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Planning. Design. Economics.

No. 13 Red Lion Square

Daylight and Sunlight Assessment

13-17 Red Lion Square LLP

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1.0 Introduction

1.1 This report considers the levels of daylight and sunlight that will be received within the new accommodation created within the development at No. 13 Red Lion Square, Holborn. The assessment has been prepared on behalf of 13-17 Red Lion Square LLP.

1.2 The proposal comprises the reconfiguration of the existing residential units within the building and includes the conversion of the lower ground floor to residential use.

1.3 The daylight and sunlight assessment considers the levels of natural light that will be experienced within the new residential accommodation created at lower ground floor level and the bedrooms in the floors above that look onto lightwell at the rear of the property.

1.4 The quantitative assessment has been undertaken in accordance with the guidelines set out in the revised Building Research Establishment (BRE) report *"Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice"* (October 2011). The Guide is intended to be advisory and does not contain mandatory standards. The introduction states:

"The guide is intended for building designers and their clients, consultants and planning officials. The advice given here is not 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. In special circumstances the developer or planning authority may wish to use different target values. For example in a historic city centre, or in an area with modern high rise buildings, a higher degree of obstruction may be unavoidable if new developments are to match the height and proportions of existing buildings."

1.5 This assessment has been carried out using the following information:

- Measured site survey drawings;
- The planning application drawings prepared by HWO Architects;
- Ordnance Survey Superplan digital mapping of the area;
- Aerial photography;
- Detailed site observations and a photographic survey of the site and surroundings.

1.6 The report is divided into the following subsequent sections:

- Section 2.0 provides a brief description of the site and surroundings and the nature of the proposed development, highlighting features of relevance to the assessment of daylight and sunlight levels;
- Section 3.0 outlines the scope of the assessment;
- Section 4.0 provides an assessment of the impacts of the proposal on levels of daylight;

- Section 5.0 considers the proposal's impacts in terms of sunlighting;
- Section 6.0 provides a summary of the assessment and our conclusions are drawn.

1.7 The assessment is supported by images extracted from the assessment model and reference plans at Appendices 1-2.

2.0 Site, surroundings and the proposal

Site and Surroundings

2.1 The application site is situated on at the junction of Red Lion Square and Dane Street to the south of Red Lion Square Gardens. It comprises an existing residential building of four storeys above lower and upper ground floor levels. The building contains 12 dwellings between lower ground floor and fourth floor level, with ancillary storage space within the rear sections of the lower ground floor level.

2.2 The site is situated in a mixed residential and commercial area within Central London. The development will not introduce any additional massing and will have no effect on the natural light levels experienced by neighbouring properties.

2.3 A complete description of the site and surroundings is provided in the submitted Planning Statement and Design and Access Statement.

The Proposal

2.4 The proposed development comprises the reconfiguration of the existing accommodation at the site to provide a new residential unit.

2.5 The accommodation within the northern sections of the building between lower ground and fourth floor levels and within the eastern parts of the building between ground and fourth floor level comprises an adjusted form of the existing dwellings in this location and will be served by the building's existing windows. This marginally reconfigured accommodation does not require assessment in terms of daylight and sunlight.

2.6 The assessment has therefore focused on the new accommodation within the rear sections of the building's lower ground floor and the new accommodation with windows looking onto the lightwell to the rear of the building.

2.7 A new two bedroom residential unit will be introduced to the rear section of the building's lower ground floor level in place of existing storage space. This will require the removal of the external fire escape stair and partial demolition of an existing single storey extension. A new infill extension will be introduced at lower ground floor level and the accommodation will be served by the rear lightwell and new light wells along the building's western elevation. The habitable rooms within the new unit created at lower ground floor level have been assessed.

2.8 A rear extension will be introduced to the building and will contain a cycle store at ground floor level. Above ground floor level, the rear extension will include new bedrooms looking into the rear lightwell at first and second floor levels. The bedroom at first floor level has been assessed. Again the assessment of

his room enables inferences to be drawn in relation to natural light conditions within the identical room above.

