Skyline Design

BRE Daylight & Sunlight Study - Development at 12 Eaton Terrace, London

BRE Good Practice Assessment - Site Layout Planning for Daylight and Sunlight – A Guide to Good Practice - Second Edition

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Issue Status

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1. Executive Summary

Planning permission is being sought for a new build development to the rear of 12 Eaton Terrace, London. The alteration involves an extension to the ground floor kitchen being constructed directly adjacent to the neighbouring property 14 Eaton Terrace.

Due to the proximity of the development to the adjacent 14 Eaton Terrace, there are concerns that that the development would have a detrimental impact on daylight to habitable rooms contrary to local planning policies.

Watt Energy & Consulting Engineers Ltd have been commissioned to undertake a daylight and sunlight study to support the planning application and assess the effect of daylight & sunlight levels to 14 Eaton Terrace.

This report is based on Building Research Establishment Report ‘Site layout planning for daylight and sunlight: A guide to good practice’ 2011 (the ‘BRE Guide’). In particular this report covers Chapters 2.2 (Light from Sky for Existing Buildings) and 3.2 (Sunlighting for Existing Buildings) of the BRE Guide.

The BRE Guide states that a development to a building must safeguard the daylight to nearby buildings.

In particular the guidelines states that, if applicable, the following factors should be considered:

- **Light from Sky**
  - Vertical Sky Component (VSC) calculation
In conclusion of the assessment carried out in accordance with the Building Research Establishment Report ‘Site layout planning for daylight and sunlight: A guide to good practice’ 2011 the following applies:

- **Light from Sky:**

  Conclusion – All existing windows surrounding the proposed development with either maintain a VSC of greater than 27% or more than 80% of the existing value.

- **Sunlighting:**

  Conclusion – All existing windows surrounding the proposed development receive more than 25% of annual probable sunlight hours, or more than 5% of annual probable sunlight hours between 21 March and 21 September.

*Therefore it can be concluded that with regards to Daylight & Sunlight the proposed development will not have a detrimental effect to any of the surrounding properties.*
2. **Introduction**

Planning permission is being sought for alterations to the rear elevation of 12 Eaton Terrace, London.

The alterations involve the extension to the ground floor kitchen being constructed directly adjacent to the neighbouring property 14 Eaton Terrace.

Figure 1 shows that the proposed development to 12 Eaton Terrace may be an issue with regards to obstruction of sunlight to the windows of 14 Eaton Terrace as the development is situated within 90° of due south of a main window wall.

![Figure 1: Proposed development lies within 90° of Due South of affected window.](image)

Furthermore, the windows to 14 Eaton Terrace may also have their right to Light from the Sky affected. Figure 2 shows the windows to the rear of 14 Eaton Terrace could potentially be affected.
3. Methodology of the Study

The study is based on the various numerical tests laid down in the Building Research Establishment (BRE) guide ‘Site Layout Planning for Daylight and Sunlight: a guide to good practice’ 2011. In general, the BRE tests are based on the requirements of the British Standard, BS 8206 Part 2.

The standards set out in the BRE guide are intended to be used flexibly. The following statement is quoted directly from the BRE guide:

“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.”

Light from the Sky

Diffuse daylight is the light received from the sun which has been diffused through the sky. Even on a cloudy day when the sun is not visible, a room will continue to be lit with light from the sky. This is diffuse daylight.

Diffuse daylight calculations should be undertaken to all rooms where daylight is required, including living rooms, kitchens and bedrooms. Usually, if a kitchen is less than 13m² it is considered to be a non-
habitable room and the daylight tests need not be applied. The BRE guide states that windows to bathrooms, toilets, storerooms, circulation areas and garages need not be analysed.

The BRE guide contains two tests which measure diffuse daylight:

- **Vertical Sky Component** - The percentage of the sky visible from the centre of a window is known as the Vertical Sky Component. Diffuse daylight may be adversely affected if after a development the Vertical Sky Component is both less than 27% and less than 0.8 times its former value.

