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31 Percy Street, London
Daylight/Sunlight Report

31 PERCY STREET, LONDON
Daylight/Sunlight Report

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Contents

Registration of Amendments

Revision	Amendment Details	Revision Prepared By	Revision Approved By

1.0 INTRODUCTION

1.1 Create Consulting Engineers Ltd has been commissioned by GGC Design Ltd on behalf of Path Estates Ltd to prepare a Daylight/Sunlight Report in support of the planning application for an extension to the existing property at 31 Percy Street.

1.2 This report assesses both the impact of the proposed rear extension on the amenity of the neighbouring buildings for daylight access as well as the provision for daylight access for the occupants of the existing residential property inclusive of the rear extension.

1.3 The initial daylight availability assessment is based on guidance contained within Section 6 of Camden Borough Council's document CPG 6 - *Amenity*. This report presents the results of the daylight calculation methods carried out in accordance with guidance provided by CPG 6.

Current Site Use

1.4 The building in question is located at 31 Percy Street, London, W1T 2DD, and comprises an existing four storey Victorian-era mid terrace building with a single (ground) storey room in the courtyard area to the rear of the building. The building is currently used as office space.

Proposed Development

1.5 The proposals include an extension of the single storey room located within the rear courtyard up to the boundary wall with number 10 Windmill Street and 32 Percy Street to form an L shaped space. The ground floor will comprise a combined kitchen/living room and an adjacent toilet. The first floor over the proposed extension will include two bedrooms and a bathroom. The level of the courtyard will be lowered to further limit any visual impact of the proposed extension on the surrounding buildings. Figure 1 below shows the existing and proposed ground floor layouts.

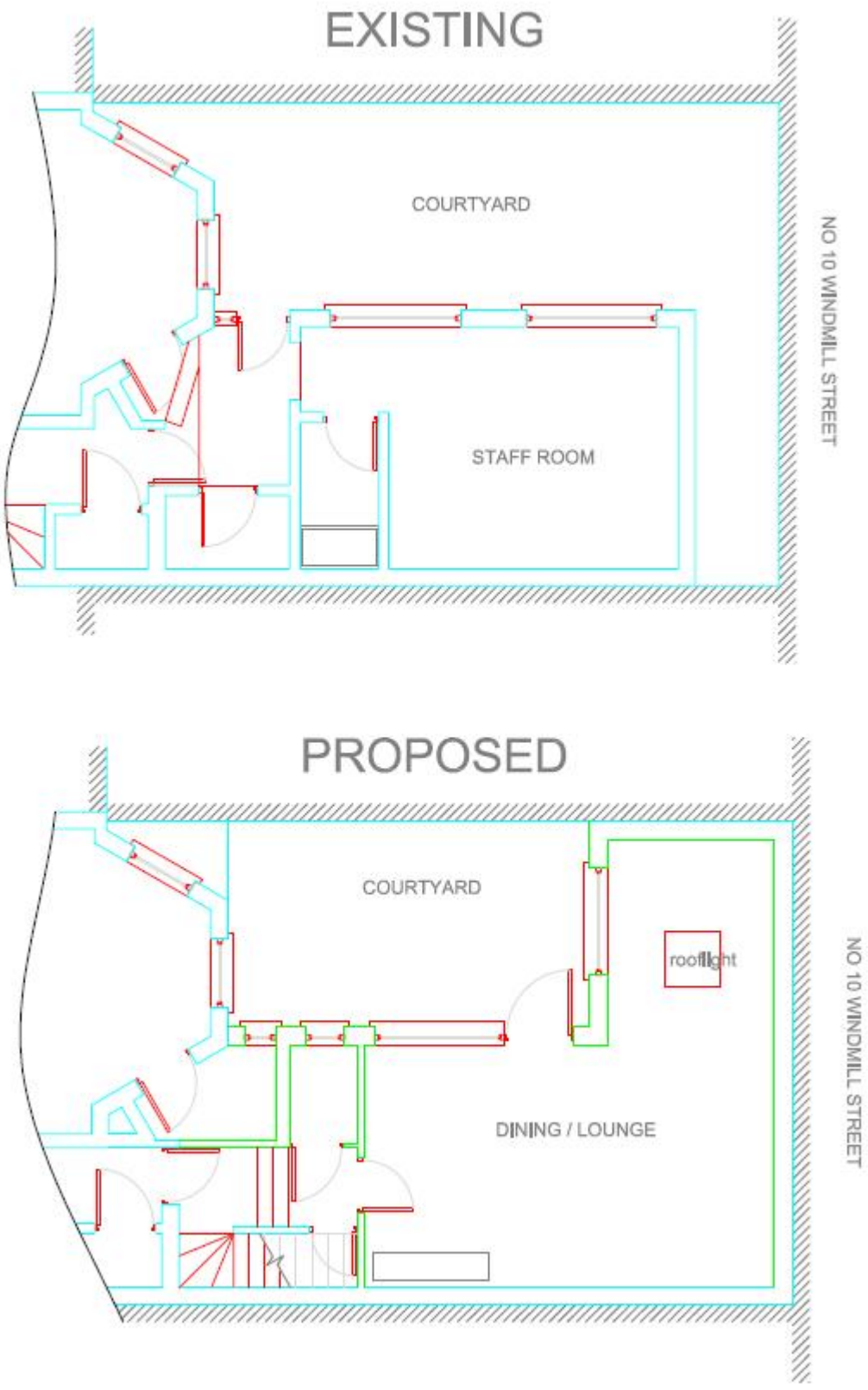

Figure 1: Existing and proposed ground floor layouts (prepared by GGC Design Ltd, drawing 31 PS/P/04 and 31 PS/P/05)

Surrounding Buildings

1.6 The rear courtyard of 31 Percy Street (north east elevation) abuts the two storey rear boundary wall of number 10 Windmill Street. Number 30 and 32 Percy Street are located either side of the courtyard separated by solid boundary walls.

