

Daylight and Sunlight Assessment (Proposed Scheme)

Astec House

For Bagri Foundation

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ecolytik

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Prepared by	Sherleen Pang
Checked by	Kostas Mastronikolaou

1 Executive Summary

Daylight and Sunlight analysis was carried out for the proposed conversion of the existing Grade II Listed Building to create student accommodation with ancillary landscaping and parking in Reading. This report outlines the results of the analysis for the planning application, evaluating access to daylight and sunlight within the development.

The methodology set out in this report is in accordance with BRE’s “Site Layout Planning for Daylight and Sunlight, A Guide to Good Practice” by PJ Littlefair (2022) which is accepted as good practice by Planning Authorities. The numerical criteria suggested within the BRE guidelines have been applied to the assessment and it is important to note that these guidelines are not a rigid set of rules but are advisory and often need to be applied flexibly according to the specific context of a site.

To carry out the assessment, a 3D computer model of the proposed scheme and key surrounding properties was generated. Using this model and specialist software, daylight and sunlight levels for all residential habitable spaces within the proposed development have been calculated.

The results show that 94% of all residential habitable rooms will meet the recommended daylight targets set out by the BRE. The remaining two rooms are at lower ground level with windows to the front façade which cannot be altered due to heritage considerations. These rooms were found to perform marginally below the BRE guidelines.

All residential habitable rooms with window(s) facing within 90° due south will meet the BRE’s sunlight targets.

Overall, it can be concluded that the scheme is designed in line with relevant policies and will generally provide good quality of accommodation to the future residents from a natural light perspective.

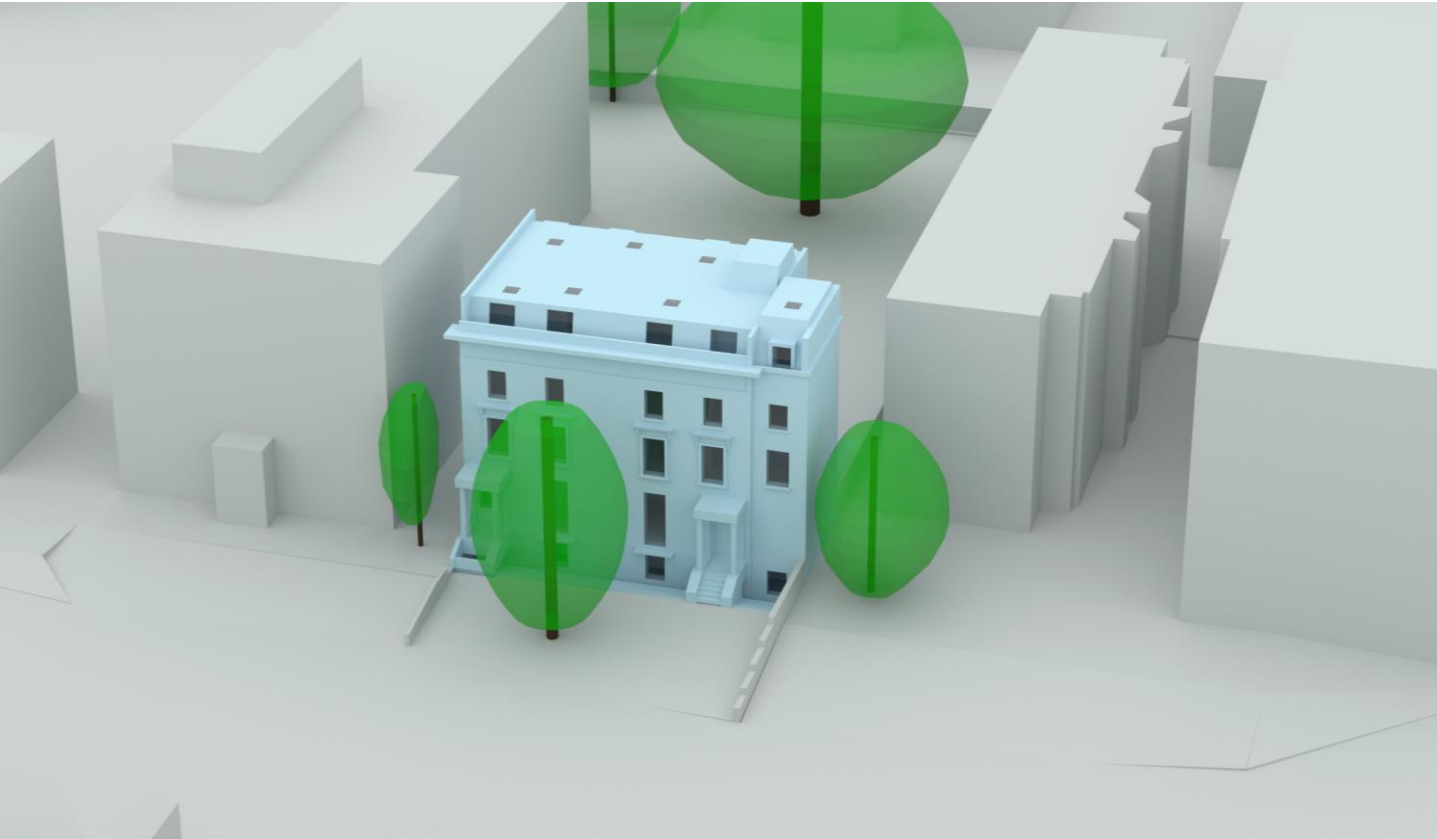


Figure 1: 3D technical model of Astec House and immediate surrounding context, view from southeast.

