DAYLIGHT & SUNLIGHT

IMPACT ON NEIGHBOURING PROPERTIES REPORT: APPENDICES

Lordship Lane, London

Atri7 2 Limited

19 February 2024

GIA No: **2351**

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Map data

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ASSUMPTIONS

APPENDIX 01
ASSUMPTIONS

01

A 1.1 The context model has been produced using our VU.CITY platform. GIA have extracted the required area, creating a 3D model with an overall building tolerance of up to 150mm. The relevant windows have been added to the VU.CITY model from site photographs, observations and brick counting.

02

A 1.2 GIA have sought to create the most accurate 3D model possible based on the data available, however, a degree of tolerance should be applied.

03

A 1.3 The scope of buildings assessed has been determined as a reasonable zone which considers both the scale of the proposed scheme and the proximity of those buildings which surround and face the site. There may be properties outside of the considered scope that are affected by the scheme, however,no significant effects are anticipated.

04

A 1.4 The property uses have been ascertained by reference to a Valuation Office Agency search and/or based upon external observations from a site visit carried out on date.

05

A 1.5 GIA have obtained full or partial floor plans for the following properties:

- 1-16 Vincent Square
- 17-22 Vincent Square
- 23-28 Vincent Square
- 681-703 Vincent Square
- Omnibus House

A 1.6 These layouts have been incorporated into our 3D computer model. It is reasonable to assume that these layouts have been implemented, however, GIA would require access to confirm this.

06

A 1.7 Where GIA have not been able to source detailed internal floor-plans reasonable assumptions as to the internal layouts of the rooms behind the fenestration have been made. This is normal practice where access to adjoining properties is undesirable in terms of development confidentiality. Unless the building form dictates otherwise, we assume a standard 4.2m deep room (14ft) for residential properties.

07

A 1.8 Floor levels have been assumed for adjoining properties as access has not been obtained. This dictates the level of the working plane which is the point at which the No Sky Line assessments are carried out.

08

A 1.9 GIA have discounted rooms that appear to be or are confirmed to be bathrooms, hallways, circulation space etc. These rooms are not considered to be habitable and thus do not require assessment in accordance with the BRE Guidelines.

09

A 1.10 We are limited to identifying clearly visible solar panel arrays from online map imagery and what we can ascertain from site visits. Where solar tiles are in use, we may not be able to clearly identify them as solar receptors and therefore consider them in our assessment.

APPENDIX 02

PRINCIPLES OF DAYLIGHT, SUNLIGHT & OVERSHADOWING

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19 February 2024

APPENDIX 02

PRINCIPLES OF DAYLIGHT, SUNLIGHT & OVERSHADOWING

The Building Research Establishment (BRE) have set out in their handbook 'Site Layout Planning for Daylight & Sunlight: A Guide to Good Practice 3rd edition (2022)', guidelines and methodology for the measurement and assessment of daylight, sunlight and overshadowing.

BACKGROUND & CONTEXT

A 2.1 The quality of daylight and sunlight amenity as well as the overshadowing of open spaces is often stipulated within planning policy for protection or enhancement and a concern for adjoining owners and other interested parties.

A 2.2 The BRE Guidelines provide advice on site layout planning to determine the quality of daylight and sunlight both within buildings and reaching open spaces.

A 2.3 The BRE Guidelines note that the document is intended to be used in conjunction with the interior daylight recommendations found within the British Standard Daylight in buildings, BS EN 17037 and the CIBSE Publication LG 10 Daylighting – a guide for designers.

A 2.4 Whilst the BRE Guidelines are typically referred to for daylight sunlight and overshadowing matters within the planning process, they were not intended to be used as an instrument of planning policy, nor were the figures intended to be fixedly applied to all locations.

A 2.5 In the introduction of 'Site Layout Planning for daylight and sunlight (2022)', section 1.6 (page 7), 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 since 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 a historic city centre, or in an area with modern high-rise buildings, a higher degree of obstruction may be unavoidable if new developments are to match the height and proportions of existing buildings".*

A 2.6 Paragraph 2.2.3 (page 14) 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".*

A 2.7 The numerical criteria suggested by the BRE are therefore designed to provide industry advice/ guidance to plan/design with daylight in mind. Alternative values may be appropriate in certain circumstances such as highly dense urban areas. The BRE approach to creating alternative criteria is detailed within Appendix F of the Document.

