

**DAYLIGHT AND SUNLIGHT  
REPORT**

**40 QUEENS GROVE**

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You have asked us to provide you with a daylight and sunlight analysis in relation to 40 Queen's Grove, and the impact of the redevelopment of this building on the surrounding properties, and in particular 39 and 41 Queens Grove.

### **Daylight and Sunlight**

The BRE guidelines provide three main methods of calculation for daylight. The first is known as the Vertical Sky Component (VSC) method which considers the potential for daylight by calculating the angle of vertical sky at the centre of each of the windows serving the residential buildings which look towards the site. This is a more simplistic approach and it could be considered as a "rule of thumb" to highlight whether there are any potential concerns to the amenity serving a particular property.

The second method is the No Sky Line or Daylight Distribution method. This simply assesses the change in position of the No Sky Line between the existing and proposed situations. It does take into account the number and size of windows to a room, but still does not give any qualitative or quantitative assessment of the light in the room, only where sky can or cannot be seen.

The third method of calculation is the Average Daylight Factor (ADF). This is a more detailed and thus more accurate method which considers not only the amount of sky visibility on the vertical face of the window, but also the window size, room size and room use.

In relation to sunlight, the criteria given calculates the annual probable sunlight hours (APSH) which considers the amount of sun available in both the summer and winter for each given window which faces within 90° of due south. Summer is considered to be the six months between March 21<sup>st</sup> and September 21<sup>st</sup> and winter the remaining months.

The surrounding properties that may be potentially impacted by the redevelopment of 40 Queens Grove, are 39 and 41 Queens Grove. These properties have been assessed in terms of daylight and sunlight, and are discussed below.

### **39 Queens Grove**

There is only one room within this property which faces the proposal site and could be potentially affected in terms of daylight and sunlight.

## **DAYLIGHT**

39 Queens Grove only has one window and thus one room facing the proposed site.

In terms of the VSC analysis for daylight, window W1/21 will receive a reduction in daylight superseding the permissible 20% recommended by the BRE. However, the room use behind the fenestration must be considered when ascertaining whether the reduction in daylight will significantly impact the habitants' everyday use and enjoyment of the living space. If the window affected serves a bathroom, a store room or circulation space, any impact can be discounted, as it is ancillary to the use of the building.

The ADF method of daylight analysis not only considers the room use behind the fenestration but also the area of glazing serving that area. Only rooms used for habitation, such as living rooms, bedrooms and dining rooms are considered for the purposes of this assessment.

From our external observation and the juxtaposition of the window and floor level it is our understanding that the room facing the proposed site serves a staircase and as a non-habitable space the true application of the BRE guidance need not be applied. If the room was defined as a bedroom the quality of light reaching to within the room space in terms of ADF will be in excess of the minimum standard (1% suggested by the BRE) with a retained level of 1.24%.

The Daylight Distribution analysis indicates that there will be no loss of sky visibility at the working plane, and will be fully BRE compliant.

Given the room use behind the fenestration the reductions in light will not be of concern or indeed the direction and application of the BRE guidelines.

## **SUNLIGHT**

The APSH method of sunlight assessment indicates full compliance with the BRE recommended guidelines.

## **41 Queens Grove**

This residential property is adjacent to the proposal site, and has a number of windows which overlook the proposal site, and have therefore been assessed for the purposes of daylight and sunlight.

## **DAYLIGHT**

Eight windows within this property overlook the proposal site; these fenestrations serve dining (W1/11, W2/11, W3/11, W4/11, W5/11), kitchen (W6/11, W7/11) or bathroom spaces (W1/13). In

terms of the VSC method of daylight analysis, 7 of 8 windows fully satisfy the BRE criteria; the only window which technically breaches the BRE guidance, is W5/11 – which has another four windows serving the same dining room space. Taking into account that all of the other 4 windows in room R1/11 are compliant with the BRE, this minor technical breach is not a cause for concern.

In terms of the ADF method of analysis, mitigating windows are also considered and the quality of light penetrating the room spaces will be fully BRE compliant.

The Daylight Distribution analysis demonstrates that there will be no loss of sky visibility at the working plane for any of the rooms assessed; (rooms R1/11, R2/11 and R1/13 were the only rooms relevant for the purposes of the Daylight Distribution assessment).

