EAL CONSULT BUILDING SUSTAINABILITY SINCE 2008

DAYLIGHT, SUNLIGHT & OVERSHADOWING ASSESSMENT

PROPERTY ADDRESS

No 11 Marston Munster Square,
London,
NW1 3PP

DATE

July 2022

PREPARED BY

EAL Consult

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EXECUTIVE SUMMARY

This daylight, sunlight and overshadowing assessment has been prepared to support the planning application for the proposed second floor at No 11 Marston Munster Square, NW1 3PP. This assessment should be consulted in conjunction with the accompanied planning drawings.

The primary purpose of this daylight, sunlight and overshadowing assessment is to determine the likely loss of light to adjacent buildings resulting from the alteration of the existing dwelling. Therefore, the proposed scheme can be identified as the potential source of impact.

The main objective to carry out this Daylight & Sunlight assessment is to:

- Assess the impact of the proposed dwelling upon the current levels of sunlight & daylight being enjoyed by the existing surrounding buildings.

The methodology set out in this report is in accordance with BRE's 'Site Layout Planning for Daylight and Sunlight' 2nd edition 2011, which is accepted as good practice by Planning Authorities.

The following assessments were carried out:

Daylight & Sunlight Assessment

- **Existing neighbouring properties**

    a. Vertical Sky Component
    b. Annual Probability of Sunlight Hours (APSH) annual and winter calculations

Overshadowing Assessment

- **Existing Open Space - Gardens**

    a. Sunlight hours (on the 21st of March – Equinox)

Neighbouring properties were identified which may be impacted upon by the scheme.

The assessment of daylight, sunlight and overshadowing to the surrounding residential properties and open spaces, indicates that the proposal will not cause a noticeable change in light levels to existing occupants.

The Autodesk Ecotect software was used to carry out the daylight, sunlight and overshadowing impact assessment. A 3-dimensional site model has been created from information supplied by the architect, drawings, including location and site plan, existing and proposed drawings.

TERMS AND DEFINITIONS

CIE Standard Overcast Sky

A completely overcast sky for which the ratio of its illuminance Ly at an angle of elevation y above the horizontal to the luminance Lz at the zenith is given by: Ly=Lz (1+2siny) /3
A CIE standard overcast sky is darkest at the horizon and brightest at the zenith (vertically overhead).

No-Sky Line

The no-sky line divides those areas of the working plane which can receive direct light from the sky, from those which cannot. It is important as it indicates how good the distribution of daylight is in a room. Areas beyond the no-sky line will generally look gloomy.

As an approximation, obstructions that are parallel to the window can be considered infinite.

Working Plane

The working plane is a notional surface, typically at about desk or table height, at which daylight factor or the 'no-sky line' is calculated or plotted.

For the purpose of assessing useful daylight, a working plane of 850mm above finished floor level is assumed. It is generally expected that ceiling heights will not fall below 2.4m.

Obstruction Angle

The angular altitude of the top of an obstruction above the horizontal, measured from a reference point in a vertical plane in a section perpendicular to the vertical plane.

Probable Sunlight Hours

The long-term average of the total number of hours during a year in which direct sunlight reaches the unobstructed ground (when clouds are taken into account).

Sky Factor

Sky Factor is the ratio of the parts of illuminance at a point on a given plane that would be received directly through unglazed openings from a sky of uniform luminance, to illuminance on a horizontal plane due to an unobstructed hemisphere of this sky. The sky factor does not include reflected light, either from outdoor or indoor surfaces.

Vertical Sky Component (VSC)

Ratio of that 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 the buildings.

CURRENT POLICIES, REGULATIONS AND BENCHMARKS

Regulations

European workplace directive – Assess to daylight required

Building Regulations – No minimum daylight standards

Guides

- NPPF – Paragraph 123(c)
- GLA Housing SPG
- CIBSE SLL Daylighting and Window Design LG10 1999
- BRE Designing Buildings for Daylight
- BRE Designing with Innovative Daylighting
- BREEAM

Recommendations as to daylight in domestic buildings are to be found in the British Standard BS 8206-02 (BSI, 2002) on Lighting, specifically the section on day lighting, in the publications of the CIBSE and in the publication of BRE (1,2,3).