A 2.8 Paragraph 2.2.2 (page 14) of the BRE Guidelines states:

> *"intended for use for rooms in adjoining dwellings where daylight is required, including living rooms, kitchens, and bedrooms. Windows to bathrooms, toilets, storerooms, circulation areas, and garages need not be analysed."*

A 2.9 Although primarily designed to be used for residential properties, the BRE Guidelines continue to state that they may be applied to any existing non-residential buildings where there may be a reasonable expectation of daylight including; schools, hospitals, hotels and hostels, small workshops, and some offices.

A 2.10 Many Local Planning Authorities consider daylight and sunlight an important factor for determining planning applications. Policies refer to both the protection of daylight and sunlight amenity within existing properties and areas of amenity as well as the creation of proposed dwellings and spaces with high levels of daylight and sunlight amenity.

A 2.11 Although Local Authorities will look to the BRE Guide to understand impacts it is their Planning Policies that will determine whether the changes in light should be a reason for refusal at planning.

A 2.12 It is an inevitable consequence of the built-up urban environment that daylight and sunlight will be more limited in dense urban areas. It is well acknowledged that in such situations there may be many other conflicting and potentially more important planning and urban design matters to consider other than just

the provision of ideal levels of daylight and sunlight.

A 2.13 The following sections extract relevant sections from the Guide.

EFFECTS TO DAYLIGHT

A 2.14 The BRE Guidelines provide two methodologies for daylight impact assessment, namely;

1. The Vertical Sky Component (VSC); and
2. The No Sky Line (NSL).

Vertical Sky Component (VSC)

A 2.15 The Vertical Sky Component (VSC) method is described in the Glossary of BRE Guidelines as the:

> *"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 other buildings"*

A 2.16 Put simply, the VSC provides an assessment of the amount of skylight falling on a vertical plane (generally a window) directly from the sky, in the circumstance of an overcast sky (CIE standard).

A 2.17 The national numerical value target "ideal" for VSC is 27%. The BRE Guidelines advise that upon implementation of a development, a window should retain a VSC value of 27% or at least 0.8 of its former value (i.e. no more than a 20% change) as per paragraph 2.2.23 of the Guide.

A 2.18 This form of assessment does not take account of window size, room use, room size, window number or dual aspect rooms. The assessment also assumes that all obstructions to the sky are 100% non-reflective thereby omitting the consideration of reflection and considering only the light coming directly from the sky.

A 2.19 The VSC calculation is undertaken in both the existing and proposed scenarios so as to make a comparison.

A 2.20 The image in Figure 01 depicts a Waldram Diagram which can be used to calculate the VSC. The existing buildings are solidly pictured with the proposed scheme semi-transparent in the foreground.

