

23a Great Queen Street, London, WC2B 5RG

# Internal Daylight Assessment

# April 2023

Ref: 23-10734 Rev 1





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Date	12/04/2023	21/04/2023		
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## **1. Executive Summary**

Syntegra Consulting Ltd has been appointed to prepare an Internal Daylight Assessment in order to examine the levels of daylight received by the proposed rooms within the residential development at 23a Great Queen Street, London, WC2B 5RG.

The following can be concluded based on the studies undertaken:

- <u>Internal daylight (sDA)</u>: All habitable rooms have been assessed for internal daylight levels. This has shown that the rooms at Ground, First and Second floor will not achieve the recommended levels of Lux within 50% of the room area. This is due to the highly dense urban setting and inherited window sizes. However, the proposed layouts make the most of the available daylight within the tight courtyard. Furthermore, occupants will have a view of the sky even at ground level with the introduction of roof lights. Therefore, it can be stated that future occupants will see good levels of daylight through the use of the upper floors.
- <u>Annual Sunlight (aSE)</u>: The main living area and additional upper living room both see high levels of sunlight. Therefore, as the future occupants will have access to excellent levels of sunlight the proposed accommodation performs well in terms of sunlight.

Therefore, as the proposed is situated within an extremely dense urban area it is understandable that lower levels of daylight will be seen. However, all habitable rooms have at least two windows and therefore will see some reflected daylight, and the upper floors will receive excellent levels of sunlight meaning the occupants will have access to good levels of daylight and sunlight.

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# 2. Introduction

This report has been prepared to support the planning application for the habitable rooms within the proposed residential unit at 23a Great Queen Street, London, WC2B 5RG.

The report assesses the internal daylight levels within the proposed rooms. The assessment is undertaken in accordance with *"BRE 209 Digest: Site Layout Planning for Daylight and Sunlight – A Guide to Good Practice".* 

The Proposed drawings (in pdf format) of the project were provided by Watson, Bertram & Fell Ltd in **April 2023** and have been used in preparing this report.

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## 3. Assessment Methodology

This study is based on guidelines set out in the *BRE Site Layout Planning for Daylight and Sunlight, A Guide to Good Practice, 2022.* The assessment has been conducted using Radiance software through IES VE plugin software. A 3D model has been built based on the latest architectural drawings.

The simulations assess the Annual Illuminance Target (ET), DA and sDA. Key points of the simulation include:

- Tested on a horizontal plane at 0.85 m above the floor
- Grid size of 0.25m
- Margin of 0.30m from the internal walls,
- Glass surface maintenance factor of 0.95,
- Hourly weather file for a whole year from GBR\_ London.Gatwick.037760\_IWEC
- Windows frames based on drawings received

If a property is considered to have a reasonable expectation of daylight or sunlight the following methodology to assess the impacts has been used.

### Internal Daylight Assessment

### British Standard "Daylight in buildings" (BS EN 17037)

The British Standard "Daylight in buildings" (BS EN 17037) contains advice and guidance on interior daylighting. The guidance contained in the BRE publication (BR 209, 2022) is intended to be used with BS EN 17037 and its UK National Annex.

BS EN 17037 supersedes BS 8206 Part 2 "Code of practice for daylighting" [C2], which contained a method of assessment based on Average Daylight Factor, which is now no longer recommended. For daylight provision in buildings, BS EN 17037 provides a methodology based on target illuminances from daylight to be achieved over specified fractions of the reference plane for at least half of the daylight hours in a typical year.

BS EN 17037 gives three levels of recommendation for daylight provision in interior spaces: minimum, medium and high. For compliance with the standard, a daylit space should achieve the minimum level of recommendation.

The National Annex A of BS EN 17037 also gives minimum values for housing, in living rooms, kitchens, and bedrooms. Achieving higher daylight factor values will give improved daylight provision. This would be particularly appropriate in housing for the elderly because they require more light and are more likely to be at home during the day.

However, interiors with very high daylight levels (for example where a daylight illuminance of 500 lux is exceeded over half the room for more than half of the daylight hours) sometimes have problems with summertime overheating or excessive heat loss in winter.