2 Introduction

Ecolytik have been instructed to evaluate daylight and sunlight access within the proposed development at Astec House. The assessment considers the latest proposal for the site.

2.1 Site

Astec House is located at 187-189 King’s Road, within the jurisdiction of Reading Borough Council (hereafter referred to as ‘RBC’).

Dating back to post-1832 as part of Waterloo Place, Nos. 187-189 Kings Road is a Grade II listed, three-storey symmetrical pair of houses featuring a basement and attic level. The structure is built from Bath stone with a slate roof, characterised by a rusticated ground floor, a dentil cornice entablature, and a moulded sill string. While most original sash windows remain, the ground floor is distinguished by honeysuckle-patterned cast-iron balconies. Access is provided via six-panel doors under Doric porches. Although the original "service" houses on Orts Road were lost in 1977, the main building has since undergone an attic conversion, featuring a raised roofline and parapet designed to blend the new dormer windows into the historic facade.

The proposed development comprises the conversion of the building to create student accommodation with ancillary landscaping and parking.

The approximate site location is presented in Figure 2.

2.2 Planning policies

Local, regional and national planning policies relating to daylight and sunlight have been considered. In general terms, planning policy advises that new development should be making the best use of land and be designed in a way that enables appropriate levels of daylight and sunlight amenity. Provision of daylight and sunlight should be balanced against potential overheating risks. BRE’s latest “Site layout planning for daylight and sunlight” document published in 2022 provides a set of recommendations for daylight and sunlight in new developments. It builds on British Standard EN 17037 (2018) and sets out criteria to evaluate both the quantity and quality of daylight and sunlight within new developments. A full summary of the relevant policy landscape is presented in Appendix B.



Figure 2. Approximate site location of Astec House (source: Google Maps, accessed: December 2025).

2.3 Application of BRE's guidance

The BRE guidelines advise that the quality, quantity and distribution of daylight and sunlight within a habitable space would be notably affected if building obstructions are large in relation to their distance away. When assessing a proposed residential development, only those windows and rooms that have a reasonable expectation of daylight and sunlight need to be considered.

Sunlight specifically is mainly sought in living rooms and external amenity spaces, although the BRE guide recognises that for housing specifically, at least one room of the dwelling should meet the minimum sunlight recommendation. It is therefore considered that any dwellings that have at least one habitable room receiving adequate sunlight to be performing satisfactorily.

In addition, it is worth highlighting the following excerpt from the guidance:

“The guide is intended for building designers and their clients, consultants, and planning officials. The advice given here is not mandatory and the guide should not be seen as an instrument of planning policy; its aim is to help rather than constrain the designer. Although it gives numerical guidelines, these should be interpreted flexibly since natural lighting is only one of many factors in site layout design.”

It is therefore important to apply the BRE guidance flexibly, with careful consideration of the specific site context. Its numerical targets theoretically apply to any built environment, from city centres to rural villages. However, in more tightly constrained environments, achieving the default BRE targets can be very challenging and conflict with other beneficial factors of site layout design. With the above in mind, rigid adherence to the BRE in certain situations could result in an inappropriate form of development. The specific criteria and recommendations of the BRE guidance are presented in Appendix C of this report.

3 Technical model

3.1 Sources of information and assumptions

Architectural drawings prepared by Mountford Pigott and publicly available satellite images have been used to create a 3D computer model of the proposed development in the context of the site and surrounding buildings.

The full list of sources of information used in this assessment is as follows:

- Proposed plans:
 - Proposed site plan (2486-MP-DR-P002-P03)
 - Proposed basement floor plan (2486-MP-DR-P003-REV P10)
 - Proposed ground floor plan (2486-MP-DR-P004-REV P07)
 - Proposed first floor plan (2486-MP-DR-P005-REV P06)
 - Proposed second floor plan (2486-MP-DR-P006-REV P04)
 - Proposed third floor plan (2486-MP-DR-P007-REV P05)
- Proposed elevations
 - Proposed south elevation (2486-MP-DR-P011-REV P03)
 - Proposed north elevation (2486-MP-DR-P013-REV P03)
- Proposed Section
 - Proposed Section BB (2486-MP-DR-P021-REV P03)
- 3D satellite images from Google Maps (accessed December 2025).

Where survey and architectural information was not available, surrounding building heights and massing were approximated based on brick counts and available satellite images. This method is considered to provide sufficient approximation to determine daylight and sunlight performance of the proposed dwellings.

3.2 Scope of assessment

The images to the right show the technical 3D model developed for the analysis. Daylight and sunlight access to all dwellings was assessed using specialist simulation software.

The model includes the following inputs with regards to surface reflectance which can influence the calculations:

- External walls 0.2;
- Internal walls 0.8;
- Floors 0.4;
- Ceiling 0.9.

The above surface reflectance parameters are enhanced values over the typical BRE guidelines and will be achieved through specification of light colour finishes to all internal surfaces within the proposed development.

All existing vertical glazing has been modelled as single-glazed units, with a light transmittance (LT) of 0.8 in line with BS8206 guidelines for clear glazing. New windows and rooflights will be double glazed, with LT of 0.7.

A maintenance factor for dirt of 92% has been applied to all glazing in line with BRE guidance.

The working plane of each habitable room has been set in line with BRE's guidance. Where there is an entrance corridor of less than 1.5m wide to reach the main occupied zone of the room, this was excluded from the assessed working plane.