2.9 The assessment model showing the existing building and proposed development is illustrated at Appendix 1 and the layout of the units' assessed is shown at Appendix 2.

3.0 Scope of Assessment

3.1 This section of the assessment provides an overview of the scope of the daylight, sunlight and shadow assessment in terms of the proposed accommodation assessed. The development and the locations of the window reference points and habitable rooms assessed are illustrated at Appendices 1 and 2.

3.2 As noted in the preceding section, the assessment has considered the levels of natural light introduced within the rear section of the building's lower ground floor level and the new bedroom looking onto the lightwell to the rear of the property at first floor level.

3.3 This comprises the following:

Unit	Floor	Room	Room Ref	Window Refs
Unit 3	Lower ground	Living room/kitchen	Room 1.1	1.1.1; 1.1.2; 1.1.3; 1.1.4 & 1.1.5
		Bedroom 1	Room 1.2	1.2.1
		Bedroom 2	Room 1.3	1.3.1
Unit 7	First	Bedroom 1	Room 2.1	2.1.1 & 2.1.2

Table 3.1: Rooms and Windows Assessed

3.4 The windows serving these rooms have been assessed in terms of ambient daylight (VSC) levels. The rooms they serve have been assessed in terms of internal daylighting (Average Daylight Factor and Daylight Distribution). The south facing windows serving these rooms have been assessed in terms of annual and winter sunlight availability.

3.5 As noted above, the assessment of these rooms enables inferences to be drawn regarding the corresponding rooms in the floors above. For examples the bedroom assessed within unit 7 is comparable to the bedroom directly above which will experience superior levels of natural light.

4.0 Daylight

4.1 This section of the assessment assesses the levels of daylight received at the window reference points and rooms assessed.

Methodology

4.2 The daylight assessment is based on the analysis of Vertical Sky Component (VSC) and Average Daylight Factor (ADF). The following sets out the methodology for calculating VSC and ADF.

Vertical Sky Component

4.3 The level of ambient daylight received by a window is quantified in terms of its Vertical Sky Component (VSC), which represents the amount of vertical skylight falling on a vertical window. The daylight assessment has been based on three dimensional AutoCAD models constructed for the site and surroundings as existing and with the proposed development in place. The heights and locations of the surrounding buildings and the proposed development have been taken from measured site survey information, Ordnance Survey digital plan data, site observations, aerial photography of the site and surroundings and the application drawings.

4.4 The VSC level at each of the windows requiring assessment has been quantified using Waldram Tools daylight and sunlight software (MBS Software Ltd).

4.5 The BRE good practice guide outlines numerical guidelines that represent flexible targets for new developments in relation to the vertical sky component at nearby reference points. The document states that:

*"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 the loss of light is likely to be noticeable." (our emphasis)*

4.6 The guidelines therefore require that either the VSC target or the degree of change in daylighting are met (i.e. if the 27% target is adhered to, there is no requirement under the BRE guidelines for the resultant VSC level to remain at 0.8 times the former VSC level).

Average Daylight Factor

4.7 The BRE guide advises that the calculation of Average Daylight Factor (ADF) provides an alternative means of assessing the level of daylight received by the interior of the room served by a window. It is an appropriate means of assessment for proposed accommodation where the parameters required for the ADF calculations are known.

4.8 The calculation of ADF provides a more sophisticated method of calculating the daylight level experienced within a room than VSC as it takes into account

the size and reflectance of room's surfaces and the number, size and transmittance of its window(s), as well as the ambient daylight level (VSC) received at the window(s).

4.9 The Average Daylight Factor (df) is defined as the average internal illuminance as a percentage of the unobstructed external illuminance under standard overcast conditions.

4.10 ADF can be calculated using the following formula (amended in the updated BRE guide, 2011):

$$df = \frac{TA_w \theta}{A(1-R^2)} \%$$

Where:

- T is the diffuse visible transmittance of the glazing (a value of 0.65 is typical for double glazed clear glass; a value of 0.18 is used for obscured glazing);
- Aw is the net glazed area of the window (m2);
- θ is the angle of visible sky in degrees;
- A is the total area of the room surfaces: ceiling, floor, walls and windows (m2);
- R is the average reflectance (a value of 0.7 is applicable for new/proposed accommodation with light internal surface treatments1).

