17.2	Negligible

(RSAF data from CD12.5.1)

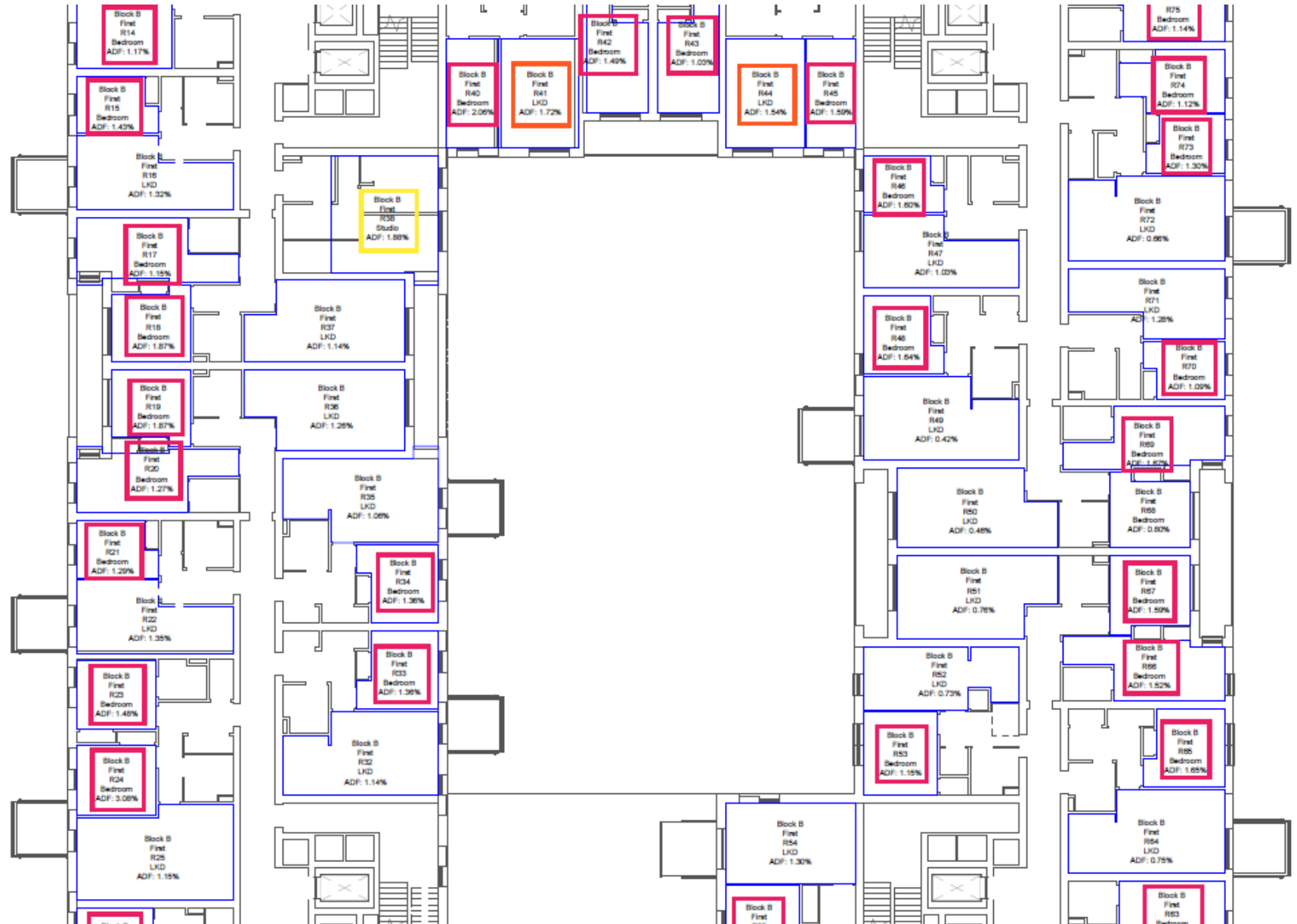


Definition of average daylight factor
Under standard overcast conditions:
Average daylight factor $df = \frac{\bar{E}_{in}}{E_{out}} \times 100\%$