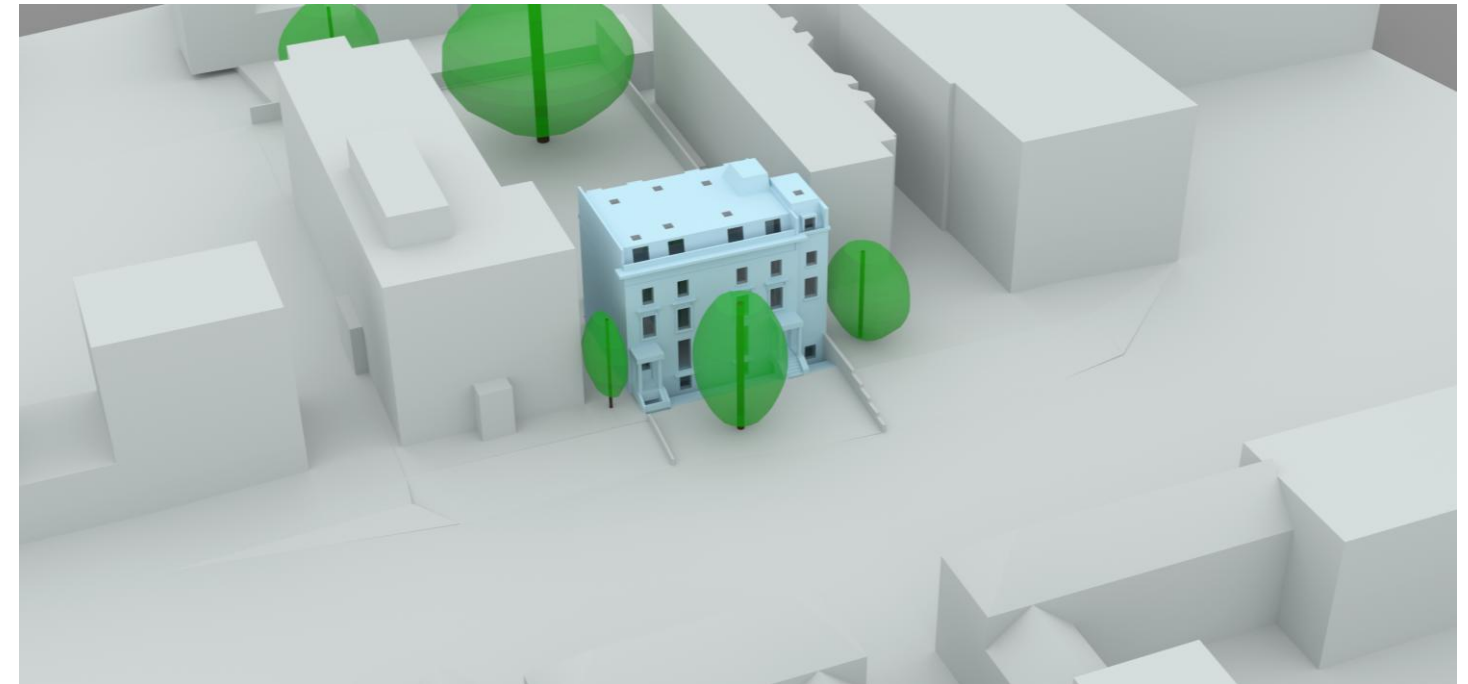


Figure 3: 3D technical model of Astec House and immediate surrounding context, view from southwest.

