
Daylight & Sunlight Simulation Analysis

61-65 Charlotte Street

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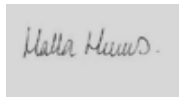
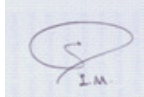
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EXECUTIVE SUMMARY

Energy Rating Services has been instructed to carry out a detailed daylight and sunlight analysis on the potential changes to light amenity to the neighboring properties for the 61-65 Charlotte street proposed extension project.

The analysis is based upon the Building Research Establishment (BRE) guidelines '**Site Layout Planning for Daylight and Sunlight**', which provides the criteria and methodology for calculation in connection to daylight and sunlight.

The RADIANCE lighting simulation package, developed by the Lawrence Berkeley Laboratory in California, in conjunction with IES modelling software and interface has been used to perform the daylight simulations. Calculations for Annual Sunlight Availability were performed using IES modelling software SUNCAST.

Results showed that the impact of the proposed changes to 61-65 Charlotte Street, on daylight and sunlight received by 12 Goodge Pl. is within the guidelines contained in BRE Report for both daylight and sunlight.

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SECTION 1 INTRODUCTION

GENERAL

- Energy Rating Services has been appointed to carry out an analysis on the potential changes to light amenity to the neighboring properties for the 61-65 Charlotte Street proposed project.
- The BRE document; 'Site Layout Planning for Daylight and Sunlight' has been used as the base for this assessment.
- The existing and proposed building along with the neighboring buildings have been modelled using Integrated Environmental Solutions Virtual Environment (IES-VE), version 2014.2.0.0.
- The assessment involved the analysis of the property of 12 Goodge Pl. windows that are in closest proximity to the proposed extension. All the windows assessed within the property fully complied with the BRE recommendations
- The location of those windows can be identified in Figure 3.
- Due to the orientation of the windows they would not normally require sunlight analysis. However, it has been analysed for information purposes.
- Based on the BRE document, the following methods were used for measuring the daylight and sunlight:
 - Vertical Sky Component (VSC)
 - No Sky Line
 - Average Daylight Factor (ADF)
 - Annual probable sunlight hours (APSH)

THE SITE

The site is located in London (61-65 Charlotte street, London), the location in the IES model was assigned as London.

The proposal includes refurbishment, redevelopment and extension of 61-65 Charlotte Street. It includes retention of the existing front façade, replacement of the existing rear extension and an internal refurbishment.