- **Daylight Distribution** - The BRE guide states that where room layouts are known, the impact on the daylighting distribution can be found by plotting the, ‘no sky line’ in each of the main rooms. The no-sky line is a line which separates areas of the working plane that can and cannot have a direct view of the sky. Daylight may be adversely affected if after the development 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 ratio of the illuminance at a point on a given plane due to the light received directly from a sky of assumed or known luminance distribution, to that on a horizontal plane due to an unobstructed hemisphere of this sky. Direct sunlight is excluded from both values of illuminance (i.e. CIE Overcast Sky). [Illuminance is measured in Lux]

Note: this is the same as Daylight Factor except the indirect component has been removed.
Vertical sky component results are established by using the following standard sky data.

<table>
<thead>
<tr>
<th>Sky Time/Date</th>
<th>Sky conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard CIE overcast sky</td>
</tr>
<tr>
<td>21 September</td>
<td>Time (24 hr): 12:00</td>
</tr>
</tbody>
</table>

**Sunlighting**

The BRE sunlight tests should be applied to all main living rooms and conservatories which have a window which faces within 90 degrees of due south. The guide states that kitchens and bedrooms are less important, although care should be taken not to block too much sunlight.

- **Annual Probable Sunlight Hours**

  The BRE guide states 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 21 September and 21 March and
  - Following any reduction in sunlight below 25% a window should not receive 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.

**Gardens and Open Spaces**

The availability of sunlight should be checked for all open spaces where sunlight is required. This would normally include:

- Gardens, usually the main back garden of a house
- Parks and playing fields
- Children’s playgrounds
- Outdoor swimming pools and paddling pools
- Sitting out areas, such as those between non-domestic buildings and in public squares
- Focal points for views such as a group of monuments or fountains.
The BRE guide recommends that at least 50% of the area of each amenity space listed above should receive at least two hours of sunlight on 21st March. If as a result of new development an existing garden or amenity area does not meet the above, and the area which can receive two hours of sun on 21st March is more than 0.8 times its former value, then the loss of light is likely to be noticeable.

4. Calculations and Results

Vertical Sky Component

Any reduction in the total amount of skylight can be calculated by finding the VSC at the centre of each main window. In the case of a floor-to-ceiling window such as patio door, a point of 1.6m above ground on the centre line of the window may be used.

The VSC is a measure of the light reaching the centre of a window. It is the ratio between the vertical illuminance on the glazing direct from the sky and the illuminance from an unobstructed sky. For a CIE standard overcast sky with no obstructions the VSC is 40%. A VSC of 27% is regarded as offering the potential for good daylight. This corresponds to an angle of obstruction of 27°.

If the VSC for the affected window is greater than 27% then it can be considered that enough skylight should still be reaching the window of the existing building. Any reduction below this level should be kept to a minimum. If the VSC, with the new development in place, is both less than 27% and less than 0.8 times its former value, then occupants of the existing building will notice the reduction in the amount of skylight.

In order to calculate the VSC for the affected window the ground floor room of 12 Eaton Terrace, London was modelled using IESVE Suncast and Radiance IES and the VSC for the existing and proposed assessed.

Figures 3 and 4 show the models of the existing and proposed VSC calculations.
Figure 3: Existing Building, 12 Eaton Terrace, London

Figure 4: Proposed Building, 12 Eaton Terrace, London
The below table summarises the VSC figures and confirms that the VSC is either greater than 27% and as proposed or is not less than 0.8 times its former value.

Therefore, enough skylight will still be reaching the window of the existing building and the occupants will not notice a reduction in the amount of skylight.

<table>
<thead>
<tr>
<th>Window</th>
<th>Existing VSC</th>
<th>80% of Existing VSC</th>
<th>Proposed VSC</th>
<th>Proposed VSC % of Existing</th>
<th>% Reduction</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>39.8</td>
<td>31.84</td>
<td>35.8</td>
<td>90%</td>
<td>10%</td>
<td>PASS</td>
</tr>
<tr>
<td>2</td>
<td>35</td>
<td>28</td>
<td>34.2</td>
<td>98%</td>
<td>2%</td>
<td>PASS</td>
</tr>
<tr>
<td>3</td>
<td>39.8</td>
<td>31.84</td>
<td>39</td>
<td>98%</td>
<td>2%</td>
<td>PASS</td>
</tr>
<tr>
<td>4</td>
<td>39.1</td>
<td>31.28</td>
<td>39.4</td>
<td>101%</td>
<td>-1%</td>
<td>PASS</td>
</tr>
</tbody>
</table>

*Figure 5: Calculated VSC Figures*

Sunlight

*Figure 6: Proposed development lies within 90° of Due South of affected window.*

The BRE Guide states that obstruction to sunlight may become an issue if:
• Some part of the new development is situated within 90° of due south of a main window wall of an existing building.