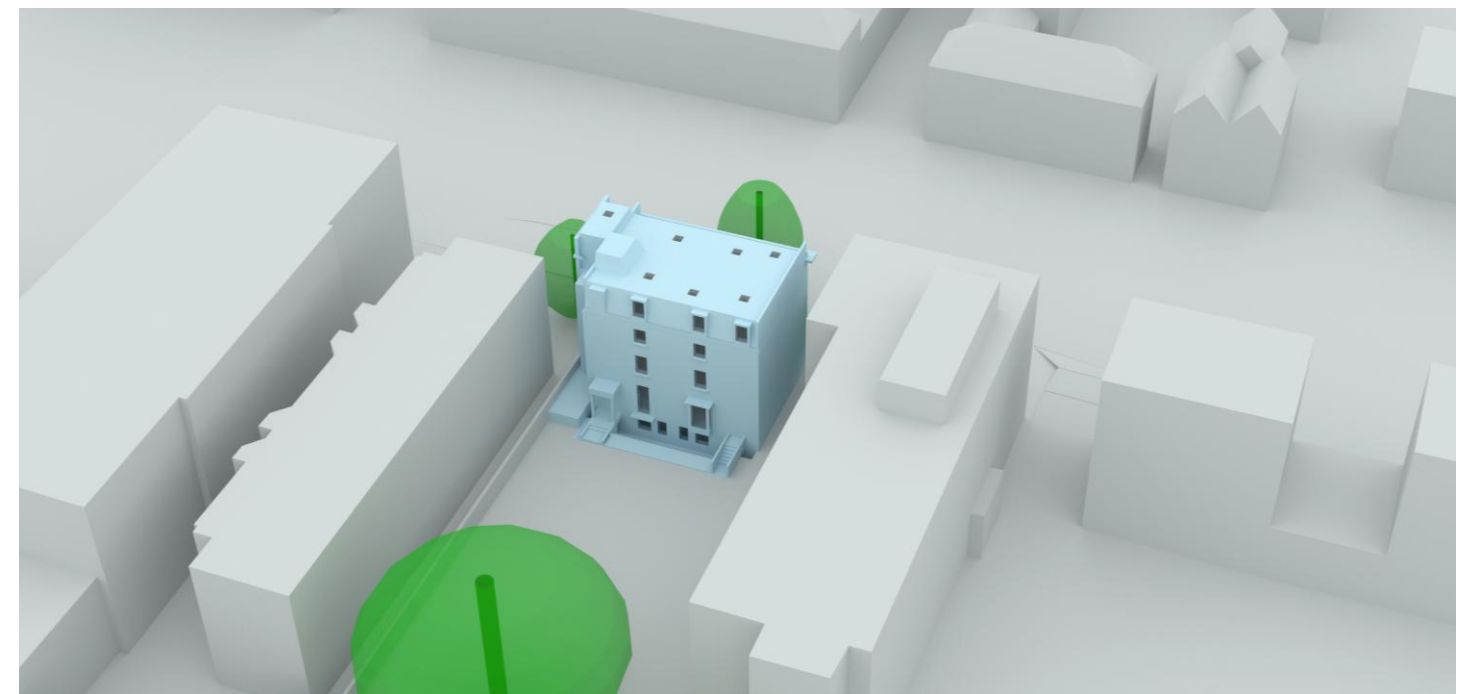


Figure 4: 3D technical model of the Astec House and immediate surrounding context, view from northwest.

3.3 Trees

The analysis was carried out for the proposal with all existing and surrounding trees that will be retained as part of the proposed development. Trees were included within the technical model in line with the Tree Survey and Impact Assessment and Tree Constraints Plan prepared by Keen Consultants (dated December 2025).

Transparencies of tree crowns to solar radiation are modelled based on recommended values for corresponding tree species recommended in Table G1 of the BRE Guide. Reflectance of trees are modelled based on Table G2 of the BRE Guide. Both tables are summarised to the right.

For deciduous tree species that are not covered within Table G1, transparencies of 10% under full leaf condition and 55% under bare branch condition were applied as a conservative approach. Evergreen tree species were assumed to have a transparency of 10% throughout the year.

The technical software outputs a single climate-based daylight assessment result for each assessed entity with varying tree transparencies throughout the year (assuming on average 6 months of bare branch between 21 September to 21 March and 6 months of full leaf between 21 March to 21 September).

Table 1. Transparencies of tree crowns to solar radiation (selected species) (Source: BRE guide).

Common name	Transparency (% radiation passing)	
	Full leaf	Bare branch
Lime (properties used for deciduous trees not within Table G1 of the BRE guide)	10	55
Sycamore	20	60
Evergreen conifers	10	

Table 2. Reflectance of trees (Source: BRE guide)

Tree type	Reflectance (%)	
	Summer	Winter
Trees with open foliage	20	10
Evergreen conifers	10	10

4 Assessment results

4.1 Daylight to rooms

All residential habitable rooms from the proposed development have been included in the analysis.

Open planned studio rooms with bedrooms, study area and kitchenette are modelled as a single space in the assessment. All studio rooms have their bed and study areas located closest to the façade adjacent to windows. The kitchenette spaces are located to the rear of the open planned shared and are designed to be task lit. In line with BRE guidance, the illuminance target of 150 lux for living rooms as the main habitable space has been applied to this open planned rooms, with the kitchenette spaces included in the assessment area.

For rooms where the kitchenettes are separated from the main room areas by full height internal walls, the kitchenettes are intended to be fully task lit and have been excluded from the assessment plane.

The target daylight illuminance levels for rooms have been applied in line with the BRE guidelines, as follows:

- All studio rooms: 150 lux;
- Common room on third floor level: 150 lux.

Figures 5 to 9 illustrate the results of the climate-based daylight analysis. The yellow colour shows where a room achieves the required daylight illuminance for over 50% of the daylight hours of the year. If this area is more than 50% of the room's area, then the room exceeds BRE's daylight recommendations.

The results show that 29no. of the 31no. habitable rooms will meet the BRE daylight targets, which represents 94% of the assessed spaces.

The remaining two rooms (6% of the spaces) will receive daylight levels marginally less than the BRE target, with 49% and 42% of their areas meeting the illuminance target. Both rooms (R2, R3) are located at lower ground floor level with windows to the front façade. For heritage reasons,

it is not considered appropriate to increase the size of the windows connected to these rooms or provide addition windows to them.

Daylight access to all habitable rooms has been maximised as far as feasible and is considered satisfactory for the listed building conversion scheme with notable spatial and heritage constraints.

Detailed numerical results are presented in Appendix A (Daylight to rooms) of this report.

4.2 Sunlight to rooms

All residential rooms with a window facing within 90 degrees due south will receive sunlight levels meeting the BRE target.

The number of residential rooms with access to south facing windows have been maximised in the conversion scheme.

Detailed results are presented in Appendix A (Sunlight to rooms) of the report.

4.3 Sunlight to amenity

There are no private or communal amenity space proposed as part of the development.