1.7 The following photographs illustrate the position of the courtyard in relation to the adjacent properties. Photograph 1 shows the view from 31 Percy Street looking over the courtyard at number 10 Windmill Street (facing opposite) and the two storey solid boundary wall of number 32 Percy Street on the left side of the photo. Photograph 2 shows the single storey boundary wall of number 30 Percy Street.

Photo 1: Boundaries of number 10 Windmill Street and number 32 Percy Street

Photo 2: Boundary of number 30 Percy Street

1.8 Number 10 Windmill Street, located to the north west of 31 Percy Street is a five storey residential building. The boundary wall with number 10 Windmill Street intersects the direct line of sight for the ground and first floors and partially intersects the line of sight for the second floor levels.

1.9 The development is a mid-terraced building located between number 30 and 32 Percy Street. These neighbouring buildings are of comparable height to 31 Percy Street. Photograph 3 shows the view from the courtyard of 31 Percy Street looking south east towards the rear of numbers 30 and 31 Percy Street. Photograph 4 is from the same position looking at the rears of numbers 31 and 32 Percy Street.

Photo 3: South easterly view of the adjoining buildings of 30 and 31 Percy Street.

Photo 4: Rear view of number 31 and 32 Percy Street.

1.10 Figure 2 shows the orientation and location of the development in relation to the surrounding buildings.

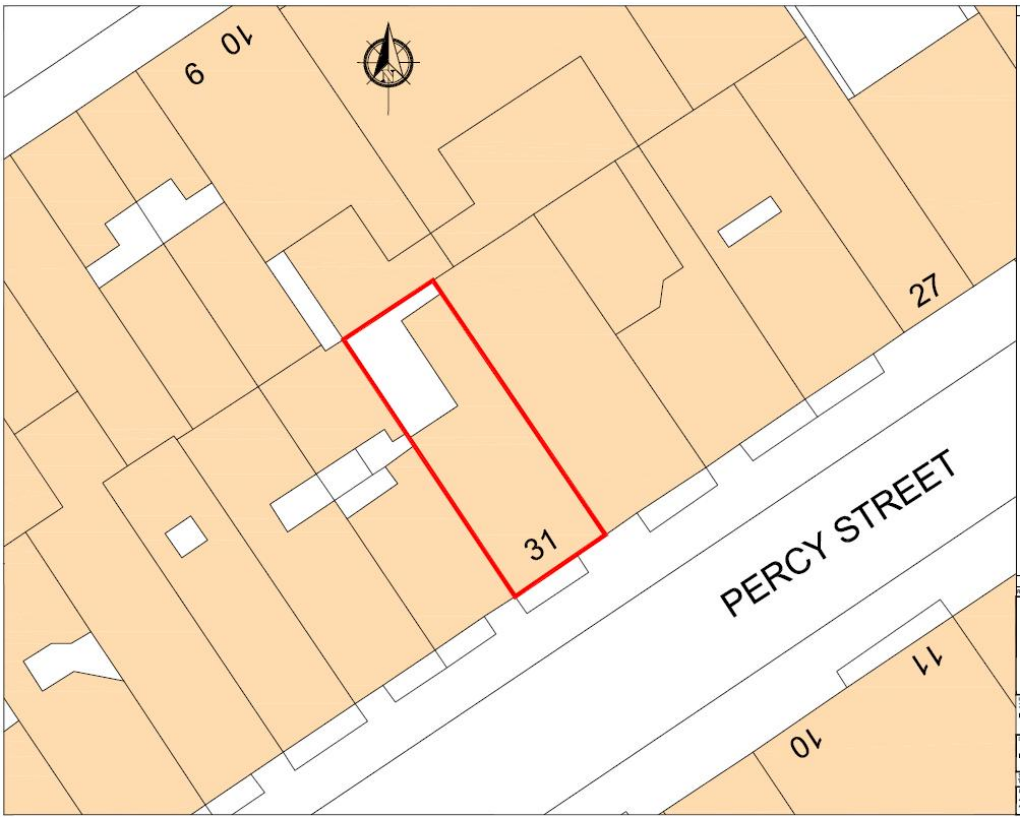

Figure 2: Existing Site Plan (prepared by GGC Design Ltd, drawing 31 PS/P/02)

2.0 CALCULATION METHODOLOGY

2.1 The existing property at 31 Percy Street and the surrounding buildings are already subject to relatively high levels of obstruction to daylight and sunlight. This assessment will only take into consideration any additional obstruction caused by extending the existing property.

2.2 The assessment and all methods used to determine daylight access have been based upon geometric and photographic images provided by GGC Design Ltd. The geometric information has been supplied in an AutoCAD DWG format and has been used to determine all dimensions.

2.3 This daylight availability assessment is based upon the guidance given in Section 6 of Camden Borough Council's document 'CPG 6 Amenity'. Guidance CPG 6 requires daylight and sunlight reports to assess the impact of the development following the methodology set out within the Building Research Establishments (BRE) 2011 guidelines Site Layout Planning for Daylight and Sunlight: as guide to good practice. The BRE guide suggests a series of sequential measures for determining the impact of new developments upon the daylight and sunlight availability to existing properties. These sequential measures are as follows:

Step 1: 25/45 degree line check

2.4 The 25/45 degree line check is an initial quick test to determine if a new development will impact upon the amount of daylight received by surrounding buildings, as well as assessing whether the surrounding buildings will impact upon the amount of daylight received within the proposed development. The 25 degree check is for buildings that oppose each other while the 45 degree check is specific to extensions whereby the projection lies perpendicular to existing windows.

2.5 The 25 degree line check consists of drawing a line in a sectional view from the highest obstructing point to the centre of the assessed window. If the angle of this line exceeds 25° from the perpendicular then the amount of daylight received by the window is likely to be affected. The 45 degree line draws a line back from the highest and furthest obstructing point of an extension/new development in both plan and elevation views. If both these lines extend past the centre point of a window then daylight access to that window is likely to be affected.