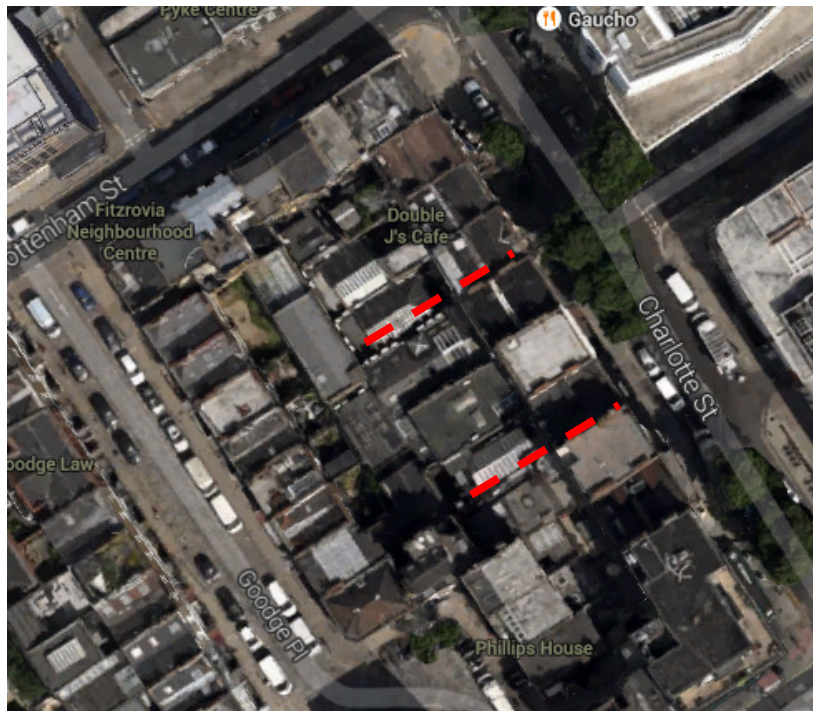


Figure 1 Site Location

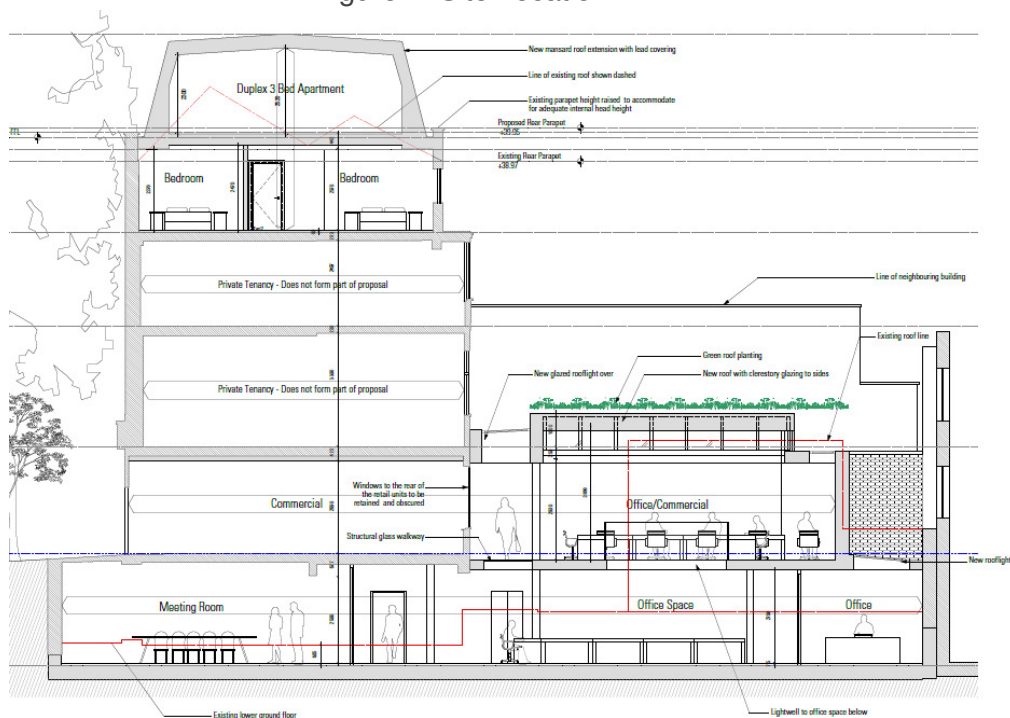


Figure 2 Cross section showing existing (Red) and proposed



Figure 3: The location of the windows tested

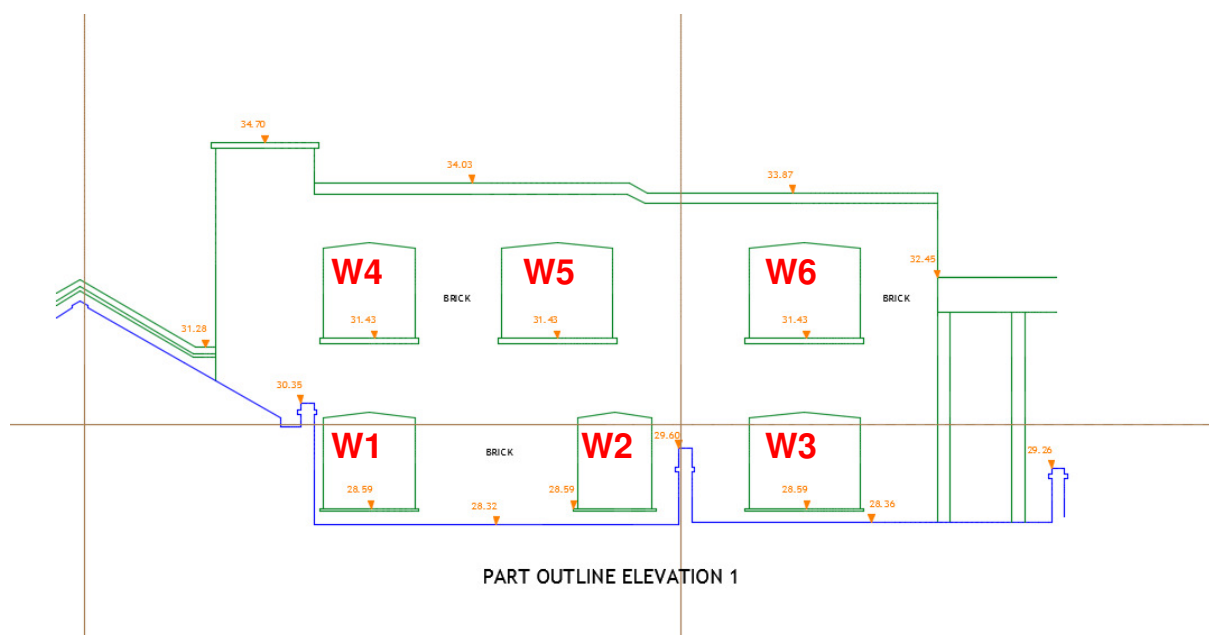


Figure 4: Elevation of neighboring back building (12 Goodge Pl.)

DOCUMENTS CONSIDERED

The models of the existing and the proposed have been constructed based on the architectural drawing provided, a list of the drawing references are listed in Table 1 below.

Table 1: Drawings reference

Description	Drawing Reference
Floor Plan	696-EXGA00-P1 696-EXGA01_02-P1 696-GA00-OptA-P1 696-GA01-P1
Sections	696_GS01-Ex 696_GS02-Ex 696_GS03-Ex 696_GS01-P1 696-GS02-P1 696-GS03-P1 696-GS05-P1
Neighboring elevation	13478-10

SECTION 2 TESTS & RESULTS

If any part of a new building or extension measured in a vertical section perpendicular to a main window wall of an existing building, from the centre of the lowest window, subtends an angle of more than 25 degree to the horizontal, then the diffuse daylighting of the existing building may be adversely affected.

The adjacent windows of 12 Goodge P, shown in Figure 3, require further analysis due to their proximity to the site.

Reasonable assumptions were made for the internal layout of the rooms behind the fenestrations of the building. Room heights were assumed to be 2.7m based on the total height of the building.

VERTICAL SKY COMPONENT (VSC)

The BRE document definition of the (VSC) is: Ratio of the part of illuminance, at a point on a given vertical plane that is received directly from a CIE standard overcast sky, to illuminance on a horizontal plane due to an unobstructed hemisphere of this sky. Usually the 'given vertical plane' is the outside of a window wall. The VSC does not include reflected light, either from the ground or from other buildings.