The recommendations for internal spaces are expressed in three ways:

- A minimum average Daylight Factor (2% for Kitchen, 1.5% for Living Rooms and 1% for Bed Rooms)
- The position of the No-Sky Line at working plane height (0.85m). If the area beyond the No-Skyline is more than 50% the room will look gloomy
- Limiting Depth Criteria

To put the first recommendation in context, a room with an average daylight factor of more than 5% is regarded as well daylit, that is electric lights would be used infrequently during daylight hours, but if it is below 2% electric lights would be used frequently. The requirements are therefore minimal.

These recommendations are illumination based so orientation is not considered a factor. As the perception of how well a space is daylit may be influenced by the factors orientation, shading control and view hence the orientation factor can be used to reflect the higher levels of illuminance on the South facade.

In regard to a new building affecting an existing recommendations have an origin in solar access in the UK. The new building should not reduce the Vertical Sky Component (VSC) below 27% or if it does it should not reduce it by more than 20%. Where there is horizontally facing window/skylight VSC can be up to 40%.

In most city centres the Vertical Sky Component is already below 27% at many windows of building. Planning Authorities have tended to use the 20% reduction guideline when assessing planning permission in such areas which unfortunately has its drawbacks, leading to creeping increased heights in urban areas reducing daylight access.

METHODOLOGY

BRE Guide: Site Layout Planning for Daylight and Sunlight, 2011

This assessment would be based on the various numerical tests laid out in the Building Research Establishment (BRE) Guidelines "Site Layout Planning for Daylight and Sunlight: a good practice guide" 2011. It is important to note that BRE tests in general are based on the requirements of the BS Standards 8206 Part 2.

"The guide is intended for building designers and their clients, consultants and planning officials. The advice given here is not mandatory and the guide should not be seen as 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."

The first step in the methodology is to determine the key sensitive receptors, which windows may be affected by the existing buildings.
Key receptors are windows directly facing and located perpendicular - to the site.

Existing Buildings

Using simple geometry, it will be determined whether the daylight to existing buildings and amenity spaces is adversely affected and this will be done using 25 degree and 45 degree methods.

If new buildings are set out in accordance with the 25 degree method for daylight, this will be sufficient to show that the sunlight to the existing buildings will not be adversely affected.

If these two methods of assessments are satisfied, this will be sufficient in showing that the day lighting to existing buildings and their amenity spaces will not be adversely affected by the new development.

Calculation Method of Daylight to Surrounding Windows

A plane is drawn at 25 degrees from the horizontal, at the centre of an existing window. If a new development intersects with this plane, the internal daylight levels of the surrounding windows may be reduced. When an obstruction of the 25 degree plane occurs, a more detailed assessment involving the Vertical Sky Component of the affected window would need to be carried out.

Calculation Method of Vertical Sky Component (VSC)

The Vertical Sky Component is the ratio of the direct sky illuminance falling on the vertical wall at a reference point, to the simultaneous horizontal illuminance under an unobstructed sky. To maintain good levels of daylight, the Vertical Sky Component of a window needs to be 27% or greater. If the VSC is less than 27%, then a comparison of existing and proposed levels of VSC level would need to be calculated.

VSC can be determined by calculating the Obstruction angle: **Obstruction Angle= tan-1 (H/D)**

Where; H is the height of the obstruction above the middle of the window and D is the horizontal distance from the window to the obstruction

Good levels of daylighting can still be achieved if VSC levels are within 0.8 of their former value. Otherwise, the Average Daylight Factor of the internal rooms would need to be calculated.

SITE

The proposed site is located in a predominantly residential area and therefore, a daylight, sunlight and overshadowing assessment was undertaken to determine the potential impact of the proposed development on these neighbouring areas.

The proposal includes the addition of a second floor on top of the existing building, to provide extra residential space. Thus, the proposed massing will exceed the previous scheme by 1 storey only.

This assessment considers all neighbouring properties near the proposed site, that could possibly be affected from the development.

Figure 1 – Site Location

Possibly affected properties:

1. No 10 Marston Munster Square – 0 windows that would face directly the proposed new extension – The property can be excluded from this assessment
2. No 13-48 Clarence Gardens – 18 windows were identified – Please note only the windows close to the proposed site have been assessed

DAYLIGHT & SUNLIGHT ASSESSMENT

Vertical Sky Component (VSC)

VSC analysis of each window was carried out. The results are listed in the following pages.
If the VSC is greater than 27%, then enough skylight should still be reaching the window and the levels of daylight experienced in the space should not be seriously affected.