- The average daylight factor (ADF) is the average illuminance in a space divided by the simultaneous horizontal unobstructed illuminance outside, under standard overcast sky conditions.
- 5% ADF gives a well daylit space
- 2-5% gives good daylighting though supplementary electric lighting may sometimes be needed.
- BS 8206 Part 2 gives minimum values for housing of 2% for kitchens, 1.5% for living rooms, 1% for bedrooms
- BS 8206 Part 2 was superseded in 2019 by BS EN 17037, but BRE Report still refers to old standard

Daylight in Illustrative scheme - example

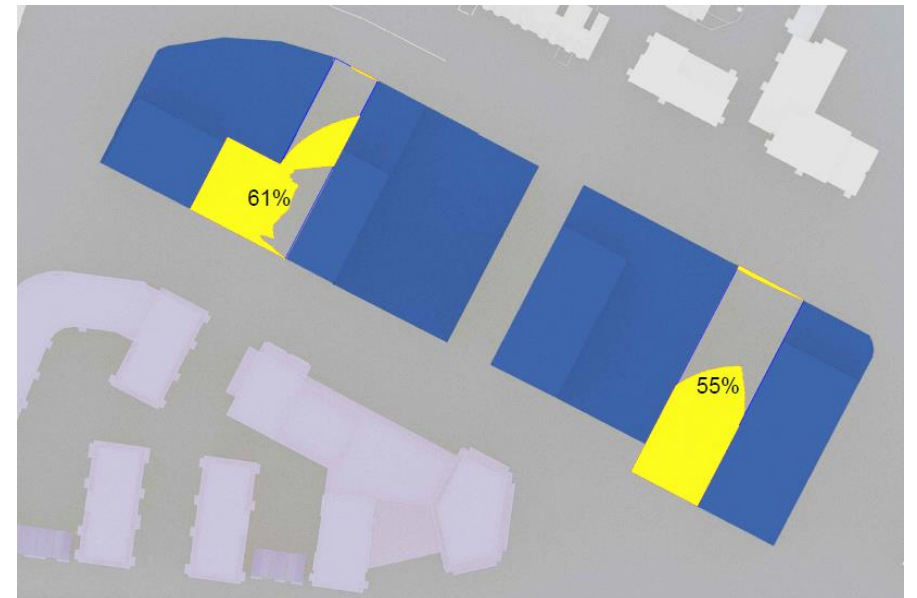
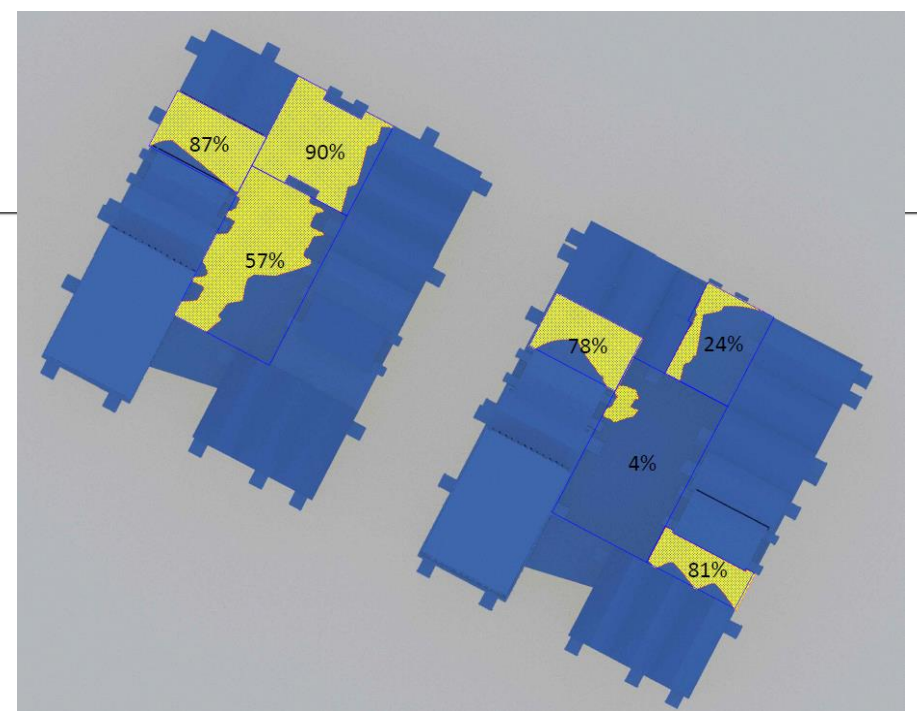
- Example for part of Block B first floor
- Uses unrealistic frame factor of 0.9 so will overestimate ADFs
- Unlabelled rooms indicate LKDs with ADF below 1.5% minimum
- Orange rooms are LKDs with ADF between 1.5% and 2%
- Green rooms are LKDs with ADF > 2%
- Magenta rooms are bedrooms with > 1%