The VSC is usually expressed as a percentage and the maximum value for a completely unobstructed window is slightly less than 40%. The recommendations set down in the BRE report, 'Site layout for daylight and sunlight, a guide to good practice', would indicate, for residential properties, that a VSC value of greater than 27% is acceptable.

The BRE guide explains that diffuse daylight may be adversely affected if, after a development, the VSC is both less than 27% and less than 0.8 times its former value.

It should be noted that the Guide itself, within the introduction, states that the advice given was not mandatory and the Guide should not be seen as an instrument of planning policy, its aim being to help rather constrain the designer. Although it gives numerical guidelines, these should be interpreted flexibly.

The RADIANCE lighting simulation package in IES-VE, has been used to perform the daylight simulations.

The results of the VSC for the windows are shown in Table 2. The VSC of the ground floor windows (1-3) have a value of less than 27% in the existing condition. The results for the proposed scenario show that although windows (1-5) have a VSC less than 27%, none of the windows will have a reduction of less than 0.8 the former. This indicates that the proposed changes, of 61-65 Charlotte Street, will have negligible impact on the neighboring amenity in terms of daylight.

Table 2: VSC Results

Room/ Window		Existing VSC (%)	Proposed VSC (%)	Proposed/Existing	Condition
Room1	W1	19.83	16.55	0.83	Pass
Room2	W2	22.54	20.01	0.88	Pass
Room 3	W3	22.17	20.94	0.94	Pass
Room 4	W4	27.51	26.08	0.95	Pass
Room 5	W5	27.90	26.28	0.94	Pass
Room 6	W6	29.53	27.72	0.93	Pass

AVERAGE DAYLIGHT FACTOR (ADF)

The BRE document defines ADL as: The ratio of total daylight flux incident on the working plane to the area of the working plane, expressed as a percentage of the outdoor illuminance on a horizontal plane due to an unobstructed CIE standard overcast sky.

The results of the ADF for the tested rooms are shown in Table 3 below. Results are highlighting that the Average Daylight Factors were not reduced in the proposed model and maintained their previous levels.