4.11 The updated BRE guide (2011) introduces a separate procedure for floor to ceiling windows and glazed doors. It states that areas of glazing below the working plane should be treated as a separate window and an extra factor is applied to it to take account of the reduced effectiveness of low level glazing in lighting the room. The BRE states that a value equivalent to the floor reflectance can be taken for this factor. An adjustment factor of 0.3 is appropriate for medium timber floors and has been used in this case.

4.12 The approach to assessing internal daylighting using the ADF method is set out at Appendix C of the BRE guide. The BRE guide and British Standard BS8206 set the following minimum recommended ADF levels for different room types:

- Kitchens: 2%;
- Living rooms: 1. 5%;
- Bedrooms: 1%.

[1] A 0.7 reflectance value assumes white painted walls and ceiling (0.85) and a medium wooden floor (0.3).

Daylight Results

4.13 The development has been designed to ensure that daylight levels within the proposed units are maximised. The following table summarises the VSC and ADF results obtained for the proposed residential accommodation requiring assessment.

			Vertical Sky Component (VSC)		Average Daylight Factor (ADF)		
Unit	**Room Ref**	**Window Ref**	**VSC Level**	**Above/ Below Guide Level**	**ADF Level**	**BS/BRE Guide Level**	**Above/Below Guide Level**
Unit 3	Room 1.1	1.1.1	2.13%	Below	**1.44%**	**1.5/2%**	**Below [marginal]**
		1.1.2	1.61%	Below			
		1.1.3	0.78%	Below			
		1.1.4	0.67%	Below			
		1.1.5*	n/a	n/a			
	Room 1.2	1.2.1	6.11%	Below	**2.53%**	**1%**	**Above**
	Room 1.3	1.3.1	4.34%	Below	**1.66%**	**1%**	**Above**
Unit 7	Room 2.1	2.1.1	14.77%	Below	**1.16%**	**1%**	**Above**
		2.1.2	14.06%	Below			

Table 4.1: Proposed Units – Daylight Results

4.14 The results of the daylight analyses for the proposed units show that while the windows assessed will experience VSC levels below the BRE guide levels, all but one of the rooms assessed will comply with the guide levels for ADF.

4.15 As discussed above, VSC merely provides a measure of the obstructions to skylight taken at the midpoint of each window. It does not take into account the size of each window aperture, the size, layout and nature of the room served by the window, or the number if windows serving a room. In contrast, the calculation of ADF provides a more sophisticated method of calculating the daylight conditions experienced within a room. ADF takes into account the size and reflectance of room's surfaces and the number, size and transmittance of its window(s), as well as the ambient daylight level (VSC) received at the window(s). For these reasons, and particularly given that the some of the rooms assessed are served by multiple windows, ADF is the most appropriate measure of daylight conditions in this case.

4.16 The ADF results for the proposed accommodation assessed demonstrate that all of the rooms assessed will achieve good levels of interior daylight and all but one will comply with the BS/BRE guide levels for their respective room types. The resultant ADF levels are good for accommodation within the lower floors of a historic building situated within an urban environment in Central London (particularly at lower ground floor level).

4.17 A single living room/kitchen at lower ground floor level will experience a level of ADF of 1.44%, against guide levels of 1.5% for living rooms and 2% for kitchens. The bedrooms assessed at lower ground, and first floor levels will all achieve the guide levels for ADF. Given that the bedroom assessed within unit 7 at first floor level achieves the guide levels, it is reasonable to conclude that

the identical room introduced directly above this bedroom will also comply with the BS/BRE guidance.

4.18 Overall, it is considered that the proposed residential units assessed, and by association the accommodation across the scheme, will experience good levels of interior daylight for an urban development project in the context of the BS/BRE guidance.

