British Standard Daylighting Calculations and BRE Daylighting and Sunlighting Study

Proposed Redevelopment / Refurbishment of New Garden House, Hatton Garden, London EC1

Introduction

Drivers Jonas have been appointed by Wilmar Estates Limited to undertake a British Standard daylighting study and a BRE daylighting and sunlighting study. The British Standard daylighting study analyses the effect of the proposed redevelopment of the Sweeps Building into residential. The BRE study will analyse the effect of the proposed redevelopment / refurbishment of New Garden House on the residential properties along St Cross Street and Leather Lane.

Summary of Results

British Standard – Daylighting results

The Average Daylight Factor analysis will clearly demonstrate that thirty eight habitable rooms out of a possible forty pass the daylighting standards for their appropriate use by reference to British Standard 8206, Part II. The remaining two bedrooms only just fail the Average Daylight Factor test, both just failing by 0.1%. This level of daylight will still be good, especially as the design has been restricted by the existing structure of the Sweeps Building. Therefore the proposed scheme is acceptable in terms of daylighting standards for residential use.

BRE – Daylighting and Sunlighting results

The results will show that the proposed development passes the daylighting and sunlighting tests set out in the BRE guidelines for the residential properties to St Cross Street and Leather Lane. Therefore the proposed scheme is acceptable and will not produce a notice loss of daylight or sunlight to its neighbouring residential properties.

Analysis

The following calculations are based on site survey information and drawings showing the proposal from Allford Hall Monaghan Morris Architects, drawing series A437/PL102-108, A437/PL110-112, A437/PL050-PL058 and A437/PL068-069.

Attached is an A4 Ordnance Plan (Appendix 1) of the site with the relevant reference points along St Cross Street and Leather Lane indicating the points taken for the BRE daylighting and sunlighting calculations. Additionally attached are floor plans of the proposed residential Sweeps Building with referencing for room identification (Appendix 2-4).

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British Standard Average Daylight Factor Calculations

The daylighting calculations have been based on the formula as set out in the British Standard document BS8206 Pt 2 'Lighting for buildings code of practice for daylighting'. The minimum values of Average Daylight Factor in dwellings are 1% for bedrooms, 1.5% for living rooms and 2% for kitchens.

Certain constants were assumed in the formula, which are as follows:-

The diffuse light transmittance of glazing was 0.65, which is the value for a sealed unit of two 6mm clear glass sheets. A correction factor of 0.9 for the effects of dirt has been applied giving a total diffuse light transmittance of 0.6.

The average reflectance of interior surfaces was taken as 0.5, which is a value for a white ceiling and mid reflectance of walls.

Calculations and results

The Average Daylight Factor (ADF) results were obtained for each room individually and expressed as a percentage. Where there were two or more windows within one room the ADF was found separately for each window, and the results summed.

Ground Floor

There are no habitable rooms at ground floor level.

First Floor

Living / Dining room (A) passes with an Average Daylight Factor of 1.5%

Bedroom 1 (B) fails with an Average Daylight Factor of 0.9%

Bedroom 2 (C) passes with an Average Daylight Factor of 2.7%

Second Floor

Bedroom 2 (A) passes with an Average Daylight Factor of 2.1%

Bedroom 1 (B) passes with an Average Daylight Factor of 1.4%

Bedroom 1 (C) passes with an Average Daylight Factor of 1.3%

Bedroom 2 (D) passes with an Average Daylight Factor of 1.0%

Bedroom 1 (E) fails with an Average Daylight Factor of 0.9%

Bedroom 2 (F) passes with an Average Daylight Factor of 1.9%

Bedroom 3 (G) passes with an Average Daylight Factor of 1.4%

Living Room (H) passes with an Average Daylight Factor of 4.1%

Living Room (I) passes with an Average Daylight Factor of 3.7%

Living Room (J) passes with an Average Daylight Factor of 2.6%

Bedroom 1 (K) passes with an Average Daylight Factor of 2.8%

Bedroom 1 (L) passes with an Average Daylight Factor of 2.8%

Living Room (M) passes with an Average Daylight Factor of 2.6%

Living Room (N) passes with an Average Daylight Factor of 3.4%

Third Floor

Bedroom 1 (E) passes with an Average Daylight Factor of 1.7%

No other rooms were calculated as reciprocal rooms on the second floor passed.

Fourth Floor

No rooms were calculated as reciprocal rooms on the second floor passed.

Fifth Floor

No rooms were calculated as reciprocal rooms on the second floor passed.

Conclusion / Recommendations

The Average Daylight Factor analysis clearly demonstrate that thirty eight habitable rooms out of a possible forty pass the daylighting standards for their appropriate use by reference to British Standard 8206, Part II. The remaining two bedrooms only just fail with Average Daylight Factors of 0.9%, whereas the British Standards require 1%.

Bedroom 1 (B) on the first floor only just fails due to the size of the bedroom compared to the area of glazed window. The existing first floor level cannot provide any further windows to this room as it is adjoining neighbouring properties. Alternatively, the size of the bedroom could be reduced to ensure this room passes, although it seems pointless as the functional quality of the main bedroom will be reduced. As this room is a bedroom, it does not require task lighting and therefore the quality of the daylight it will receive will be adequate for its use.