Step 2 Vertical Sky Component (VSC)

2.6 The Vertical Sky Component (VSC) can be calculated by using the skylight indicator provided within the BRE guidelines, by mathematical methods using a Waldram diagram or by 3D CAD Modelling. A skylight indicator can be used to determine the impact of obstructions on the skylight access to a specific window.

2.7 A VSC greater than 27% is typically viewed as having little to no impact on skylight access. If the VSC with the new development is below 27% then it should not be less than 0.8 times its former value. The VSC result is determined by the number of crosses obscured on the skylight indicator by the over shading effect of surrounding buildings. Each cross corresponds to 0.5% and there are a total of 80 crosses giving a maximum potential score of 40%. The over shading impact of surrounding buildings is an effect of their relative height and proximity to the window being assessed.

Step 3: Average Daylight Factor

2.8 The level of daylight available to a given space is expressed as the daylight factor (DF). The daylight factor for a space (or room) is the ratio between the internal and external luminance of a space. It is expressed as a percentage. As the amount of natural light will vary in any one space depending on the time of day and year, it is impossible to set one standard level of illuminance for any given space. As daylight factors are expressed as ratios this is not an issue and so they can be used irrespective of the actual availability of natural light at any one time.

2.9 It is important to note that there are currently no minimum requirements for daylight factor. The Chartered Institute of Building Service Engineers (CIBSE) Guide A (Environmental Design) and CIBSE Guide LG 10 (Day Lighting and Window Design) both reference BS8206 (Code of Practice for Day Lighting). The recommended average daylight factor for each defined living space is detailed below:

Room Type	Recommended Daylight Factor
Bedroom	1%
Living Room	1.5%
Kitchen	2%

Commission Internationale de Eclairage (CIE) standard overcast sky: The CIE standard overcast sky is one of several sky light models used for daylight calculation. This model gives a more representative example of how light from the sky is actually distributed. Essentially it describes how the luminance of the sky varies from the horizon to the zenith. It is a standard model used to describe the distribution of light from the sky when carrying out calculations. The CIE standard overcast sky assumes that the sky is 100% overcast with no direct sunlight.

Reflectance: The reflectance of a material is the percentage of light falling on its surface that is reflected. Light coloured gloss surfaces will reflect far more than dark matt surfaces. High levels of internal reflectance will generally improve the daylight factor of any given space.

Transmittance: Transmittance is a property of transparent fabric elements such as windows. The transmittance of a material is the percentage of light that will be transmitted through it.

Working Plane: The working plane is the horizontal plane in which the visual task lies. Typically this is between 0.7 and 0.85m above floor level. Daylight factors are typically given at a working plane level.

2.10 Computer simulations have been undertaken using the IES-VE Radiance system to determine the daylight factor levels of the development.

3.0 25 DEGREE LINE TEST

2.0 Only those surrounding buildings likely to be affected by the proposed extension have been examined. Based upon the available site information the buildings likely to be affected are:

i. The rear elevation of number 10 Windmill Street
ii. Adjoining building of number 30 Percy Street
iii. Adjoining building of number 32 Percy Street

3.1 Figure 3 below shows the location of the cross sectional views through the proposed extension. Sectional view BB (figure 4) shows the view through the proposed extension towards 30 Percy Street. Sectional view CC (figure 5) shows the view through the proposed extension towards number 10 Windmill Street.