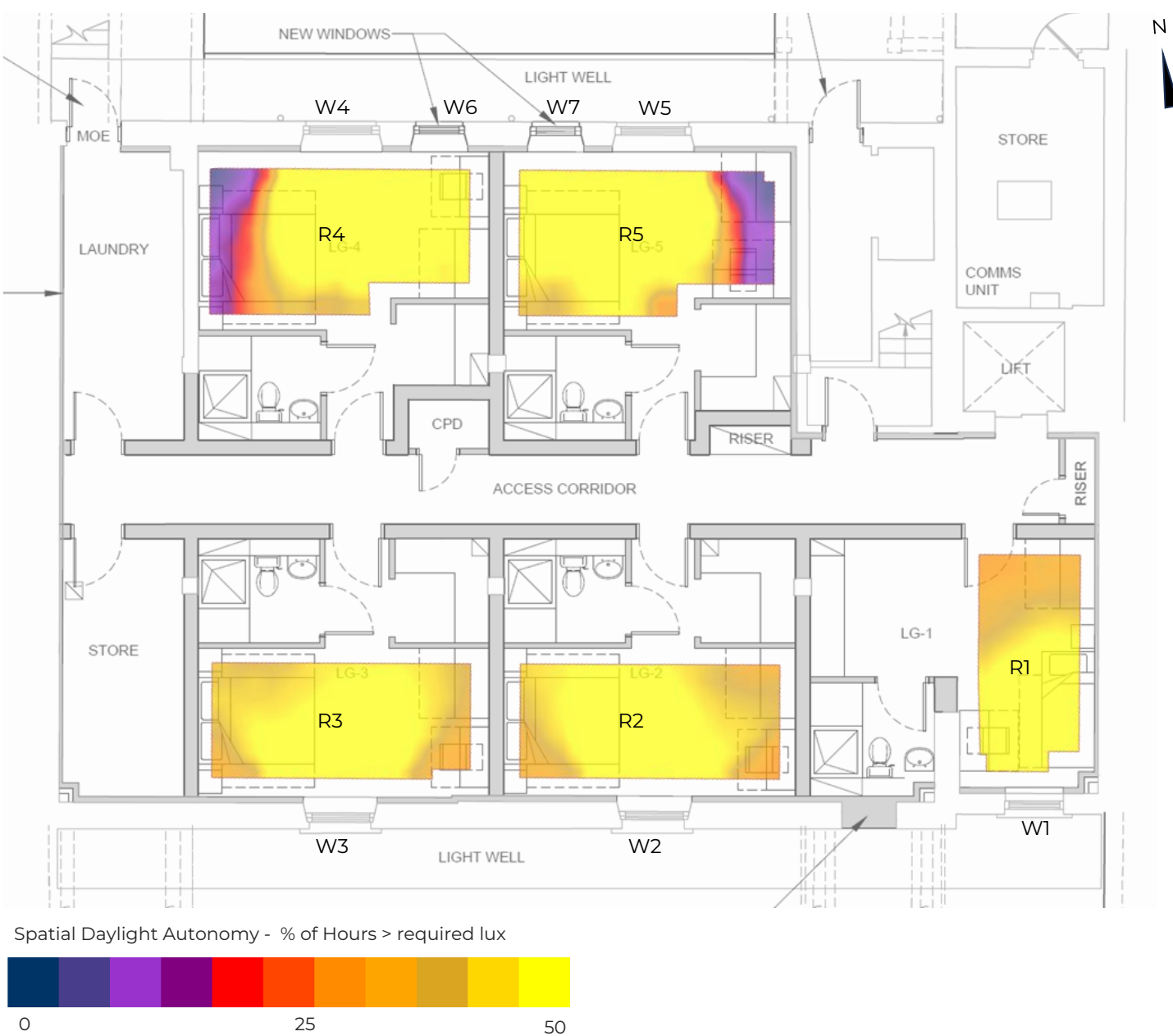


Figure 5. Spatial Daylight Autonomy (SDA) results for habitable rooms at lower ground level (with window and room references).



Figure 6. Spatial Daylight Autonomy (SDA) results for habitable rooms at ground floor (with window and room references).



Figure 7. Spatial Daylight Autonomy (SDA) results for habitable rooms at first floor (with window and room references).



Figure 8. Spatial Daylight Autonomy (SDA) results for habitable rooms at second floor (with window and room references).