- In the cumulative scenario, with a realistic frame factor of 0.8, 70% of the rooms analysed would comply if the lower value of 1.5% is used for living/kitchen/diners. With the recommended higher value of 2% for living/kitchen/diners, the figure drops to 63%.
- However most of these rooms are bedrooms which have a lower requirement for daylight. Out of the 180 living/kitchen/diners or studios, 68 (38%) would meet the minimum 1.5% ADF for a living room. Only 33 (18%) would meet the higher 2% recommendation.
- There are some very low levels of daylight in rooms in the illustrative scheme; for example, three living rooms would have ADFs of 0.2%, and two bedrooms would have average daylight factors of 0%. Such very low values indicate that any residential rooms in these locations could not be expected to have adequate daylight.
- The analysis of the illustrative scheme has not demonstrated that adequate daylight could be achieved in the proposed development.

- Sunlight can be quantified by calculating annual probable sunlight hours to main living room windows. This is defined as hours of sunlight falling on centre of window in typical year, as % of unobstructed ground.
- BS 8206 Part 2 recommends 25% of annual probable sunlight hours year round, 5% in winter (21 Sept-21 March)
- In the cumulative scenario, only 21 (12%) of the 180 living/kitchen/diners would meet both recommendations. Another 8 would meet the winter recommendation only, and another 7 would meet the summer recommendation only.
- These are very poor levels of sunlight provision. Although the Reading Metropolitan/Hermes development makes some difference, even without it less than a quarter of the rooms would meet the recommendations. This is largely because the distances between the blocks and within the courtyards are small compared to the heights of the blocks.
- In a final scheme there would be little way of markedly improving sunlight provision apart from removing balconies above windows.

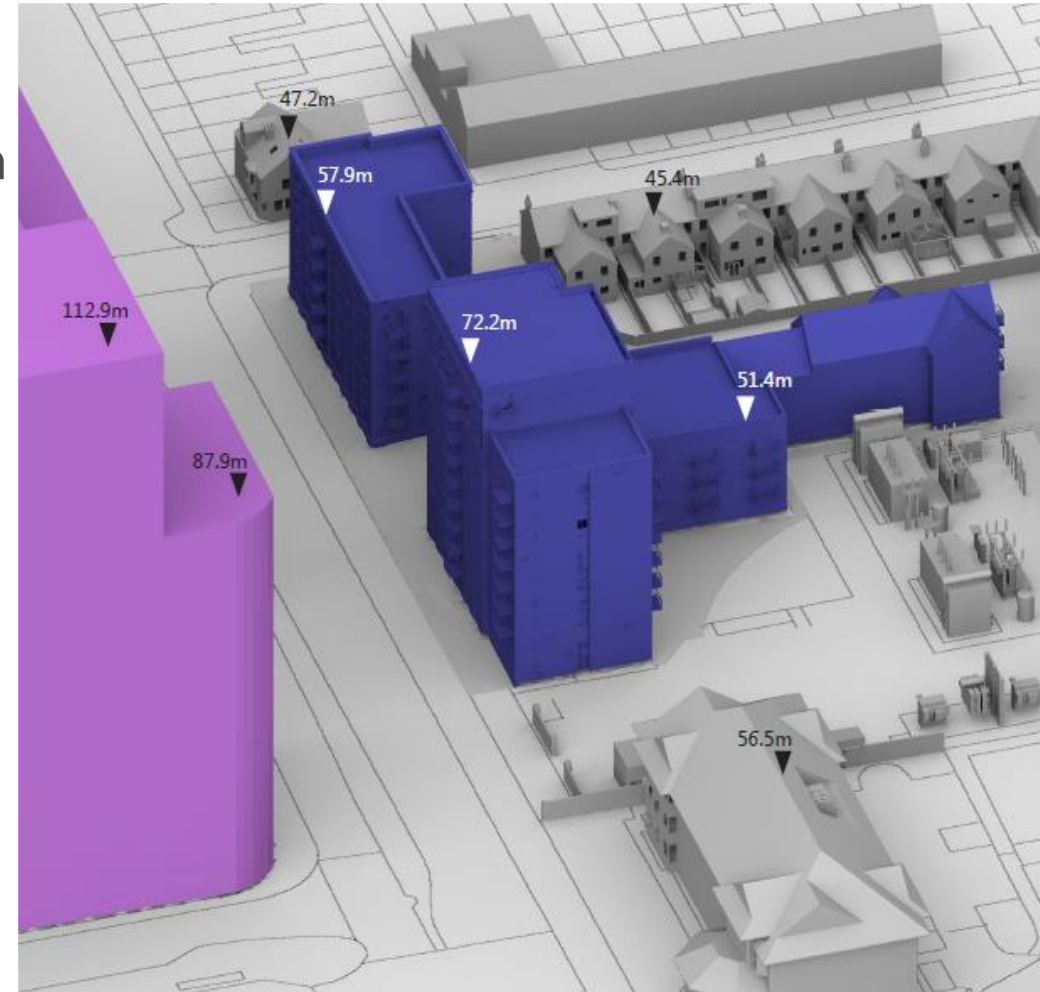
- For proposed open spaces, the BRE Report 'Site layout planning for daylight and sunlight' recommends that 50% of the space can receive at least 2 hours sunlight on March 21.
- Sunlight provision in open spaces in the proposed scheme varies. Most of the roof terraces and the courtyard to Block B meet the recommendation; the courtyard and a roof terrace to Block C would not.
- Sunlight in the spaces between Blocks A and B and between Blocks C and D would meet the recommendation; the space between Blocks B and C probably would not, but in the illustrative scheme it is planned to be a street thoroughfare.