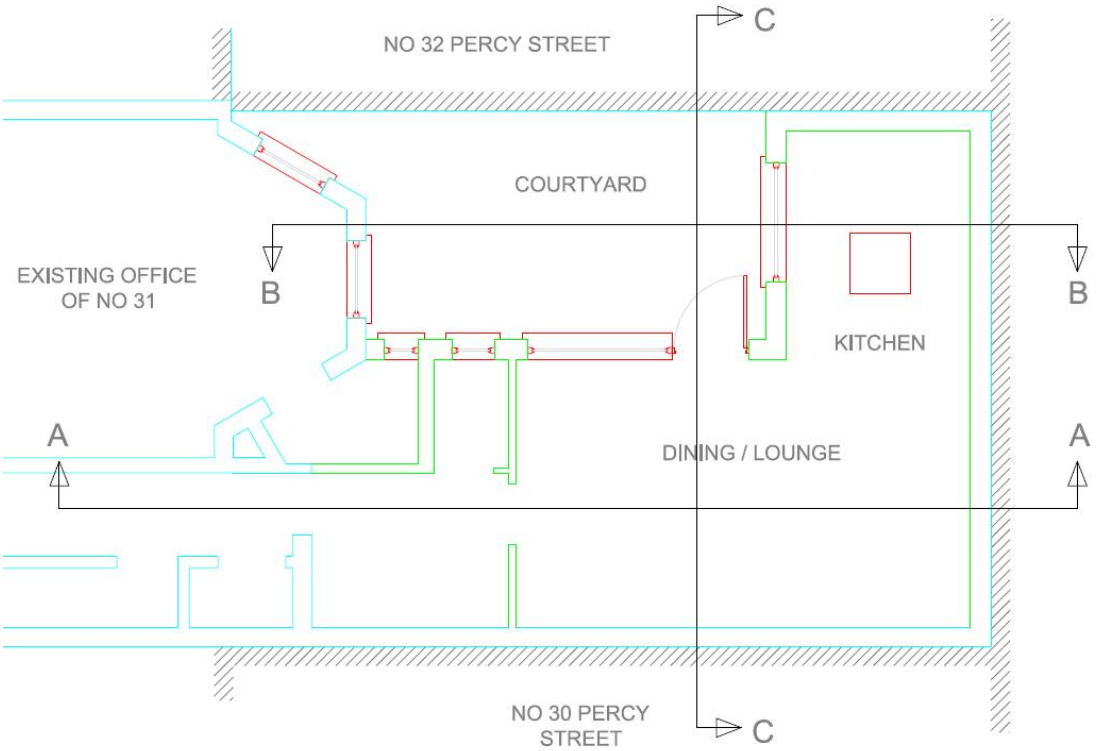

Figure 3: Sectional View Layout

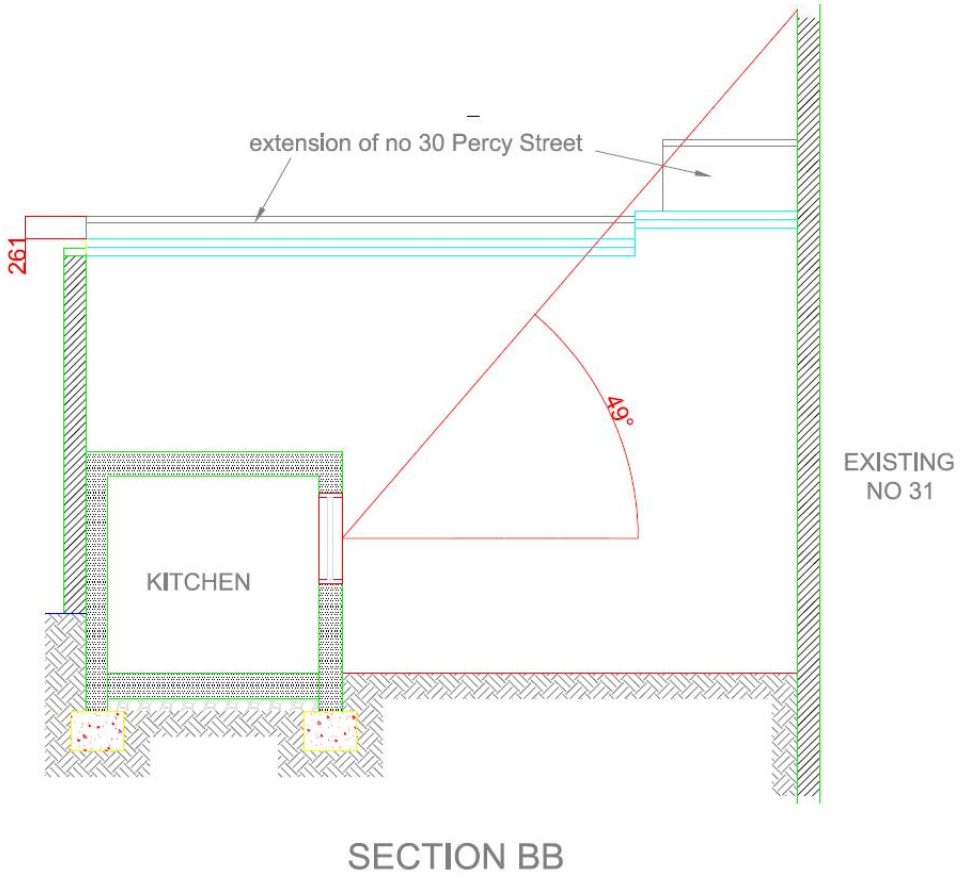

Figure 4: Sectional View BB towards 30 Percy Street

3.2 Figure 4 shows that the proposed extension will be 261mm below the line of the existing boundary wall between number 30 and number 31 Percy Street. As such it can be inferred that the proposed extension will have no impact on number 30 and number 32 Percy Street as the height of the extension is below the height of the existing obstruction and neither number 30 or 32 have windows that directly face the proposed extension. The kitchen window of the proposed extension shows a degree line angle in excess of 49° indicating daylight access through this window will be affected.

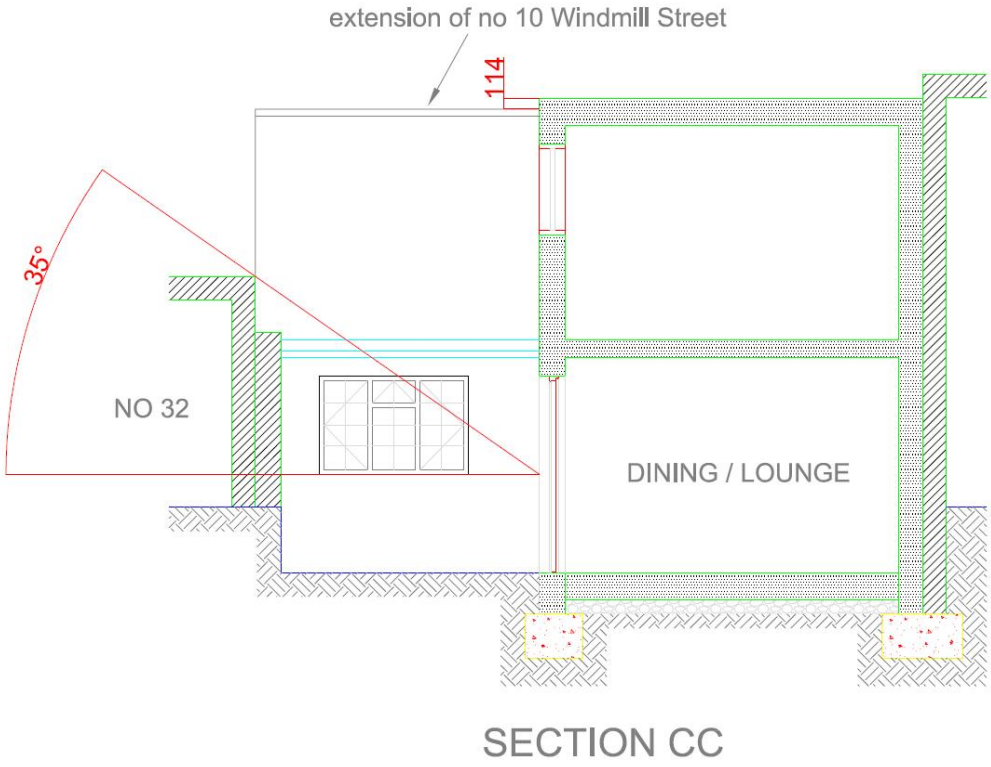

Figure 5: Sectional View CC towards 10 Windmill Street

3.3 Figure 5 shows that the proposed extension will extend marginally above the existing boundary wall between number 10 Windmill Street and number 31 Percy Street by approximately 114mm. Based on the available photographic evidence (please refer to photographs 1 and 2) an increase of 114mm over the top of the existing boundary wall will have no effect on daylight access to number 10 Windmill Street. This increase will not extend past the mid line of any of the windows to the rear of number 10 Windmill Street, which are already overshadowed by the existing rear of 31 Percy Street which is 4 storeys high (please refer to photographs 3 and 4). Figure 5 shows that the lounge/dining area of the proposed extension will have a degree line angle of 35° again indicating daylight access will be restricted.