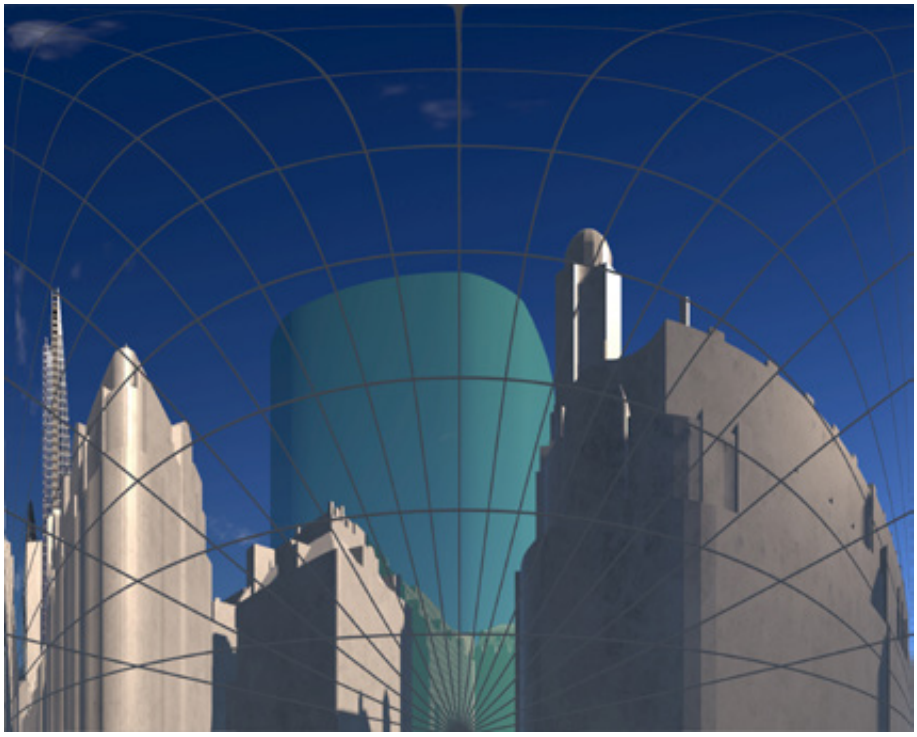

Figure 01: Waldram diagram

No Sky Line (NSL)

A 2.21 In addition to the VSC, the BRE recommends the NSL method of assessment where internal layouts are known. Whilst the VSC provides information on the quantum of light reaching a window, the NSL seeks to provide information on how well this light is distributed within the room. The NSL is sometimes also referred to as 'Daylight Distribution' for this reason.

A 2.22 The NSL is defined in the Glossary of the Guide as *"the outline on the working plane of the area from which no sky can be seen."* and so the NSL is effectively an assessment of sky visibility within a room. As stated already, the calculation is undertaken across the working plane which in accordance with paragraph 2.2.10 *"in houses [...] is assumed to be horizontal and 0.85m high"*.

A 2.23 Again, both the existing and proposed positions are calculated and presented alongside any change in position of the NSL. The results can then be presented in table format or else illustrated on a contour plot if required, an example of which can be found in Figure 02 below.

A 2.24 The BRE Guidelines state at paragraph 2.211 that:

> *"If, following construction of a new development, the no sky line moves so that the area of the existing room, which does receive direct skylight, is reduced to less than 0.8 times its former value this will be noticeable to the occupants, and more of the room will appear poorly lit. This is also true if the no sky line encroaches on key areas like kitchen sinks and worktops."*

A 2.25 In accordance with the strict application of the national numerical values, therefore the change in daylight would be noticeable to the occupants should the NSL experience a loss of NSL greater than 20%.

A 2.26 It is relevant to note that this assessment takes the number and size of windows serving a room into account as well as the shape of the room but, being concerned only with sky visibility and the distribution of light, does not consider the quantum of light reaching the room.