Figure 6 shows that the proposed development to 12 Eaton Terrace may be an issue with regards to obstruction of sunlight to the rear windows of 14 Eaton Terrace.

**Annual Probable Sunlight Hours**

As the windows may be affected by loss of sunlight an Annual Probable Sunlight Hours (APSH) assessment is required. For interiors, access to sunlight can be quantified by an APSH assessment. BS 8206-2 recommends that interiors where the occupants expect sunlight should receive at least 25% of APSH, including in the winter months between 21 September and 21 March at least 5% of APSH.

![Figure 7: Existing APSH – windows receiving more than 25% of Annual Probable Sunlight Hours (1st Jan – 31st Dec). The windows shown in colour are where the window receive more than the stated % of APSH. Windows not coloured are below the threshold % APSH.](image)

All windows receive at least 25% of APSH, from 1st Jan – 31st Dec as shown in the image above.
Figure 8: Proposed APSH – windows receiving more than 25% of Annual Probable Sunlight Hours (1st Jan – 31st Dec). The windows shown in colour are where the window receive more than the stated % of APSH. Windows not coloured are below the threshold % APSH

<table>
<thead>
<tr>
<th>Window</th>
<th>Existing APSH</th>
<th>80% of Existing APSH</th>
<th>Proposed APSH</th>
<th>Proposed APSH % of Existing</th>
<th>% Reduction</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Window 1</td>
<td>72</td>
<td>57</td>
<td>62</td>
<td>87%</td>
<td>13%</td>
<td>PASS</td>
</tr>
<tr>
<td>Window 2</td>
<td>72</td>
<td>57</td>
<td>72</td>
<td>100%</td>
<td>0%</td>
<td>PASS</td>
</tr>
<tr>
<td>Window 3</td>
<td>72</td>
<td>57</td>
<td>72</td>
<td>100%</td>
<td>0%</td>
<td>PASS</td>
</tr>
<tr>
<td>Window 4</td>
<td>72</td>
<td>57</td>
<td>70</td>
<td>98%</td>
<td>2%</td>
<td>PASS</td>
</tr>
</tbody>
</table>

Figure 9: Calculated APSH Figures

It can be seen in the table above that all windows following development receive an APSH of more than 25% or more than 80% their former value. The development therefore passes the recommendations of the BRE Guidance.
Figure 10: Proposed APSH – windows receiving more than 5% of Annual Probable Sunlight Hours (21st Mar – 21st Sep). The windows shown in colour are where the window receive more than the stated % of APSH. Windows not coloured are below the threshold % APSH.

All windows receive at least 5% of APSH, from 21st Mar – 21st Sep as shown in the image above.

5. Conclusions

In conclusion to the assessment carried out in accordance with the Building Research Establishment Report ‘Site layout planning for daylight and sunlight: A guide to good practice’ 2011 the following applies:

- **Light from Sky: Vertical Sky Component**
  - Virtual environment modelling calculations confirm that the VSC for the worst affected window following the proposed development is **35.8%** with just a 10% reduction from its previous value
  - The VSC is greater than 0.8 times its former value.

  **Conclusion – Occupants of the existing buildings will not notice a reduction in the level of skylight.**

- **Sunlight: Annual Probable Sunlight Hours**
o Virtual environment modelling calculations confirm that the APSH for the worst affected window following the proposed development is 62% reduced from 72%.
o The worst APSH is greater than 0.8 times its former value.
o Following APSH all window point of references receive at least 5% of APSH in the winter months between 21 September and 21 March.

**Conclusion – Occupants of the existing buildings will not notice a reduction in the level of sunlight.**

In summary the proposed development will have a low impact on the light receivable by its neighbouring properties.

Watt Energy & Consulting Engineers confirms that the development design satisfies all of the requirements set out in the BRE guide Site Layout Planning for Daylight and Sunlight.