4.0 FURTHER ANALYSIS

4.1 The 25° line tests indicate that the lounge/dining/kitchen area of the proposed new development may have limited access to daylight.

4.2 Camden Planning Guidance Document 6 offers two further methodologies for more in-depth analysis other than the 25° projected line method. These are the Vertical Sky Component (VSC) and the Average Daylight Factor (ADF).

4.3 A VSC calculation is typically used for existing buildings where the internal layout is unknown. It determines the amount of light that can reach a window based upon the degree of obstruction generated by surrounding features. The ADF method, while more accurate, requires details of internal layout and geometry and typically requires computer simulation for all but the most basic layouts. As only the proposed new build areas are affected and layout information is available the ADF method has been used for the purpose of this analysis.

5.0 AVERAGE DAYLIGHT FACTOR

5.1 The ground floor lounge/dining/kitchen area on the proposed new development has been identified by the 25 degree line method as having restricted access to daylight. Additionally Camden Guidance CPG 6 requires that residential spaces such as living rooms, kitchens and bedrooms have minimum levels of daylight access as detailed in table 1 below:

Area	Daylight Factor
Kitchen	2%
Living room	1.5%
Bedroom	1%

Table 1: Daylight Factor Limits

5.2 Average Daylight Factors are specified by Camden's Planning Document CPG 6 – *Amenity* as an acceptable method for assessing likely daylight availability. The daylight factor is the ratio of the internal to external luminance; as a ratio it will be constant irrespective of time of day or year. The daylight factor is measured using the CIE standard overcast sky and as such only the indirect sky light component (not direct sun light) is assessed. This is essentially the worst case scenario for assessing daylight availability. As a ratio, daylight factors are expressed as percentages.

5.3 The average daylight factors of these areas have been calculated using the IES VE Radiance program, a lighting simulation system widely used throughout the world. It is a backward ray tracing system meaning light rays are tracked back from the object/area in question to the source of illuminace, which in this case will be an overcast sky. The system is capable of producing highly accurate lighting simulations up to and including photo realistic renders. However, the accuracy of the system is reliant upon the calculation parameters used and a compromise must be reached between accuracy and computational time.

5.4 The radiance parameters and a description of their function are as follows:

Radiance Property	Value Set
Ambient bounces (ab)	4
Ambient accuracy (aa)	0.1
Ambient resolution (ar)	512
Ambient divisions (ad)	1024

Table 2: Radiance Parameters Used

ab = number of reflections – determines the number of times a sampled light ray will bounce (or reflect). Higher settings are required for accurate interpretation of recessed areas or through narrow structures (such as light wells). Set to 4 to provide a balance between computational time and sufficient reflections to re-distribute the light to provide accurate simulation of indirect sky components.

aa = ambient accuracy – set to 0.1. Ambient accuracy is linked with ambient resolution and together with ar determines the scale over which the radiance system uses interpolation (estimated results) rather than further sampling.

ar = ambient resolution – set to 512. Linked to ambient accuracy. A value of 512 when linked with an aa of 0.1 provides the optimum sampling density.

ad = ambient divisions – set to 1024. Defines the initial number of light rays sampled. The figure for ambient divisions heavily influences computational time.

5.5 The working plane for the daylight simulation has been taken as 0.8m above floor level. The working plane is the plane at which the daylight analysis is carried out and typically represents surface level where tasks are assumed to be carried out.

5.6 Material reflectance values affect the distribution of reflected light. The reflectance values assigned to the radiance simulation have been determined based upon the likely material finishes of the elements in question and using reference values from published industry accepted design guides (CIBSE Guide LG 10 Day Lighting and Window Design). The reflectance values used are detailed in the table below and are given as a proportion of 1.

Surface	Reflectance values (range 0 to 1)	Equivalent to
Walls (Internal)	0.7	Light or white coloured walls
Walls (External)	0.3	Brick
Ground Plane	0.25	Concrete
Ground floor (internal)	0.45	Cream coloured carpet
Roof (external)	0.25	Concrete
Ceiling (internal)	0.8	Paper white

Table 3: Reflectance Values Used

5.7 Glazed constructions typically have relatively low reflectance values. The parameters of primary concern with a window are the transmittance (Tn) and the transitivity (tn).

5.8 Transmittance can be defined as the total amount of light transmitted by a system, usually given for normal incidence.

5.9 Transmissivity is the fraction of light that passes through the interior of a glass pane at normal incidence. This does not consider light lost to reflection by the front or back surface, or multiple internal reflections. From the transmissivity and the index of refraction, total transmittance and reflectance can be computed for any incident angle.

5.10 Table 4 below summarises the glazing systems performance.

Glazing	Transmissivity	Transmission Value	Interior/exterior reflectance
Standard	0.8	0.734	0.07

Table 4: Glazing Specifications Used

5.11 The proposed development and the surrounding buildings that would affect daylight access have been modelled using the IES VE program. Figure 6 shows a view of the simulation model looking from the North.