Vertical Sky Component Assessment

Table 1 – Vertical Sky Component for the existing properties, Pre & Post Development

Vertical Sky Component		Pre development	Post development	VSC after Proposal	Comments
Assessed neighbouring property:	**Window no.**	**BRE VSC %**	**BRE VSC %**	**>27**	
No 13-48 Clarence Gardens	**Ground Floor**				**Minor/Negligible impact.**
	Win01(rear elevation)	25.4%	24.6%	No	
	Win02(rear elevation)	25.2%	24.4%	No	
	Win03(rear elevation)	25.7%	25.7%	No	
	1st Floor				
	Win04(rear elevation)	26.5%	25.9%	No	
	Win05(rear elevation)	26.3%	25.7%	No	
	Win06(rear elevation)	26.1%	25.6%	No	
	Win07(rear elevation)	26.9%	26.4%	No	
	2nd Floor				
	Win08(rear elevation)	27.3%	27.0%	Yes	
	Win09(rear elevation)	27.3%	27.0%	Yes	
	Win10(rear elevation)	27.4%	27.1%	Yes	
	Win11(rear elevation)	27.4%	27.1%	Yes	
	Win12(rear elevation)	27.5%	27.2%	Yes	
	Win13(rear elevation)	27.5%	27.2%	Yes	
	Win14(rear elevation)	27.5%	27.2%	Yes	
	Top Floor				
	Win15(rear elevation)	27.8%	27.8%	Yes	
	Win16(rear elevation)	27.8%	27.8%	Yes	
	Win17(rear elevation)	27.8%	27.8%	Yes	
	Win18(rear elevation)	27.8%	27.8%	Yes	

Results confirm the minimum difference at pre- and post- construction phase. Thus, the proposed re-development will not affect the existing neighbouring property at No 13-48 Clarence Gardens.

Sunlight Assessment – Annual Probable Sunlight Hours

Annual probable sunlight hours (APSH) is a measure of sunlight that a given window may expect over a year period. The BRE guidance recognises that sunlight is less important than daylight in the amenity of a room and is heavily influenced by orientation. North facing windows may receive sunlight on only a handful of occasions in a year, and windows facing eastwards or westwards will only receive sunlight for some of the day. Therefore, BRE guidance states that only windows with an orientation within 90 degrees of south need be assessed.

For sunlight studies the APSH (annual probable hours) test calculates the percentage of statistically probable hours of sunlight received by each window in both the summer and winter months. From March 21st to September 21st – Summer period and from the 21st September to 21st of March – Winter period.

Sunlight is measured using a sun indicator which contains 100 spots, each representing 1% of APSH. Therefore, where no obstruction exists the total annual probable sunlight hours would amount to 1486 and therefore each spot equates to 14.86 hours of the total annual sunlight hours.
Following are the recommended Sunlight hours for London. Total recommended sunlight hours:

= 25% of APSH
= 25% of 1468hrs
= (25/100) x 1486
= 371.5hrs/yr

Recommended sunlight hours for winter

= 5% of APSH
= 5% of 1486hrs
= (5/100) x 1486
= 74.3hrs/yr

Table 2 – Annual Probable Sunlight Hours for existing properties, after the proposed development

Annual Probable Sunlight Hours		Post development
Assessed neighbouring property:	**Window no.**	**>371.5hrs**
No 13-48 Clarence Gardens	**Ground Floor**	
	Win01(rear elevation)	Yes
	Win02(rear elevation)	Yes
	Win03(rear elevation)	Yes
	1st Floor	
	Win04(rear elevation)	Yes
	Win05(rear elevation)	Yes
	Win06(rear elevation)	Yes
	Win07(rear elevation)	Yes
	2nd Floor	
	Win08(rear elevation)	Yes
	Win09(rear elevation)	Yes
	Win10(rear elevation)	Yes
	Win11(rear elevation)	Yes
	Win12(rear elevation)	Yes
	Win13(rear elevation)	Yes
	Win14(rear elevation)	Yes
	Top Floor	
	Win15(rear elevation)	Yes
	Win16(rear elevation)	Yes
	Win17(rear elevation)	Yes
	Win18(rear elevation)	Yes

Results show that all the assessed neighbouring windows, will receive adequate sunlight hours during the year.