### **SUNLIGHT**

The APSH method of sunlight assessment reveals that all windows will be fully BRE compliant as a result of this proposal.

### **Conclusions**

Having undertaken a full computer daylight and sunlight assessment, we can confirm that all windows within the two surrounding residential properties which serve habitable rooms will be BRE compliant.

With regard to the reduction in VSC for 39 Queens Grove our external observation indicates that the one window appears to serve a non-habitable space and thus need not be considered in relation to receiving adequate levels of daylight and sunlight.

41 Queens Grove will experience a small and technical breach in terms of the VSC method of daylight assessment. The ADF and NSL method indicate full compliance with above BRE minimum light penetrating the room space.

We therefore consider this scheme acceptable in relation to daylight and sunlight.

# APPENDIX 1

PRINCIPLES OF DAYLIGHT AND SUNLIGHT

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## PRINCIPLES OF DAYLIGHT AND SUNLIGHT

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### BACKGROUND

The quality of amenity for buildings and open spaces is increasingly becoming the subject of concern and attention for many interested parties.

Historically the Department of Environment provided guidance of these issues and, in this country, this role has now been taken on by the Building Research Establishment (BRE), the British Standards Institution (BSI) and the Chartered Institute of Building Services Engineers (CIBSE). Fortunately they have collaborated in many areas to provide as much unified advice as possible in these areas.

Further emphasis has been placed on these issues through the European directive that Environmental Impact Assessments (EIA's) are required for large projects. Part of these assessments include the consideration of the micro-climate around and within a proposal. The EIA requires a developer to advise upon, amongst other matters, the quality of and impact to daylight, sunlight, overshadowing, solar glare and light pollution.

It is also clear, particularly through either adopted or emerging Unitary Development Plans (UDP's), that local Authorities take this matter far more seriously than they previously did. There are many instances of planning applications being refused due to impact on daylight and sunlight to neighbouring properties and proportionately more of these refusals are appealed by applicants.

Where developers are seeking to maximise their development value, it is often in the area of daylight and sunlight issues that they may seek to 'push the boundaries'. Local Authorities vary in their attitude of how flexible they can be with worsening the impact on the amenity enjoyed by neighbouring owners. In city centres, where there is high density, it can be the subject of hot debate as to whether further loss of amenity is material or not. There are many factors that need to be taken into account and therefore each case has to be considered on its own merits. Clearly, though, there are governing principles which direct and inform on the approach that is taken.

These principles are effectively embodied within the UDP's and the guidance they expressly rely upon. For example, in central London, practically all of the Local Authorities expressly state they will not permit or encourage developments which create a material impact to neighbouring buildings or amenity areas. Often the basis on what is constituted as 'material' will be derived specifically from the BRE Guidelines. Their guidelines were produced in 1991, as a direct commission from the Department of the Environment, and entitled 'Site Layout Planning for Daylight and Sunlight – A Guide to Good Practice'.



These guidelines are normally the only official document used by local Authorities and consequently they are referred to extensively by designers, consultants and planners. Whilst they are expressly not mandatory and state that they should not be used as an instrument of planning policy, they are heavily relied upon as they advise on the approach, methodology evaluation of impact in daylight and sunlight matters.

## THE BRE GUIDELINES

The BRE give criteria and methods for calculating daylight, and sunlight and to some degree overshadowing and through that approach define what they consider as a material impact. As these different methods of calculation vary in their depth of analysis, it is often arguable as to whether the BRE definition of 'material' is applicable in all locations and furthermore if it holds under the different methods of calculation.

As the majority of the controversial daylight and sunlight issues occur within city centres these explanatory notes focus on the relevant criteria and parts of the Handbook which are applicable in such locations.