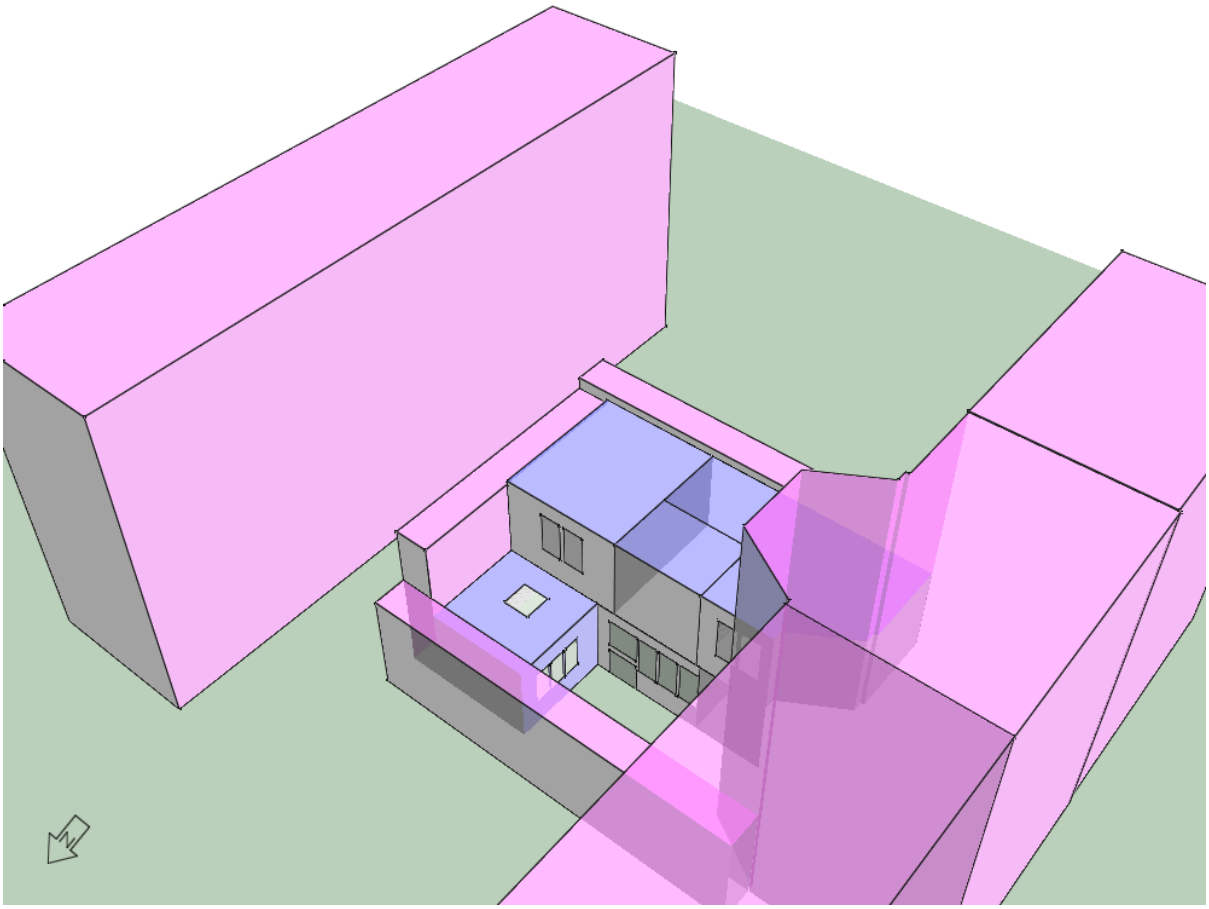

Figure 6: Simulation Model Layout

Average Daylight Factor – GF Lounge/Dining/Kitchen Area

5.12 Figure 7 show the daylight factor distributions for the ground floor lounge/dining/kitchen area for the proposed extension.

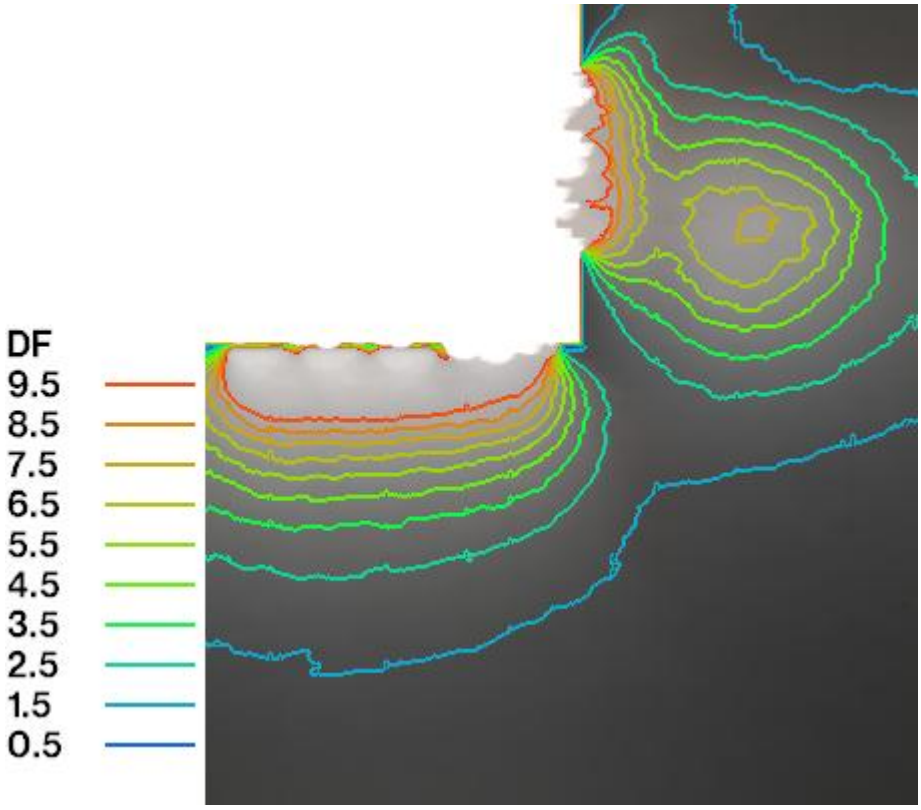

Figure 7: Lounge/Dining/Kitchen Daylight Factors

Parameter	Lounge/dining/kitchen
Average daylight factor	3.18%

Table 5: Daylight Factor achieved for Lounge/Dining/Kitchen

Average Daylight Factor – Bedroom 1

5.13 Figure 8 shows the daylight factor distributions for bedroom 1 of the proposed extension. The results are summarised in Table 6.