5.0 Sunlight

5.1 This section of the report assesses the sunlight conditions within the proposed accommodation.

5.2 The methodology is summarised below.

Methodology

5.3 The levels of sunlight availability at the window reference points assessed have been calculated based on the three dimensional AutoCAD models of the site and surroundings with the development in place, using the Waldram Tools daylight and sunlight software. The calculations provide the percentage year round sunlight availability and the percentage of sunlight availability received during the winter months.

5.4 The BRE good practice guide states that the sunlighting experienced by a south facing window should receive more than 25% of annual probable sunlight hours and more than 5% of annual probable sunlight hours during the winter months.

Sunlight Results: Proposed Units

5.5 The following table contains the annual and winter sunlight results for the proposed residential accommodation.

			Annual Sunlight (APSH)		Winter Sunlight (WPSH)	
Unit	**Room Ref**	**Window Ref**	**APSH Level**	**Above/below Guide level**	**WPSH Level**	**Above/below Guide level**
Unit 3	Room 1.1	1.1.1*	n/a	-	n/a	-
		1.1.2*	n/a	-	n/a	-
		1.1.3	0%	Below	0%	Below
		1.1.4	1%	Below	0%	Below
		1.1.5	n/a	-	n/a	-
	Room 1.2	1.2.1*	n/a	-	n/a	-
	Room 1.3	1.3.1	5%	Below	0%	Below
Unit 7	Room 2.1	2.1.1	24%	Below (marginal)	2%	Below
		2.1.2	22%	Below (marginal)	3%	Below

Table 5.1: Proposed Units – Sunlight Results [* windows not within 90 degrees of due south]

5.6 The results of the sunlight analyses for the proposed dwelling demonstrate that the lower level south facing windows assessed will experience annual and winter sunlight levels below the BRE guide levels. This is common for accommodation within the lower floors of residential buildings in urban locations, particularly where the accommodation looks onto lightwells or enclosed courtyard spaces. In this case, the development comprises the conversion/reconfiguration of an existing building and the residual levels of annual and winter sunlight are an unavoidable consequence of the building's

location/orientation, urban context and relationship with neighbouring buildings. Indeed, any residential accommodation within this building will experience lower levels of annual and winter sunlight due to the enclosed nature of the courtyard space to the rear which is contained by buildings fronting Eagle Street to the south.

5.7 Notwithstanding this, the windows assessed at first floor level will experience an annual sunlight levels only very slightly below the guide levels (**24% and 22% against a guide** level of 25%). Moreover, the levels of sunlight experienced by the new rooms being introduced will be consistent with, or superior to, these received by the existing residential accommodation at No. 13 Red Lion Square. Importantly, as outlined in the previous section, all of the rooms with lower levels of sunlight will experience good levels of interior daylight (ADF) either above or close to the guide levels. As such, these rooms will still experience good levels of natural light for an urban location in Central London.

6.0 Summary and Conclusions

6.1 The results of the assessment demonstrate that the proposed development at No. 13 Red Lion Square will not cause any materially unacceptable daylight and sunlight effects.

6.2 The development will not cause any effects on the natural light levels experienced by neighbouring properties.

6.3 The assessment of the proposed accommodation within the development, similarly, show that the habitable rooms assessed will achieve good levels of internal daylighting (ADF). This is the primary measure of natural light for proposed accommodation, often served by multiple windows.

6.4 While the sunlight levels experienced by the windows assessed at lower ground floor level will be below the BRE guide levels, this is typical of lower level accommodation served by lightwells in Central London and the windows assessed at first floor level will experience annual sunlight levels only marginally below the guide levels. The residual annual sunlight levels experienced by the windows assessed will be consistent with, or superior to, those already experienced by the residential accommodation in the building and are a function of the building's location, orientation and relationship with neighbouring properties. Importantly, the rooms assessed will retain good levels of natural light, measured in terms of interior daylight (ADF).

6.5 For these reasons, and particularly having regard to the intensively developed urban character of this area of Central London and the inherently flexible, suburban basis of the BRE guidance, the levels of natural light that will be received by the proposed accommodation at No. 13 Red Lion Square are considered acceptable in the context of the BRE guide and relevant planning policy.