In the Introduction of 'Site Layout Planning for Daylight and Sunlight' it states that:-

*"The guide is intended for building designers and their clients, consultants and planning officials. The advice given here is not mandatory and this document 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 because natural lighting is only one of many factors in site layout design (see Section 5). In special circumstances the developer or Planning Authority may wish to use different target values. For example, in an historic city centre a higher degree of obstruction may be unavoidable if new developments are to match the height and proportions of existing buildings".*

Again, the second paragraph of Chapter 2.2 of the document states:-

*'Note that numerical values given here are purely advisory. Different criteria may be used, based on the requirements for daylighting in an area viewed against other site layout constraints'.*

The reason for including these statements in the Report is to appreciate that when quoting the criteria suggested by the BRE, they should not necessarily be considered as appropriate. However, rather than suggest alternative values, consultants in this field often remind local Authorities that this approach is supportable and thus flexibility applied.

## **MEASUREMENT AND CRITERIA FOR DAYLIGHT & SUNLIGHT**

The BRE handbook provides two main methods of measurement of calculating daylight which we use for the assessment in our Reports. In addition, in conjunction with the BSI and CIBSE it provides a further method in Appendix C of the Handbook. In relation to sunlight only one method is offered for calculating sunlight availability for buildings. There is an overshadowing test offered in connection with open spaces.

### **DAYLIGHT**

In the first instance, if a proposed development falls beneath a 25° angle taken from a point two metres above ground level, then the BRE say that no further analysis is required as there will be adequate skylight (i.e. sky visibility) availability.

The three methods for calculating daylight are as follows:

- (a) Vertical Sky Component (VSC)
- (b) No Sky Contours (NSC)
- (c) Average Daylight Factor (ADF)

Each are briefly described below.

#### **(a) Vertical Sky Component**

##### Methodology

This is defined in the Handbook as:-

*"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 illuminate on a horizontal plane due to an unobstructed hemisphere of this sky."*

*"Note that numerical values given here are purely advisory. Different criteria may be used, based on the requirements for daylighting in an area viewed against other site layout constraints".*



The ratio referred to in the above definition is the percentage of the total unobstructed view that is available, once obstructions, in the form of buildings (trees are excluded) are placed in front of the point of view. The view is always taken from the centre of the outward face of a window.

This statement means, in practice, that if one had a totally unobstructed view of the sky, looking in a single direction, then just under 40% of the complete hemisphere would be visible.

The measurement of this vertical sky component is undertaken using two indicators, namely a skylight indicator and a transparent direction finder. Alternatively a further method of measuring the vertical sky component, which is easier to understand both in concept and analysis, is often more precise and can deal with more complex instructions, is that of the Waldram diagram.

The point of reference is the same as for the skylight indicator. Effectively a snap shot is taken from that point of the sky in front of the window, together with all the relevant obstructions to it, i.e. the buildings.

An unobstructed sky from that point of reference would give a vertical sky component of 39.6%, corresponding to 50% of the hemisphere, and therefore the purpose of the diagram is to discover how much sky remains once obstructions exist in front of that point.

The diagram comes on an A4 sheet (landscape) and this sheet represents the unobstructed sky, which in one direction equates to a vertical sky component of 39.6%. The obstructions in front of a point of reference are then plotted onto the diagram and the resultant area remaining is proportional to the vertical sky component from that point.

### Criteria

The BRE Handbook provides criteria for:

- (a) New Development
- (b) Existing Buildings

A summary of the criteria for each of these elements is given and these are repeated below:-

## New Development

### Summary

*In general, a building will retain the potential for good interior diffuse daylighting provided that on all its main faces:-*

- (a) *no obstruction, measured in a vertical section perpendicular to the main face, from a point 2m above ground level, subtends an angle of more than 25 degrees to the horizontal;*
- (b) *If (a) is not satisfied, then all points on the main face on a line 2m above ground level are within 4m (measured sideways) of a point which has a vertical sky component of 27% or more.*

## Existing Buildings

### Summary

*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. This will be the case if either:*

- (a) *the vertical sky component measured at the centre of an existing main window is less than 27%, and less than 0.8 times its former value;*
- or*
- (b) *the area of the working plane in a room which can receive direct skylight is reduced to less than 0.8 times its former value.*

The VSC calculation has, like the other two methods, both advantages and disadvantages. In fact they are tied together. It is a quick simple test which looks to give an early indication of the potential for light. However, it does not, in any fashion, indicate the quality of actual light within a space. It does not take into account the window size, the room size or room use. It helps by indicating that if there is an appreciable amount of sky visible from a given point there will be a reasonable potential for daylighting.