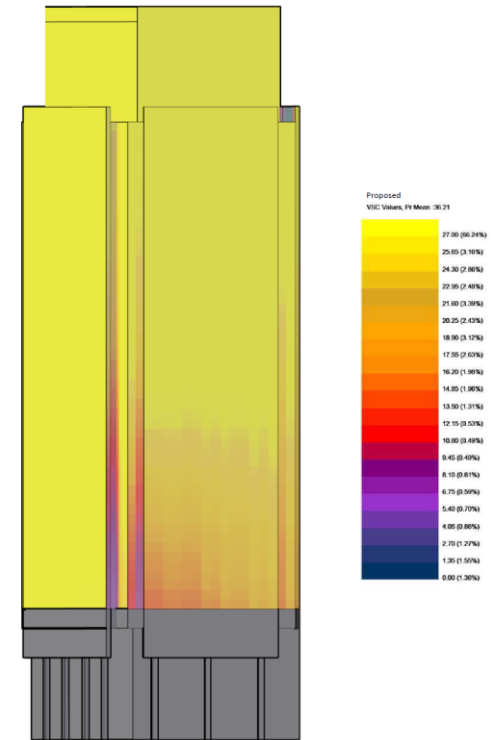
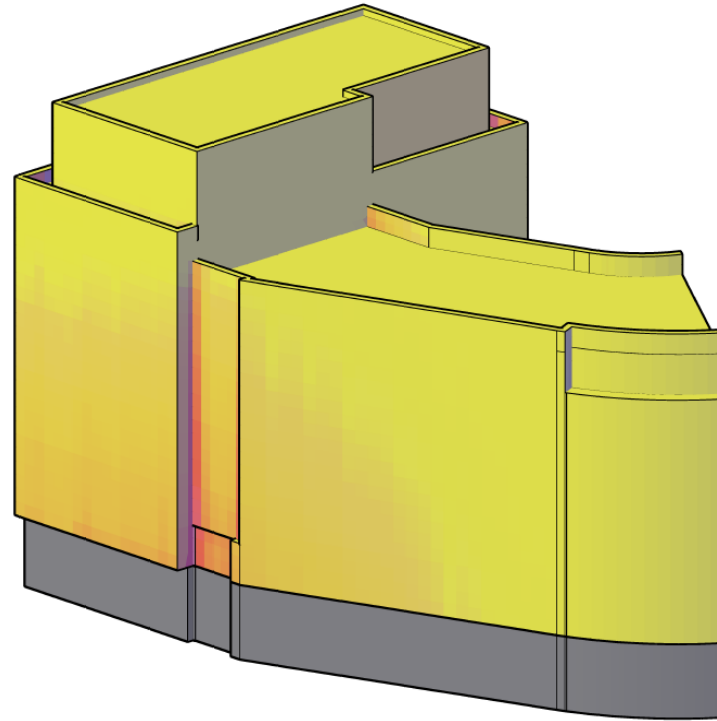
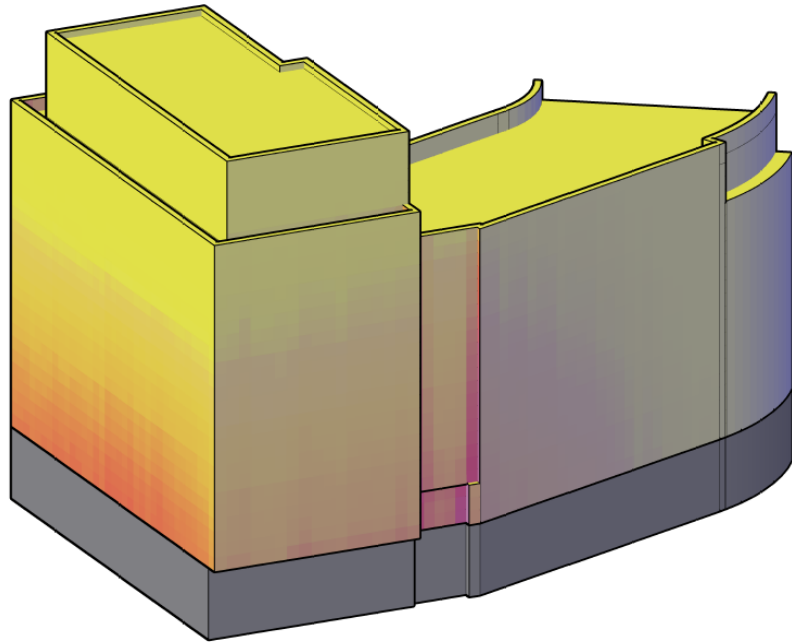
Data from Appendix C of Appellant's Position Statement (CD8.16)