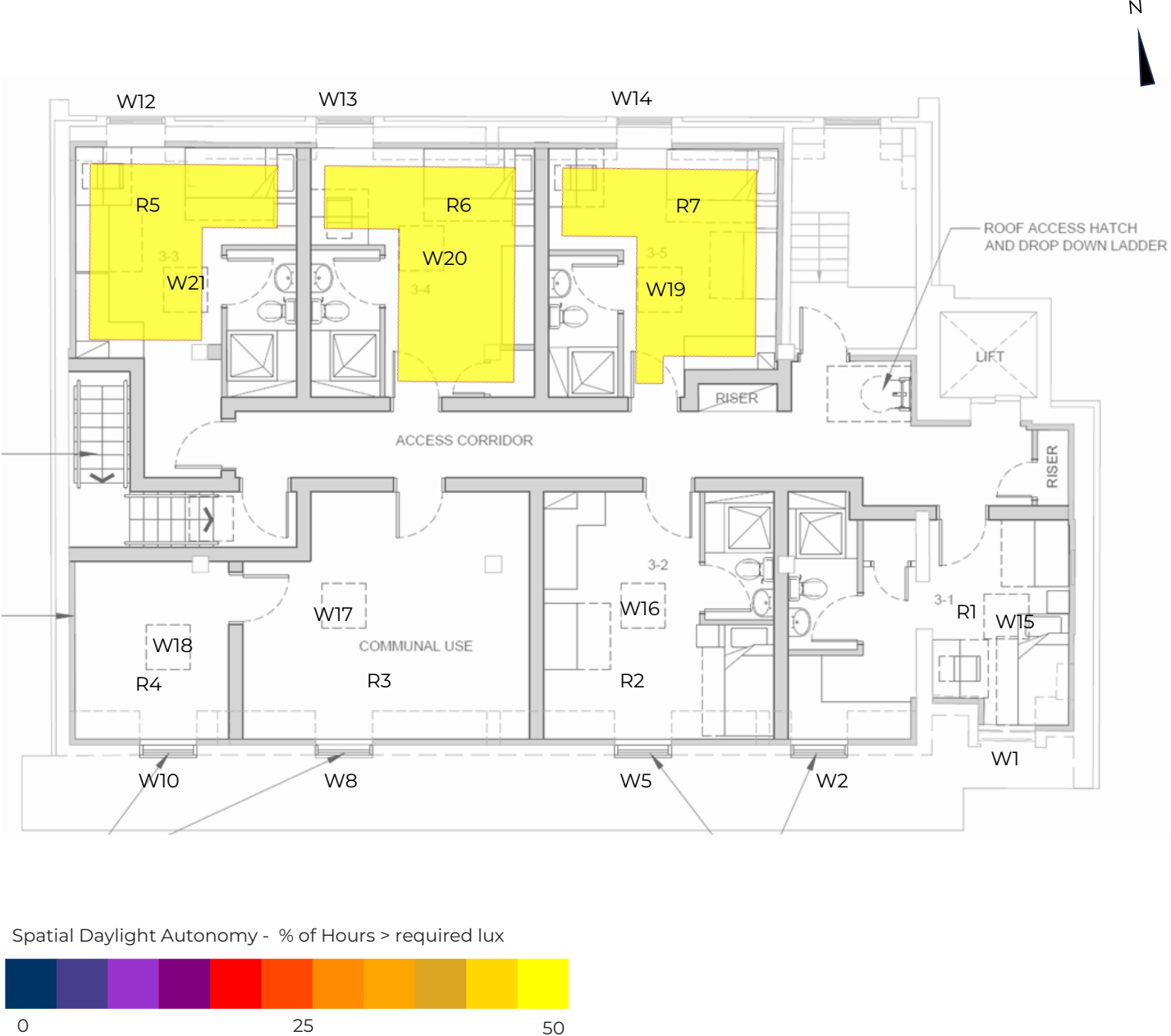


Figure 9. Spatial Daylight Autonomy (SDA) results for habitable rooms at third floor (with window and room references).

5 Conclusions

Based on the findings, it can be concluded that the proposed scheme at Astec House will provide satisfactory levels of natural light to future residents and their homes when assessed against BRE's recommended guidance levels.

Appendix A – Detailed numerical results

Daylight to rooms

Floor Ref	Room Ref	Room Area m2	Effective Area	Median Lux	Area Meeting Req Lux	% of Area Meeting Req Lux	Criteria				Meets BRE Criteria
							Req Lux	Req % of Effective Area	Req % of Daylight Hours	Daylight Hours	
Lower Ground	R1	9.76	6.16	178	3.52	57%	150	50%	50%	4380	Yes
	R2	12.82	8.63	143	4.19	49%	150	50%	50%	4380	Marginally below
	R3	12.78	8.59	140	3.58	42%	150	50%	50%	4380	Marginally below
Ground	R4	14.56	10.05	183	6.23	62%	150	50%	50%	4380	Yes
	R5	14.26	9.81	189	6.44	66%	150	50%	50%	4380	Yes
	R1	12.57	8.13	467	8.13	100%	150	50%	50%	4380	Yes
	R2	13.11	8.58	422	8.58	100%	150	50%	50%	4380	Yes
	R3	11.66	7.33	202	6.71	92%	150	50%	50%	4380	Yes
First	R4	19.69	14.10	257	12.78	91%	150	50%	50%	4380	Yes
	R6	19.25	13.93	207	11.77	85%	150	50%	50%	4380	Yes
	R1	10.25	6.60	739	6.60	100%	150	50%	50%	4380	Yes
	R2	11.74	6.78	641	6.78	100%	150	50%	50%	4380	Yes
	R3	12.48	7.92	462	7.92	100%	150	50%	50%	4380	Yes
	R4	14.78	9.94	364	9.94	100%	150	50%	50%	4380	Yes
	R5	13.11	8.46	518	8.46	100%	150	50%	50%	4380	Yes
	R6	16.35	11.43	219	9.28	81%	150	50%	50%	4380	Yes
	R7	16.72	11.71	229	10.30	88%	150	50%	50%	4380	Yes
	R1	10.34	6.66	466	6.66	100%	150	50%	50%	4380	Yes
Second	R2	11.77	6.77	453	6.77	100%	150	50%	50%	4380	Yes
	R3	12.48	7.92	351	7.92	100%	150	50%	50%	4380	Yes
	R4	14.75	9.92	280	9.92	100%	150	50%	50%	4380	Yes
	R5	7.84	4.75	640	4.75	100%	150	50%	50%	4380	Yes
	R6	16.18	11.28	199	8.48	75%	150	50%	50%	4380	Yes
	R7	17.09	11.79	196	8.71	74%	150	50%	50%	4380	Yes
	R1	13.55	7.49	856	7.49	100%	150	50%	50%	4380	Yes
Third	R2	15.26	10.46	1136	10.46	100%	150	50%	50%	4380	Yes
	R3	21.50	16.09	733	16.09	100%	150	50%	50%	4380	Yes
	R4	8.82	5.61	1741	5.61	100%	150	50%	50%	4380	Yes
	R5	12.27	7.98	635	7.98	100%	150	50%	50%	4380	Yes
	R6	14.40	9.64	444	9.64	100%	150	50%	50%	4380	Yes
	R7	13.97	9.18	556	9.18	100%	150	50%	50%	4380	Yes