Table 3: ADF Results

Room/ opening		Existing ADF	Proposed ADF	Condition
Room1	W1	2.6%	2.6%	Pass
Room 2	W2	2.1%	2.1%	Pass
Room 3	W3	3.1%	3.1%	Pass
Room 4	W4	1.8%	1.8%	Pass
Room 5	W5	2.1%	2.1%	Pass
Room 6	W6	2.2%	2.2%	Pass

ANNUAL PROBABLE SUNLIGHT HOURS (APSH)

APSH is the total number of hours in the year that the sun is expected to shine on the centre of each window, allowing for average levels of cloudiness for the location in question. This test is usually used to test façade within 90 degrees of due south.

The BRE Handbook notes that:

“...a south facing window will, in general, receive most sunlight, while a north facing one will receive it only on a handful of occasions. East and west facing windows will receive sunlight only at certain times of day”.

For existing residential buildings, the BRE Handbook suggests that: *“all main living rooms of dwellings... should be checked if they have a window facing within 90° of due south. Kitchens and bedrooms are less important, although care should be taken not to block too much sun”.*

Due to the orientation of windows 1-6, they do not require an APSH test. However, the analysis has been carried out for information purposes.

The BRE guide explains that sunlight availability may be adversely affected if the centre of the window:

- Receives less than 25% of annual probable sunlight hours, or less than 5% of annual probable sunlight hours between 21st of September and 21st March and;
- Receives less than 0.8 times its former sunlight hours during either period and;
- Has a reduction in sunlight received over the whole year greater than 4% of annual probable sunlight hours.

Table 4: APSH Results

Room/ opening		Existing Average Probable Sunlight Hours (%)			Proposed Average Probable Sunlight Hours (%)			Condition
		Winter	Summer	Total	Winter	Summer	Total	
Room1	W1	11.01	19.88	16.49	10.76	19.21	15.98	Pass
Room 2	W2	11.97	22.89	18.72	13.55	19.63	17.31	Pass
Room 3	W3	14.49	21.31	18.70	14.55	22.11	19.22	Pass
Room 4	W4	14.55	24.44	20.66	14.55	24.52	20.71	Pass
Room 5	W5	14.55	28.63	23.25	14.55	28.38	23.10	Pass
Room 6	W6	14.55	32.75	25.80	14.55	32.65	25.74	Pass

No SKY LINE

The No sky line is the outline on the working plane of the area from which no sky can be seen. This is to determine the light distribution in a room.

The percentage area of no sky view is shown for each room in Table 5 below. The results indicate the rooms have 100% sky view of the sky on the working plane level, with 0.5m margins to the walls. The proposed project did not have an effect on the room's skyline of rooms 1-6.

Table 5: Sky View Area Results

Room/ opening		Existing Sky View area	Proposed Sky View area	Condition
Room1	W1	100%	100%	Pass
Room 2	W2	100%	100%	Pass
Room 3	W3	100%	100%	Pass
Room 4	W4	100%	100%	Pass
Room 5	W5	100%	100%	Pass
Room 6	W6	100%	100%	Pass

SECTION 3 CONCLUSION

The assessment in this report involved the analysis of the property of 12 Goodge Pl. windows that are in closest proximity to the proposed extension of 61-65 Charlotte Street.

The BRE document; 'Site Layout Planning for Daylight and Sunlight' has been used as the base for this assessment. The daylight analysis was based on the evaluation of the Vertical Sky Component, the Average Daylight Factor and the light distribution (No Sky Line).

Overall, the impact of the proposed scheme is considered to have negligible impact on the neighboring amenities of 12 Goodge Pl. The results show that of the 6 windows tested all 6 will fully comply with the BRE recommendations for daylight in VSC terms as all the resulting proposed values are more than 0.8 of the original. Moreover, both the Average Daylight Factor and the light distribution showed no reduction in the proposed model in comparison to the existing.

Due to the orientation of the windows they would not normally require sunlight analysis. However, it has been analysed for information purposes. Those results indicated that not only the reduction complies with the BRE requirements, but also due to the change of the roof outline, the total percentage of Annual Probable Sunlight Hours (APSH) of windows 3 & 4 will be higher than the existing.

The impact of the proposed scheme on daylight and sunlight received by 12 Goodge Pl. is within the guidelines contained in BRE Report 'Site layout planning for daylight and sunlight; a guide to good practice' for both daylight and sunlight.