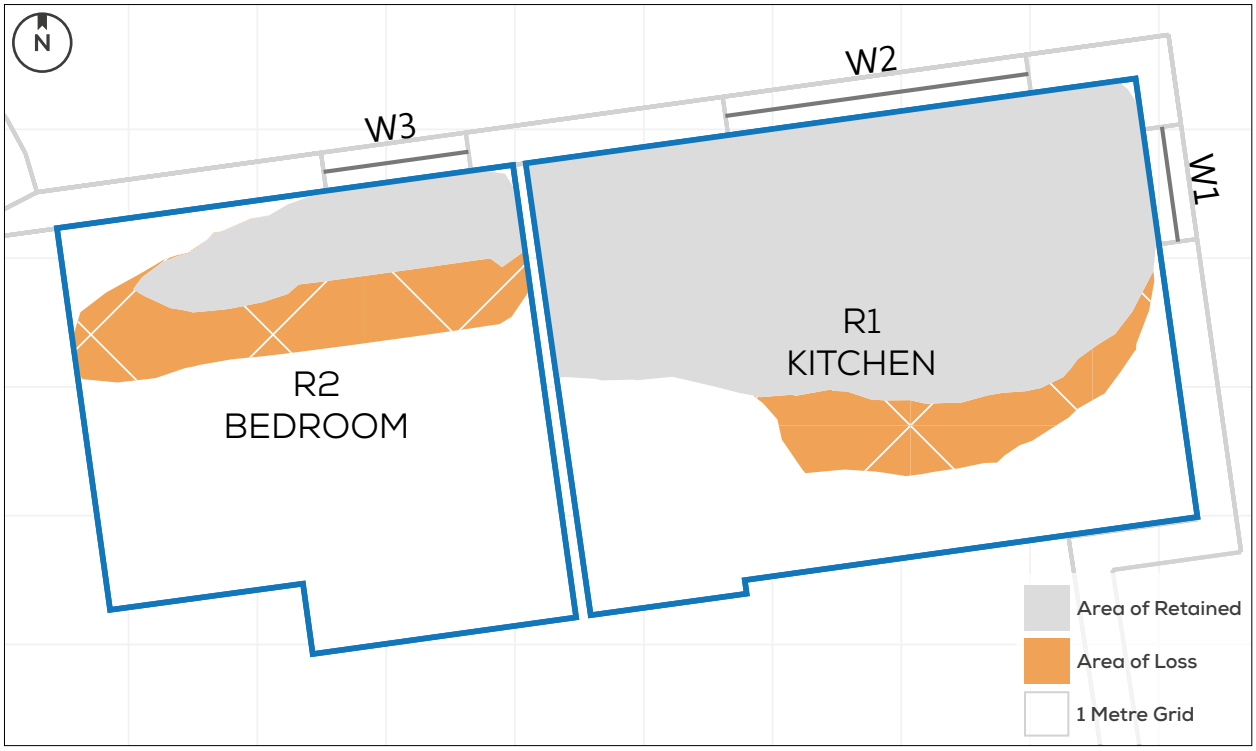

Figure 02: Example NSL diagram

Decision Chart (Figure 20 of the BRE Guide)

A 2.27 The flowchart in Figure 03 illustrates the steps and criteria outlined within the BRE Guidelines to understand whether the daylighting (VSC and NSL) may be significantly affected.