Table 3 – Winter Probable Sunlight Hours for existing properties, after the proposed development

Winter Probable Sunlight Hours		Post development
Assessed neighbouring property:	**Window no.**	**>74.3hrs**
No 13-48 Clarence Gardens	**Ground Floor**	
	Win01(rear elevation)	Yes
	Win02(rear elevation)	Yes
	Win03(rear elevation)	Yes
	1st Floor	
	Win04(rear elevation)	Yes
	Win05(rear elevation)	Yes
	Win06(rear elevation)	Yes
	Win07(rear elevation)	Yes
	2nd Floor	
	Win08(rear elevation)	Yes
	Win09(rear elevation)	Yes
	Win10(rear elevation)	Yes
	Win11(rear elevation)	Yes
	Win12(rear elevation)	Yes
	Win13(rear elevation)	Yes
	Win14(rear elevation)	Yes
	Top Floor	
	Win15(rear elevation)	Yes
	Win16(rear elevation)	Yes
	Win17(rear elevation)	Yes
	Win18(rear elevation)	Yes

Results show that all windows will achieve the recommended 74.3hours of sunlight during the winter period.

OVERSHADOWING ASSESSMENT

Sunlight to Amenity Spaces

An assessment of the sunlight levels of the neighbouring open spaces (rear gardens) was undertaken.

BRE guidance states that the test should be run on 21 March which is the midpoint between the summer and winter solstices (equinox). According to BRE, the sunlight hours on this day should be no less than 2 hours.

The proposed development has been designed with specific attention to safeguard the natural light of all the neighbouring gardens.

Detailed model study in Ecotect Analysis demonstrates that more than 50% of the neighbouring rear garden will receive the minimum of 2hours of sunlight on the 21st March.

Specifically:

- No No 13-48 Clarence Gardens:
  Garden 01 – Will receive approximately: 7.13hrs
  Garden 02 – Will receive approximately: 7.05hrs
  Garden 03 – Will receive approximately: 8.22hrs

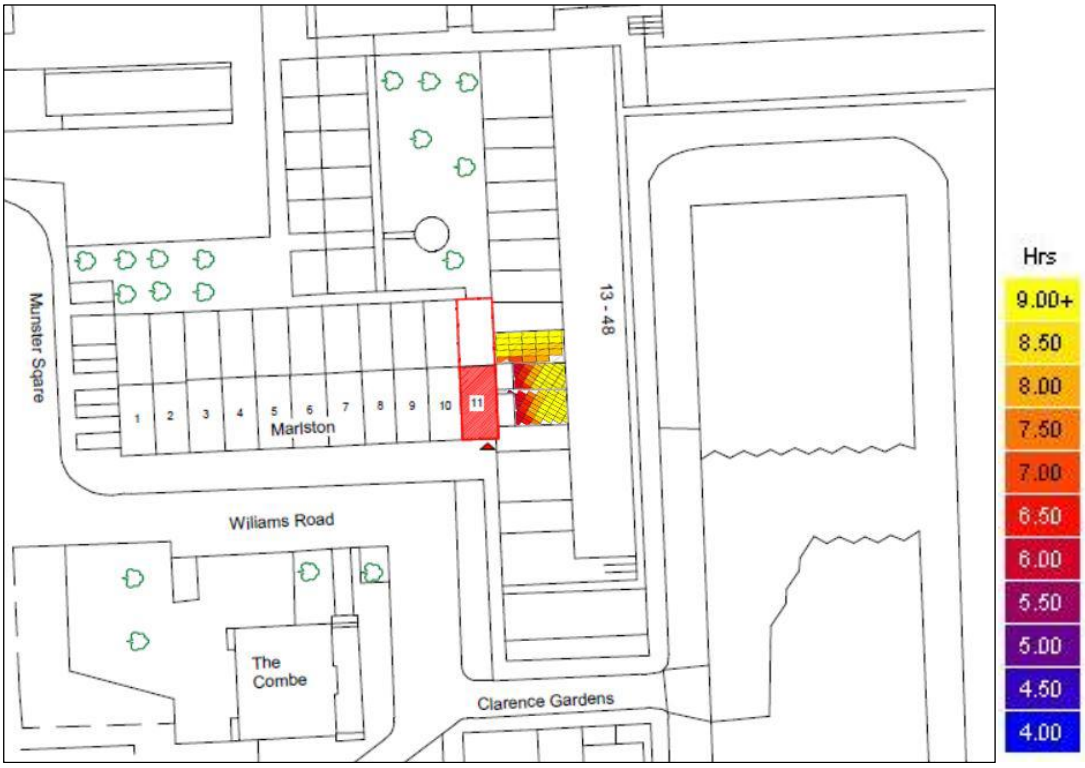

Figure 2 - Sunlight Hours for the neighbouring rear garden (numbering from bottom to top)

CONCLUSION

The proposed scheme, has been designed with care so that it has minimum visual impact on its surroundings, achieving as much sunlight hours as possible despite un-avoidable site constraints and limitations.