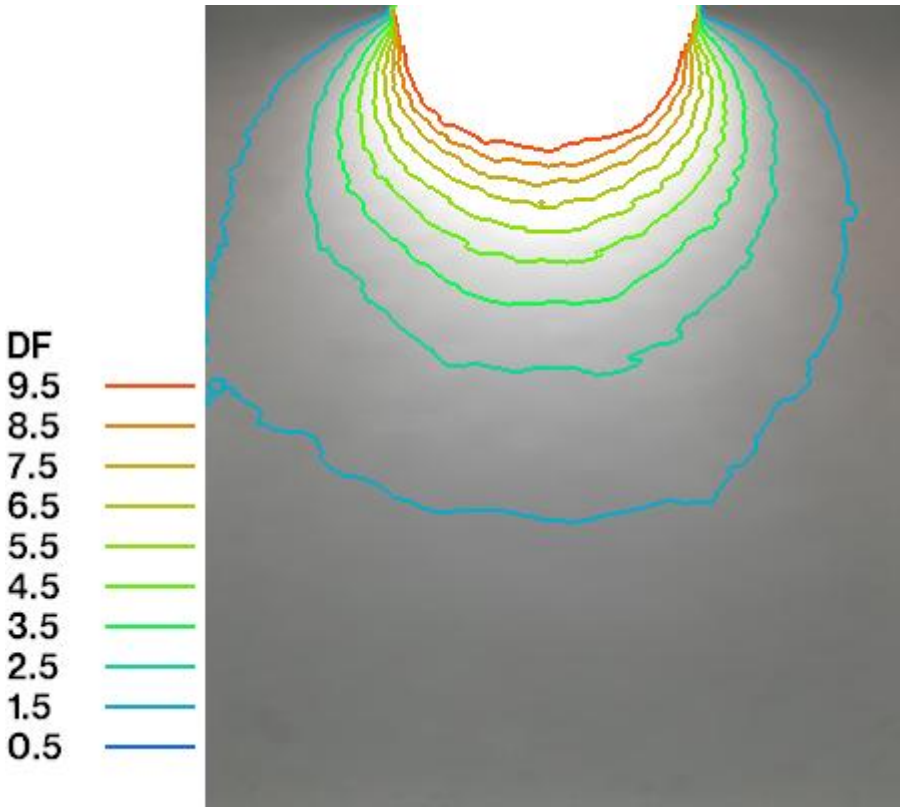

Figure 8: Bedroom 1 Daylight Factors

Parameter	Bedroom 1
Average daylight factor	2.91%

Table 6: Daylight Factor achieved for Bedroom 1

Average Daylight Factor – Bedroom 2

5.14 Figure 9 shows the daylight factor distributions for bedroom 2 of the proposed extension. The results are summarised in Table 7.

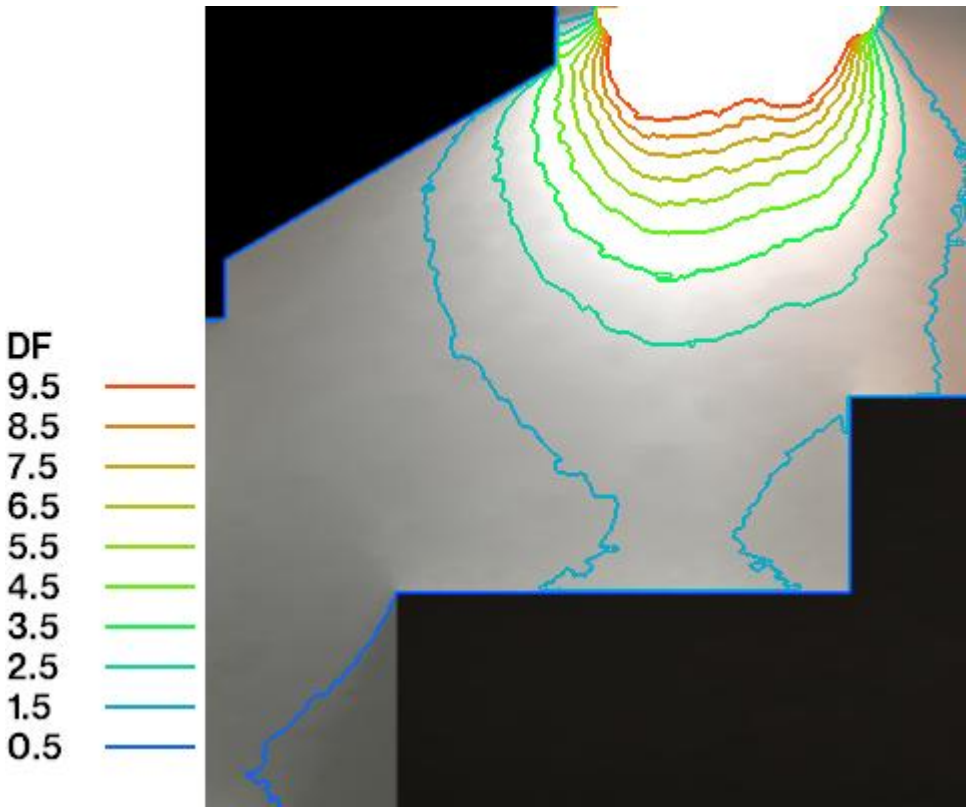

Figure 9: Bedroom 2 Daylight Factors

Parameter	Bedroom 2
Average daylight factor	1.84%

Table 7 Daylight Factors achieved for Bedroom 2

Summary of Results

5.15 For all the areas assessed against the average daylight factor method, the minimum daylight factor levels are achieved. All bedrooms achieve a daylight factor of at least 1% while the ground floor lounge dining/kitchen area scores greater than the 2% minimum requirement.