Bedroom 1 (E) on the second floor only just fails, although the daylighting levels will be better than the calculation suggests, as the proposed extension to New Garden House does not run the full extent of the main window. The Average Daylight Factor calculation uses an angle subtended by the visible sky as one of its permutations, which is produced by measuring an obstruction normal to the glass, at the centre point of the window. However, the obstruction does not run the full extent of the window, so therefore the Average Daylight Factor should be better than suggested. Again, this room is a bedroom that does not require task lighting. Therefore we would not make any recommendations for altering the scheme, as the quality of the daylight it will receive will be adequate for its use.

BRE guidelines

We have undertaken our study of the above site based upon the Building Research Establishment Guidelines set out in the report of 1991 entitled "Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice". The guide is intended for building designers and their clients, consultants and planning officials, and is not mandatory.

Daylighting

The BRE guide has a process to see whether there is an infringement to daylighting of adjoining properties and normally only residential are considered.

The first of these tests is to strike a line at an angle of 25° from the centre of existing windows. If the profile of the proposed building subtends an angle greater then 25° then the second test needs to be applied. This involves using a skylight indicator, which calculates the Vertical Sky Component at the centre point of each affected window. A pass rate of 27% Vertical Sky Component (VSC) is given in the BRE guidelines. If a window does not achieve the 27 % Vertical Sky Component, then the third test is used. This involves calculating the Vertical Sky Component of the window in the existing situation, i.e. before redevelopment. If when the Vertical Sky Component, with the new development in place, is both less than 27% and less than 0.8 its former value, then the occupants of the existing building will notice the reduction in the amount of skylight.

Sunlighting

The BRE guide then uses the skylight indicator, at the same reference points to calculate the annual probable sunlight hours, which is expressed as a percentage. The guidelines say, " If this window reference point can receive more than one quarter of annual probable sunlight hours... including at least 5% of annual probable sunlight hours during the winter months between 21 September and 21 March, then the room should still receive enough sunlight." Sunlighting may be adversely affected if less sunlight is experienced than this, and may be noticeable if less than 0.8 times former sunlight is experienced after the development is completed.

Calculations and Results

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DAYLIGHTING AND SUN LIGHTING CALCULATIONS

	P1		P2		P3	
	Existing	Proposed	Existing	Proposed	Existing	Proposed
First Floor Level						
Vertical Sky Component	13.0%	13.0%	20.0%	19.5%	20.5%	20.5%
	Ratio 1.0 - Pass		Ratio 0.9 - Pass		Ratio 1.0 - Pass	
Total Annual Probable Sunlight Hours	38.0%	38.0%	22.0%	22.0%	26.0%	25.0%
Of which % in winter months	0.0%	0.0%	2.0%	2.0%	2.0%	2.0%
	Ratio 1.0 - Pass		Ratio 1.0 - Pass		Ratio 0.9 - Pass	
Second Floor Level						
Vertical Sky Component	18.0%	17.5%	24.5%	24.5%	25.0%	24.0%
	Ratio 0.9 - Pass		Ratio 1.0 - Pass		Ratio 0.9 - Pass	
Total Annual Probable Sunlight Hours	50%	49%	29%	29%	n/a	34%
Of which % in winter months	4%	3%	3%	3%	n/a	7%
	Ratio 0.9 - Pass		Ratio 1.0 - Pass		Pass	
Third Floor Level						
Vertical Sky Component	21.0%	19.5%	n/a	30.0%	n/a	28.5%
	Ratio 0.9 - Pass		Pass		Pass	
Total Annual Probable Sunlight Hours	59.0%	58.0%	n/a	36.0%	n/a	38.0%
Of which % in winter months	5.0%	4.0%	n/a	7.0%	n/a	7.0%
	Ratio 0.9 - Pass		Pass		Pass	
Fourth Floor Level						
Vertical Sky Component	27.0%	23.5%	no window		no window	
	Ratio 0.9 - Pass					
Total Annual Probable Sunlight Hours	n/a	65%				
Of which % in winter months	n/a	10%				

Point 1

Daylighting Calculations

Point 1 passes the third daylighting tests at first, second and third floor levels achieving ratio levels of 1.0, 0.9 and 0.9 respectively.

Sunlighting Calculations

Point 1 passes the sunlighting tests at first, second and third floor levels achieving ratio levels of 1.0, 0.9 and 0.9 respectively.

Point 2

Daylighting Calculations

Point 2 passes the third daylighting tests at first and second floor levels achieving ratio levels of 0.9 and 1.0 respectively. Point 2 passes at third floor level achieving a Vertical Sky Component level of 30%.

Sunlighting Calculations

Point 2 passes the sunlighting tests at first and second floor levels both achieving ratio levels of 1.0. Point 2 passes the sunlighting tests at third floor level achieving an Annual Probable Sunlight Hour of 36%, of which 7% are in winter months.

Point 3

Daylighting Calculations

Point 3 passes the third daylighting tests at first and second floor levels achieving ratio levels of 1.0 and 0.9 respectively. Point 3 passes at third floor level achieving a Vertical Sky Component level of 28.5%.

Sunlighting Calculations

Point 3 passes the sunlighting tests at first floor level achieving a ratio level of 1.0. Point 3 passes the sunlighting tests at second and third floor levels achieving an Annual Probable Sunlight Hours over the recommended 25% of which 5 are in winter months.

Conclusion / Recommendations

The results show that the proposed development passes the daylighting and sunlighting tests set out in the BRE guidelines for the residential properties to St Cross Street and Leather Lane. Therefore the proposed scheme is acceptable and will not produce a notice loss of daylight or sunlight to its neighbouring residential properties.

We are assuming that Nos. 24 and 25 St Cross Street are residential, although planning records do not indicate any residential properties currently listed.