Calculations confirm that existing neighbouring properties will still receive adequate annual probable sunlight hours and adequate sunlight hours during the winter period.

Calculations demonstrate that the Vertical Sky Component for all nearest neighbouring windows focuses on the minimum difference between pre- and post-construction. Results show that the impact is considered minor to negligible for the neighbouring properties that were assessed.

Open spaces/rear gardens were identified around the proposed site and therefore an overshadowing assessment was carried out. Results demonstrate that more than 50% of each open space will receive minimum 2hrs of sunlight on the 21st March.

The assessment of daylight, sunlight and overshadowing to the surrounding properties indicates that the proposed scheme, will not cause a change in light levels to most existing occupants located near the proposed site.

APPENDIX A

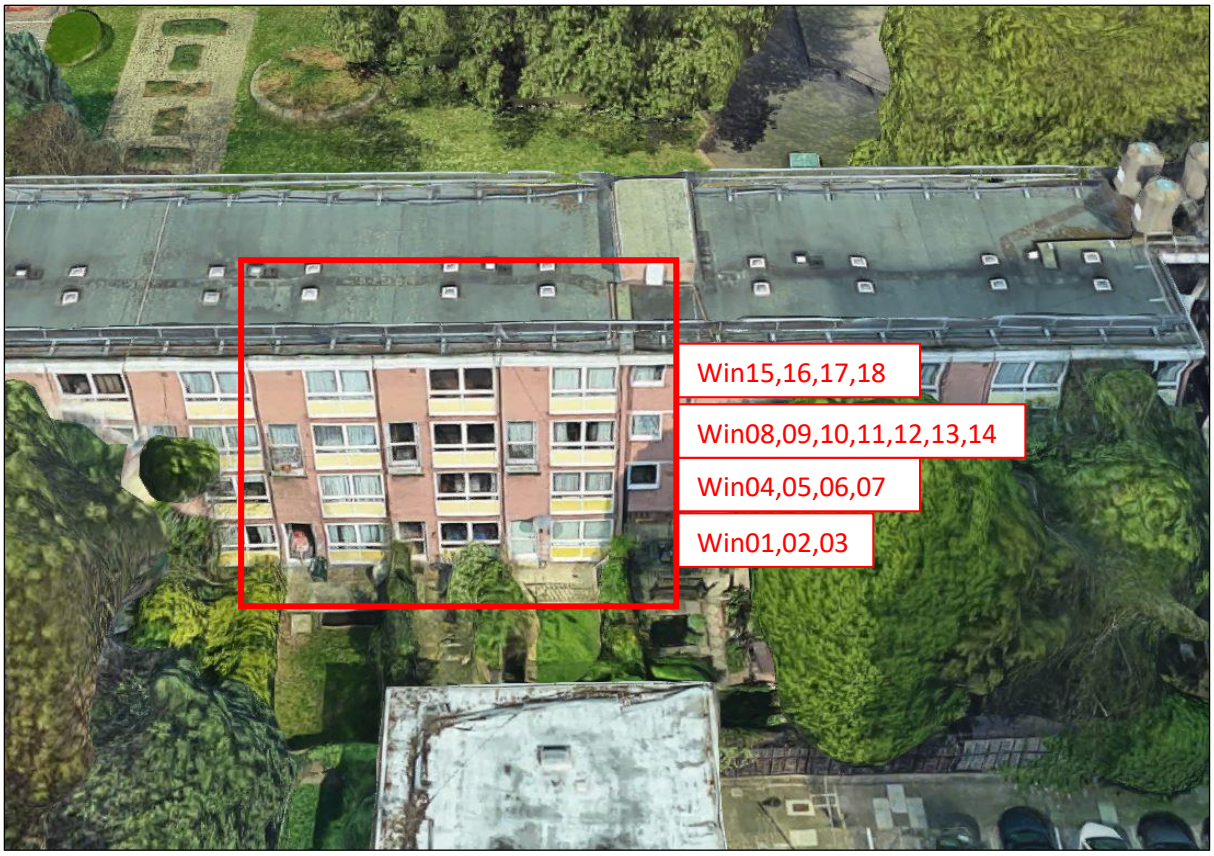

Figure 3 – Neighbouring Windows at No 13-48 Clarence Gardens – rear elevation