**(b) No Sky Contours**

This is the part (b) of the alternative method of analysis which is given under the Vertical Sky Component heading in this Appendix. It is similar to the VSC approach in that a reduction of 0.8 times in the area of sky visibility at the working plane may be deemed to adversely affect daylight. It is however, very dependent upon knowing the actual room layouts or having a reasonable understanding of the likely layouts. The contours are also known as daylight distribution contours. They assist in helping to understand the way the daylight is distributed within a room and the comparisons of existing and limitations of proposed circumstances within neighbouring properties. Like the VSC method, it relates to the amount of visible sky but does not consider the room use in its criteria, it is simply a test to assess the change in position of the No Sky Line, between the existing and proposed situation. It does take into account the number and size of windows to a room, but does not give any quantitative or qualitative assessment of the light in the rooms, only where sky can or cannot be seen.

**(c) Average Daylight Factor**

This is defined in Appendix H of the BRE Document as:

*"Ratio of total daylight flux incident on the working plane, expressed as a percentage of the outdoor illuminance on a horizontal plane due to an unobstructed CIE Standard Overcast Sky."*

This factor considers interior daylighting to a room and therefore is a more accurate indication of available light in a given room, if details of the room size and use are available.

Criteria

The British Standard, BS8206 Part II gives the following recommendations for the average daylight factor (ADF) in dwellings.

The BRE Handbook provides the formula for calculating the average daylight factor. If the necessary information can be obtained to use the formula then this criteria would be more useful.

Room	Percentage
Kitchen	2%
Living Rooms	1.5%
Bedrooms	1%

It is sometimes questioned whether the use of the ADF is valid when assessing the impact on neighbouring buildings. Firstly, it is often the case that room layouts and uses may not have been established with certainty. Additionally this method is not cited in the main body of text in the BRE Guidelines but only in Appendix C of that document. It is however, the principal method used by both the British Standard and CIBSE in their detailed daylight publications with which the BRE guide recommends that it should be read.

The counter-argument to this view is that whilst room uses and layouts may be not definitely established, reasonable assumptions can easily be made to give sufficient understanding of the likely quality of light. Building types and layouts for certain buildings, particularly residential, are often similar. In these circumstances reasonable conclusions can be drawn as to whether a particular room will have sufficient light against the British Standards. In addition, the final result is less sensitive to changes in the room layout than the No Sky Contour method as it is an average and this element represents only one of the input factors. It is in cases where rooms sizes have been assumed a more reliable indicator than the No Sky Line method.

Clearly if a room which is being designed for a new development is deemed to have sufficient light against the British Standards, then it should equally follow for a room assessed in a neighbouring existing building.

The average daylight factor considers the light within the room behind the fenestration which serves it. The latter is therefore likely to be more accurate because it takes into account the following:-

- a) All the windows serving the room in question.
- b) The room use.
- c) The size and layout of the room.
- d) The finishes of the room surfaces.

### **Summary**

The VSC (which forms part of the ADF formula) is helpful as an initial first guide, especially where access to the rooms in question is not available. Where the room layouts and uses are established or can be reasonably estimated we consider it appropriate to analyse the average daylight factor as well as the vertical sky component.

## SUNLIGHT

### (a) Annual Probable Sunlight Hours (APSH) method

Sunlight is measured in the Handbook in a similar manner to the first method given for measuring the VSC.

A separate indicator is used which contains 100 spots, each representing 1% of annual probable sunlight hours.

The BRE calculated that where no obstructions exist, the total annual probable sunlight hours would amount to 1486. Therefore, each dot on the indicator equates to 14.86 hours of the total annual probable sunlight. Again, to use this indicator the obstructions need to be scaled down and overlaid onto the sunlight indicator.

Those spots which remain uncovered by the scaled obstructions are counted and this gives the percentage of total annual probable sunlight hours for that particular reference point. Again, like the VSC, the reference point is taken to be the centre of the window.