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#### **Annual Daylight Metrics**

The annual daylight method involves using climatic data for the location of the site (via the use of an appropriate, typical or average year, weather file) to calculate the illuminance from daylight at each point on an assessment grid on the reference plane at an at least hourly interval for a typical year. A target illuminance (ET) is the Illuminance from daylight that should be achieved for at least half of annual daylight hours across a specified fraction of the reference plane in a daylit space.

Daylight Autonomy (DA) is the percentage of occupied hours that each sensor receives more than the illuminance threshold, and Spatial Daylight Autonomy (sDA) is an annual daylighting metric that quantifies the fraction of the area within a space for which the daylight autonomy exceeds a specified value.

#### Specific recommendations for daylight provision in UK dwellings

The UK National Annex gives specific minimum recommendations for habitable rooms in dwellings in the United Kingdom. These are intended for 'hard to light' dwellings, for example in basements or with significant external obstructions or with tall trees outside, or for existing buildings being refurbished or converted into dwellings. The National Annex, therefore, provides the UK guidance on minimum daylight provision in all UK dwellings.

The UK National Annex gives illuminance recommendations of:

- 100 lux in bedrooms,
- 150 lux in living rooms and
- 200 lux in kitchens
- 300 lux in commercial areas.

These are the median illuminances, to be exceeded over at least 50% of the assessment points in the room for at least half of the daylight hours.

#### **Sunlight**

In terms of Sunlight the BRE states that it is generally more important for residential properties. Within section 3.1 of it states *"in housing, the main requirement for sunlight is in living rooms, where it is valued at any time of the day, but especially in the afternoon. Sunlight is also required in conservatories. It is viewed as less important in bedrooms and in kitchens where people prefer it I the morning rather than the afternoon."* 

The guide suggests that designers minimise the number of units/dwellings with living areas windows facing solely north. This is unless there are other factors steering the design such as views and privacy.

The BRE refers to the BS EN 17037 criterion to establish sunlight targets for dwellings. It states that each dwelling should have at least one habitable room receiving 1.5 hours of exposer on the 21<sup>st of</sup> March. There are also medium and high sunlight targets (3 and 4 hours respectively). That being said it must be taken flexibly when considering the sites existing environment, as it may have constraints that determine the orientation of the proposed.

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This is tested by taking the centre point of the inner surface of the window and assesses the amount of sunlight hours it would receive on the 21<sup>st</sup> of March.

Below is a summary of section 3.1 of the guidance:

*"In general, a dwelling or non-domestic building which has a particular requirement for sunlight, will appear reasonably sunlit provided that:* 

- At least one main window faces within 90 degrees of due south, and
- A habitable room, preferably a main living room, can receive a total of at least 1.5 hours of sunlight on 21 March. This is assessed at the inside centre of the window(s); sunlight received by different windows cand be added provided the occur at different times and sunlight hours are not double counted.."

#### **Overshadowing**

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The BRE guidance covers overshadowing in section 3.3. Below is the summary:

"Sunlight in the spaces between and around buildings has an important impact on the overall appearance of a development. It is valuable for a number of reasons, to:

- Provide attractive sunlit views (all year)
- Make outdoor activities like sitting out and children's play more pleasant (mainly warmer months)
- Encourage plant growth (mainly spring and summer)
- Dry out ground, reducing moss and slime (mainly in colder months)
- Melt frost, ice and snow (in winter)
- Dry clothes (all year)"

Any proposed external amenity area should be assessed to determine the levels of sunlight that will be seen. The recommended threshold is 50% of the area should see 2 or more hours of sunlight on the 21<sup>st</sup> of March (equinox).