Sunlight to rooms

Floor Ref	Room Ref	Window Ref	Window Orientation	Proposed Sunlight Exposure (Hours)	Meets BRE Criteria
Lower Ground	R1	W1	189°	3.4	Yes
				3.4	
Lower Ground	R2	W2	189°	5.4	Yes
				5.4	
Lower Ground	R3	W3	189°	4.8	Yes
				4.8	
Lower Ground	R4	W4	9°N	0	North facing
		W6	9°N	0	
Lower Ground	R5	W5	9°N	0	North facing
				0	
Ground	R1	W1	189°	5.2	Yes
				5.2	
Ground	R2	W2	189°	5.5	Yes
				5.5	
Ground	R3	W3	189°	2.8	Yes
				2.8	
Ground	R4	W4	279°N	0	North facing
		W5	9°N	0	
Ground	R6	W6	99°	0	North facing
		W7	9°N	0	
First	R1	W1	189°	6.7	Yes
				6.7	
First	R2	W2	189°	5.5	Yes
				5.5	
First	R3	W3	189°	5.3	Yes
				5.3	
First	R4	W4	189°	5.7	Yes
				5.7	
First	R5	W5	189°	5.7	Yes
				5.7	
First	R6	W6	9°N	0	North facing
				0	
Second	R1	W1	189°	7.1	Yes
				7.1	

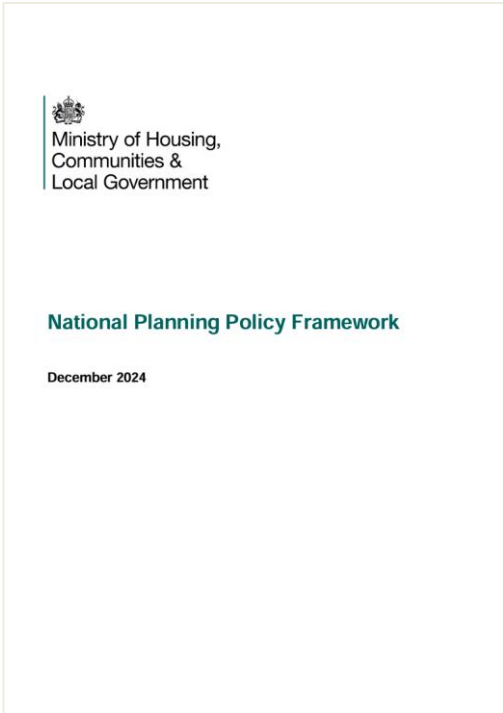
Floor Ref	Room Ref	Window Ref	Window Orientation	Proposed Sunlight Exposure (Hours)	Meets BRE Criteria
Second	R2	W2	189°	7.1	Yes
				7.1	
Second	R3	W3	189°	7.1	Yes
				7.1	
Second	R4	W4	189°	7	Yes
				7	
Second	R5	W5	189°	7	Yes
				7	
Second	R6	W6	9°N	0	North facing
				0	
Second	R7	W7	9°N	0	North facing
				0	
Third	R1	W1	189°	6.4	Yes
		W2	189° Inc	5.7	
		W15	90° Hz	4.3	
Third	R2	W5	189° Inc	6.4	Yes
				7.2	
				4.4	
Third	R3	W8	9°N Inc	7.2	Yes
				4.4	
				4.4	
Third	R4	W10	189° Inc	4.4	Yes
				7.4	
				4.4	
Third	R5	W12	9°N	7.4	Yes
				0	
				8.3	
Third	R6	W13	9°N	8.3	Yes
				0	
				8.3	
Third	R7	W14	9°N	8.3	Yes
				0	
				8.2	
		W19	90° Hz	8.2	Yes
				8.2	Yes

Appendix B – Planning Policies

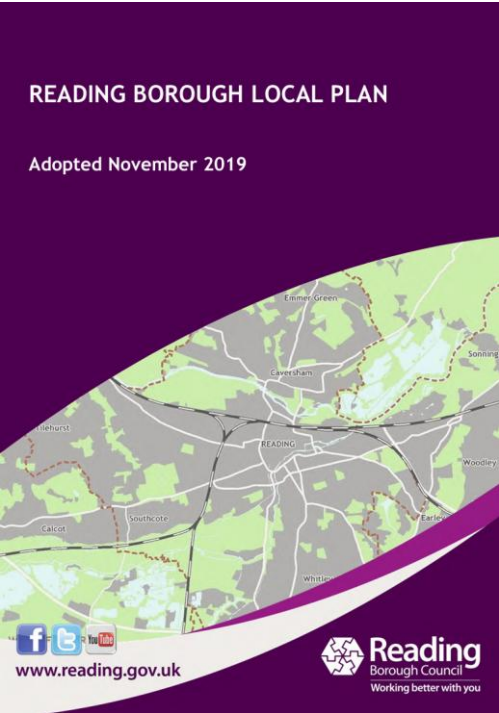
National Planning Policy Framework (2024)

This document provides a framework within which locally prepared plans for housing and other development can be produced.

For example, it sets out how the planning system could achieve sustainable development, effective use of land, well-designed places, protecting the green belt, meeting the challenge of climate change, among several other aspects which precipitate with more specificity into local planning policies.



Reading Borough Local Plan (adopted November 2019)



Planning policy within Reading’s Loal Plan related to daylight and sunlight access at the proposed development is summarised below.

Policy CC8: Safeguarding amenity

Development will not cause a detrimental impact on the living environment of existing residential properties or unacceptable living conditions for new residential properties, in terms of: ... Access to sunlight and daylight.