#### Criteria

Again, the BRE Handbook gives criteria for:

- (a) New Development
- (b) Existing Buildings

A summary is given in the handbook on page 12 and this is as follows:-

#### New Development

##### *Summary*

*In general, a dwelling or non-domestic building which has a particular requirement for sunlight, will appear reasonably sunlit provided that:*

- (a) *at least one main window wall faces within 90 degrees of due south;*

*and*



- (b) on this window wall, all points on a line 2m above ground level are within 4m (measured sideways) of a point which receives at least a 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.

### Existing Buildings

#### *Summary*

*If a living room of an existing dwelling has a main window facing within 90 degrees of due south, and any part of a new development subtends an angle of more than 25 degrees to the horizontal measured from the centre of the window in a vertical section perpendicular to the window, then the sunlighting of the existing dwelling may be adversely affected. This will be the case if a point at the centre of the window, in the plane of the inner window wall, receives in the year less than one quarter of annual probable sunlight hours including at least 5% of annual probable sunlight hours between 21 September and 21 March and less than 0.8 times its former sunlight hours during either period.*

It will be noted that the BRE clearly separate summer from winter and indicate that a 20% reduction for either may be material. The Handbook also states that "To find out whether an existing building still receives enough sunlight, the British Standard can be used. It is suggested that all main living rooms of dwellings and conservatories, 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 ..... The British Standard recommends that a 'window reference point', at the centre of each window on the plane of the inside surface of the wall, should be used for the calculations" and thus this practice gives greater consideration to the effect on the main window of a living room.

#### **(b) Area of Permanent Shadow**

The BRE Handbook, 'Site Layout Planning for Daylight and Sunlight' also provides criteria for open spaces.

In particular it gives guidance for calculating any areas of open space that may be in permanent shadow on 21 March. There is no criteria for the overshadowing of buildings.

In summary the BRE document states the following:-

*"It is suggested that, for it to appear adequately sunlit throughout the year, no more than two-fifths and preferably no more than a quarter of any garden or amenity area should be prevented by buildings from*



*receiving any sun at all on 21 March. If, as a result of new development, an existing garden or amenity area does not meet these guidelines, and the area which can receive some sun on 21 March is less than 0.8 times its former value, then the loss of sunlight is likely to be noticeable\*.*

In relation to general overshadowing we often provide, where appropriate, an hourly record for existing and proposed situations, the effect of overshadowing on December 21<sup>st</sup>, March 21<sup>st</sup> and June 21<sup>st</sup>.

For open spaces the permanent shadow criteria is naturally adopted but this offers limited understanding of how a space will feel or appear generally.

## **CITY CENTRES**

The introduction of the BRE document gives the example of 'historic city centres' being a case where there is the need for flexibility and altering the target values for criteria when appropriate, to reflect other site and layout constraints.

To explain why it is appropriate to alter these values, one needs to go further into the BRE Handbook to examine how the criteria for the vertical sky component criteria was determined and the reason therefore for varying the criteria in City Centres.

Appendix G of the document is dedicated to the use of alternative values and, it also demonstrates the manner in which the criteria for skylight was determined for the Summary given above, i.e. the need for 27% vertical sky component for adequate daylighting.

This figure of 27% was achieved in the following manner:

A theoretical road was created with two storey terraced houses upon either side, approximately twelve metres apart. The houses have windows at ground and first floor level, and a pitched roof with a central ridge.

Thereafter, a reference point was taken at the centre of a ground floor window of one of the properties and a line was drawn from this point to the central ridge of the property on the other side of the road. The angle of this line equated to 25 degrees (the 25 degrees referred to in the summaries given with reference to the criteria for skylight).

This 25 degrees line obstructs 13% of the totally unobstructed sky available, leaving a resultant figure of 27% which is deemed to give adequate daylighting. This figure of 27% is the recommended criteria referred to earlier in this report. It will be readily appreciated that in a City Centre, this kind of urban form is unlikely and is

impractical. It would therefore be inappropriate to consider values for two storey terraced housing in a City Centre.

It is therefore sometimes necessary to apply different target criteria or at least acknowledge that the recommendations in the BRE cannot be achieved.

In addition, it is often the case that residential buildings within city centres are served by balconies. Balconies restrict lighting levels even more and thus if they were to be rigidly taken into account, a neighbouring proposal would be artificially and inappropriately constrained. This view is supported by the BRE and is equally another reason for flexible and sensible interpretation of the guidelines.