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Image 1 – Site Location











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Image 3 – First Floor Plan







Image 4 – Second Floor Plan







Image 5 – Third Floor Plan



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Image 6 – Fourth Floor Plan





## 4. Results

## Annual Daylight Results

The annual daylight method involves using climatic data for the location of the site (via the use of an appropriate, typical or average year, weather file) to calculate the illuminance from daylight at each point on an assessment grid on the reference plane at an at least hourly interval for a typical year. A target illuminance (ET) is the Illuminance from daylight that should be achieved for at least half of

annual daylight hours across a specified fraction of the reference plane in a daylit space. Daylight Autonomy (DA) is the percentage of occupied hours that each sensor receives more than the illuminance threshold, and Spatial Daylight Autonomy (sDA) is an annual daylighting metric that quantifies the fraction of the area within a space for which the daylight autonomy exceeds a specified value.

Internal Daylight assessment						
Floor Ref	Room Ref	Room Use	% of Area Meeting Req Lux	Req Lux	Result	
Ground	1	Kitchen/Dining	14%	200	Fail	
First	2	Bedroom	5%	100	Fail	
Second	3	Bedroom	44%	100	Fail	
Third	4	Living Room	64%	150	Pass	
Fourth	5	Upper Living Room	100%	150	Pass	

#### Table 1 – Internal Daylight Assessment

As can be seen in the table above, the rooms on ground, first and second do not meet the recommended levels of daylight as suggested by the BRE. However, the proposed is located in an extremely dense urban setting which is why lower levels of daylight are seen. It is worth noting that every room has dual aspect windows, and the ground floor has generous roof lights installed. Furthermore, the Living Room has been located on the third floor with the upper living area on the fourth floor, both of which will see very good levels of daylight. This shows that the proposed layout makes the most of the available daylight. As future occupants will have access to very good levels of daylight the proposed dwelling performs adequately in terms of daylight.

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### **Annual Sunlight Results**

The BRE refers to the BS EN 17037 criterion to establish sunlight targets for dwellings. It states that each dwelling should have at least one habitable room receiving 1.5 hours of exposure on the 21<sup>st of</sup> March. There are also medium and high sunlight targets (3 and 4 hours respectively). That being said it must be taken flexibly when considering the sites existing environment, as it may have constraints that determine the orientation of the proposed.

This is tested by taking the centre point of the inner surface of the window and assesses the amount of sunlight hours it would receive on the 21<sup>st</sup> of March.

Daylight assessment (Surrounding buildings)					
Floor Ref	Room No.	Room Use	Window Ref	no. of Hours	Result
			W1	0	
Third	4	Living Room	W2	4	
			W3	1.7	
			W4	3.2	
				4.2	High
Fourth	5	Upper Living Room	W2	6.6	
			W1	5.5	
				7.5	High

Table 2 – Internal Sunlight Assessment

As shown in the table above, both the main living area and the upper living room have been assessed for sunlight. The results show that both see excellent levels of sunlight. Therefore, as the future residents will have access to high levels of sunlight the proposed accommodation performs very well in terms of sunlight.





# 5. Conclusion

Syntegra Consulting Ltd has been appointed to prepare an Internal Daylight Assessment in order to examine the levels of daylight received by the proposed rooms within the residential development at 23a Great Queen Street, London, WC2B 5RG.

The following can be concluded based on the studies undertaken:

- Internal daylight (sDA): All habitable rooms have been assessed for internal daylight levels. This has shown that the rooms at Ground, First and Second floor will not achieve the recommended levels of Lux within 50% of the room area. This is due to the highly dense urban setting and inherited window sizes. However, the proposed layouts make the most of the available daylight within the tight courtyard. Furthermore, occupants will have a view of the sky even at ground level with the introduction of roof lights. Therefore, it can be stated that future occupants will see good levels of daylight through the use of the upper floors.
- <u>Annual Sunlight (aSE)</u>: The main living area and additional upper living room both see high levels of sunlight. Therefore, as the future occupants will have access to excellent levels of sunlight the proposed accommodation performs well in terms of sunlight.

Therefore, as the proposed is situated within an extremely dense urban area it is understandable that lower levels of daylight will be seen. However, all habitable rooms have at least two windows and therefore will see some reflected daylight, and the upper floors will receive excellent levels of sunlight meaning the occupants will have access to good levels of daylight and sunlight.

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