Appendix C – BRE Guidance

Daylight

The illuminance method is one of the approaches that could be adopted to determine whether a development meets daylight recommendations set out within the BRE guide (2022) and BS EN 17037 (2022).

It entails the use of climatic data for the location of the site and the evaluation of the illuminance levels, measured in lux, over the working plane or assessment grid. The following should be achieved for at least 50% of the assessment grid:

- Bedrooms 100 lux
- Living rooms 150 lux
- Kitchens 200 lux

Where a room has a shared use, the higher target should apply although local authorities could use discretion. The target for living room could be used for a kitchen / living / dining area for example to avoid having small separate kitchens in a design. Conversely, a higher illuminance target may be set for a room in homes for the elderly.

Sunlight to windows

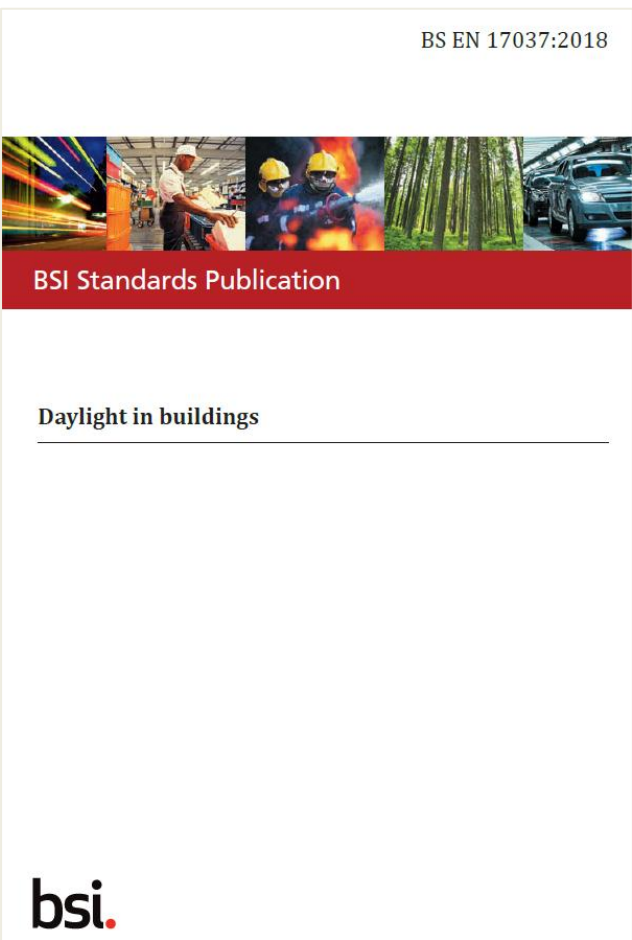
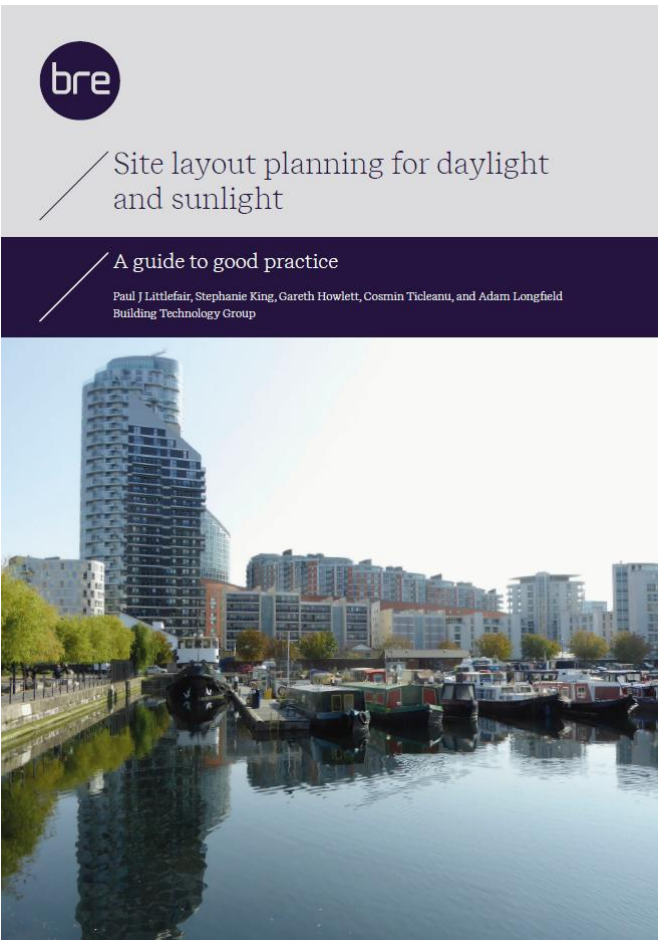
The BRE guide stipulates that in general, a dwelling or non-residential building that has a particular requirement for sunlight, will appear reasonably sunlit provided that:

- At least one window wall faces 90 degrees south.
- A habitable room, preferably a living room, can receive a total of 1.5 hours of sunlight on 21st of March. This analysis is carried out at the centre of the window(s) and sunlight received by different windows can be added provided they occur at different times and sunlight hours are not double counted.

Where groups of dwellings are planned, the design should aim to maximise the number of dwellings that have a main living room window that meets the above recommendations.

Sunlight to open spaces

For an open space to be adequately sunlit, the BRE guide recommends that at least half of the amenity area receives at least 2 hours of sunlight during the 21st of March.



ecolytik

86-90 Paul Street
London
EC2A 4NE

+44 (0) 0203 835 4114
mail@ecolytik.com
ecolytik.com