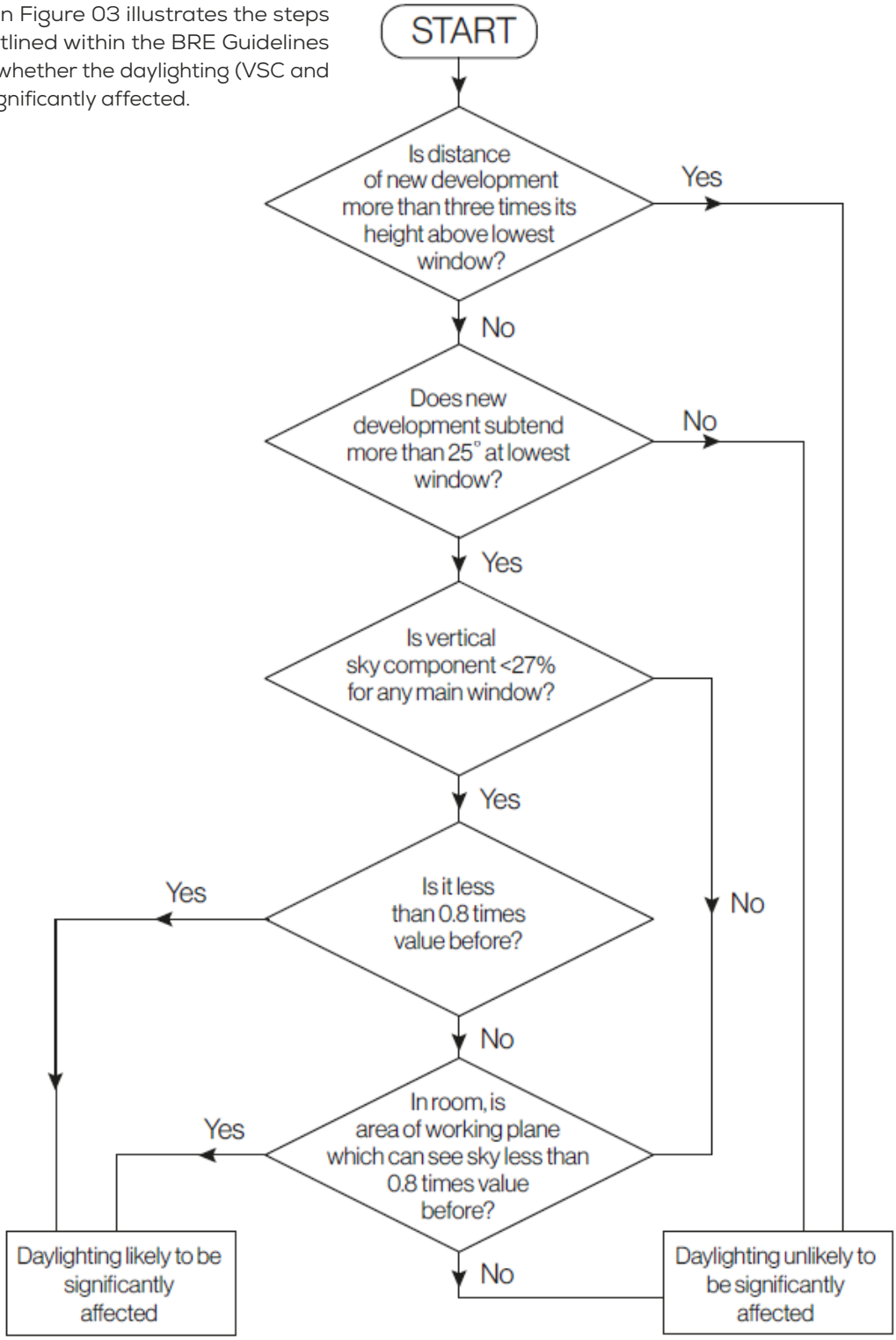

Figure 03: BRE Decision Chart (Figure 20): *diffuse daylight in existing buildings. This does not include an assessment of rights to light issues, which a developer may need to consider separately*

EFFECTS TO SUNLIGHT

Annual Probable Sunlight Hours (APSH)

A 2.28 The BRE Guidance suggests that to understand sunlight impacts to a property, an assessment of Annual Probable Sunlight Hours (APSH) is undertaken. The APSH is defined in the Glossary as:

> *"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)"*

A 2.29 Expanding on the above within the Guidance, long-term averages were used to position 100 spots in the sky, representative of sunlight over the whole year. Correlating to the probability of the sun to shine, the majority of these (70) are at times to the six-months containing summer (from spring equinox to autumn equinox) which 30 are the 'winter' months from autumn equinox to spring. The APSH is calculated though calculating how many of these 'spots' can be seen from a location (normally a window) both overall and how many of these are during the winter months.

A 2.30 To understand the potential sunlight impacts therefore, all windows facing within 90 degrees of due south and overlooking the development are generally assessed for APSH.

A 2.31 The BRE Guidelines set out the overall methodology and criteria for the assessment of Sunlight in Chapter 3. The BRE Guidelines state in paragraph 3.2.3 and 3.2.5:

> *"To assess loss of sunlight to an existing building, it is suggested that all main living rooms of dwellings, and conservatories, should be checked if they have a window facing within 90 degrees of due south. Kitchens and bedrooms are less important, although care should be taken not to block too much sun."*
>
> *"A point at the centre of the window on the outside face of the window wall may be taken."*

A 2.32 In interpreting the results, the BRE Guidance states in summary 3.2.13 that:

> *"If a living room of an existing dwelling has a main window facing within 90° of due south, and any part of a new development subtends an angle of more than 25° 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 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*
> - *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."*

A 2.33 The image in Figure 04 depicts the APSH sun spots overlaid on a Waldram Diagram. The existing buildings are solidly pictured with the proposed scheme semi-transparent in the foreground. The yellow spots indicate summer sun and the blue spots indicate winter sun.