6.0 SUNLIGHT

6.1 Sunlight is direct light from the sun as opposed to diffuse light, which is measured through the daylight factor method.

6.2 Camden's Planning Document CPG 6 – *Amenity* requires that access to sunlight be considered and that sunlight availability be maximised without overheating the space. The CPG 6 guidance requires that where practical at least one window to a habitable space faces within 90° of south and should receive at least 25% of annual probable sunlight hours including at least 5% of annual probable sunlight hours between 21 September and 21 March, where possible.

6.3 All windows within the new development face either south east or south west, however the proposed extension is heavily over shaded by the surrounding buildings and therefore achieving the sunlight hours outlined by Camden is not possible. Figure 10 below shows the sunlight hours achieved for the proposed development.

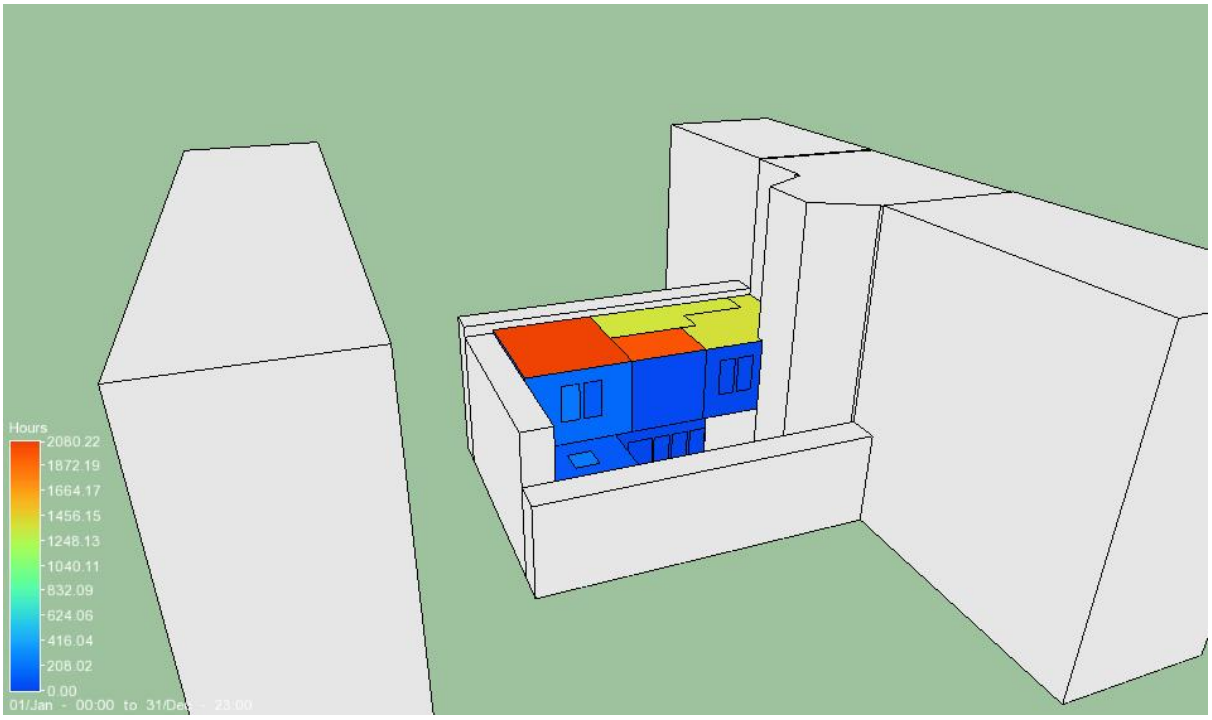

Figure 10: Available Sunlight Hours

6.4 Figure 10 shows the hours of direct sunlight exposure that can be expected for a given year. The roof top area on the eastern edge of the proposed extension will receive the greatest degree of exposure as it will be relatively un-obscured for most of the year. The western end of the roof will receive marginally less as it is subject to a greater degree of over shading. The north facing exterior walls and the roof top to the ground floor dining/lounge area will receive minimal direct sunlight due to a combination of orientation and over shading.

7.0 CONCLUSION

7.1 Daylight modelling has been carried out in accordance with Camden's Planning Document CPG 6 – *Amenity* and the series of sequential measures detailed within the BRE guidance document 'Site Layout Planning for Daylight and Sunlight; a guide to good practice' to assess both the impact of the proposed development on the amenity of the neighbouring buildings for daylight and the provision of daylight access for the occupants of the proposed extension.

7.2 The 25 degree line test indicates that the extension of number 31 Percy Street will have no impact on the surrounding buildings of number 10 Windmill Street, number 30 Percy Street and number 32 Percy Street. The 25 degree line test does, however indicate that the amount of daylight received within the proposed extension will be restricted. Daylight Factor calculations have been undertaken using the IES Radiance programme to establish whether the proposed extension will receive adequate levels of daylight in accordance with the minimum daylight factors provided by BS8206 (Code of Practice for Day Lighting).

7.3 The results from the IES simulation shows that all spaces within the proposed development will meet the recommended daylight factors contained in BS8206 Code of Practice for Daylight. Sunlight access is limited and would not meet the advised guidance, however this guidance is acknowledged as 'where possible'.

7.4 This report concludes that both the proposed development and the surrounding buildings affected by the extension of 31 Percy Street will all receive sufficient levels of daylight.

8.0 DISCLAIMER

8.1 Create Consulting Engineers Ltd disclaims any responsibility to the Client and others in respect of any matters outside the scope of this report.

8.2 The copyright of this report is vested in Create Consulting Engineers Ltd and Path Estates Ltd. The Client, or his appointed representatives, may copy the report for purposes in connection with the development described herein. It shall not be copied by any other party or used for any other purposes without the written consent of Create Consulting Engineers Ltd or Path Estates Ltd.

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