Loss of light to 55 Vastern Road (SSE scheme)

- Of the 12 living rooms analysed facing the Appeal scheme, 11 would have average daylight factors below the minimum recommendation, compared with five of these rooms with the current retail park. (The lowest ADFs are 0.4%, not 1% as stated in my rebuttal proof paragraph 5.3).
- The Appeal Scheme would therefore result in inadequate daylight in living rooms in the 55 Vastern Road scheme.
- Annual sunlight to seven of these living rooms and winter sunlight to eight would be below the BRE recommendations with the Appeal Scheme in place.
- Ten living rooms in total would have losses of sunlight outside the BRE guidelines, with eight of these losing more than half their sunlight.



Drawing by Eb7 from Appendix D of Appellant's Position Statement (CD8.16)



- The only data are in coloured diagrams indicating vertical sky components (VSCs). The shading on the drawings is not clear and it is not possible to judge accurately what the VSC might be at any particular point.
- The proposed Appeal Scheme will have an impact on 80 Caversham Road. But it is not possible to tell how large that impact will be, or whether future residents there would have adequate daylight with the Appeal Scheme in place.

Conclusions

- There would be a major adverse impact on daylight to 21-49 Caversham Road; all the windows at the front of the houses are affected including main living rooms, and the loss of light is well outside the guidelines. For numbers 17, 19 and 51 the impact is moderate.
- Daylight in living rooms at the lower levels of the proposed illustrative scheme would be poor. Only 38% would meet the minimum standard for a living room. Just 18% would meet the higher standard for a room with kitchen. Some levels of daylight are very low, indicating that any residential rooms in these locations could be expected to have inadequate daylight.
- Sunlight provision to these rooms would be very poor. Only 12% would meet the sunlight recommendations in full. In a final scheme there would be little way of markedly improving sunlight provision apart from removing balconies above windows.
- Sunlight in open spaces in the proposed scheme varies. Most of the spaces would meet the recommendation; the courtyard and a roof terrace to Block C would not.
- In the proposed 55 Vastern Road, 11 of 12 living rooms analysed would have inadequate light with the Appeal Scheme in place. Ten would have losses of sunlight outside the BRE guidelines, with eight losing more than half their sunlight.
- The diagrams showing loss of light to 80 Caversham Road are unclear and it is not possible to tell what the impact would be or whether proposed flats there would have enough light.