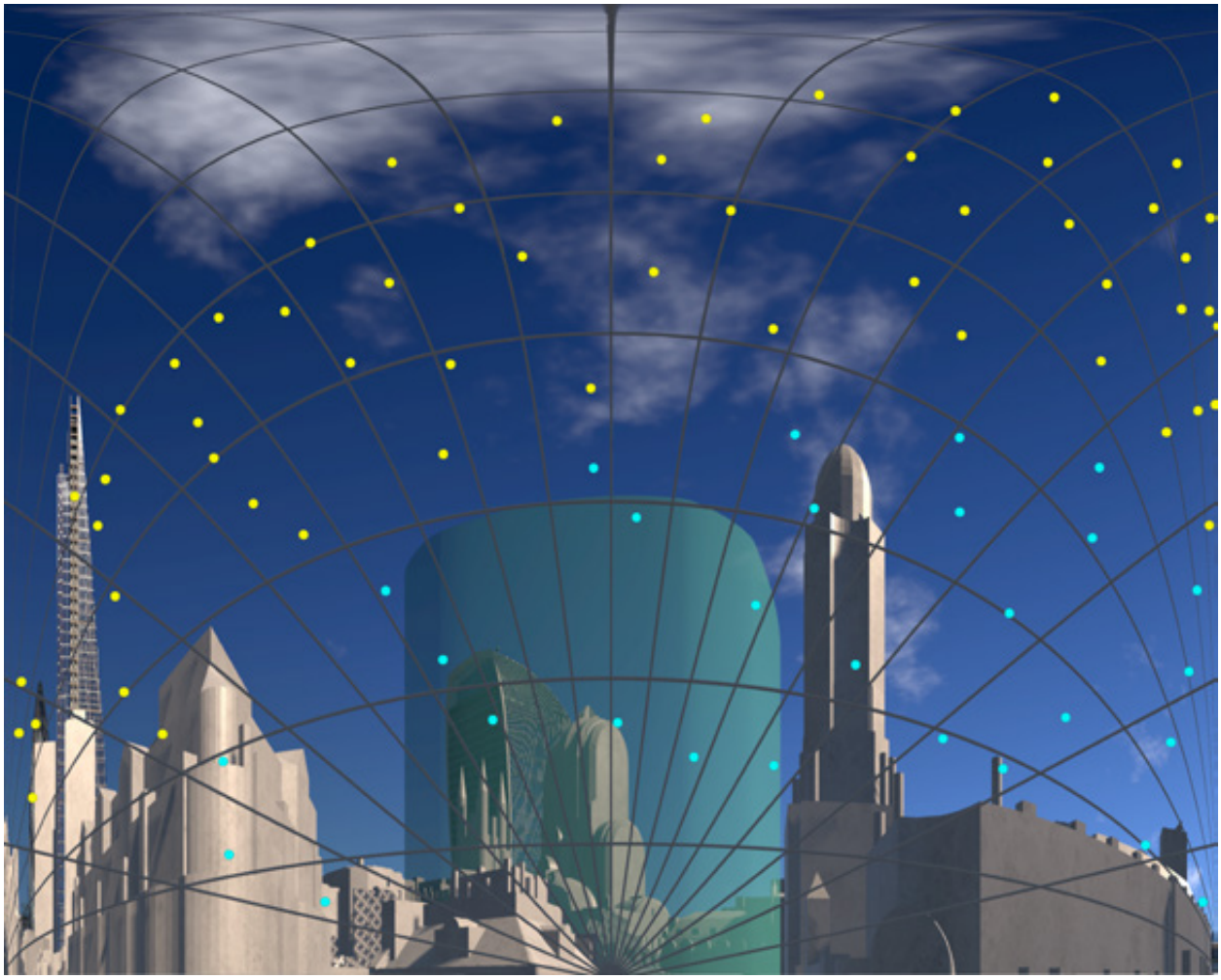

Figure 04: Waldram diagram

EFFECTS TO OVERSHADOWING

A 2.34 The BRE guidance in respect of overshadowing of amenity spaces is set out in section 3.3.1 of the handbook. Here it states as follows:

> *"Sunlight in the spaces between and around buildings has an important impact on the overall appearance and ambiance of a development. It is valuable for a number of reasons, to:*
>
> - *provide attractive sunlit views (all year)*
> - *make outdoor activities like sitting out and children's play more pleasant (mainly warmer months)*
> - *encourage plant growth (mainly spring and summer)*
> - *dry out the ground, reducing moss and slime (mainly in colder months)*
> - *melt frost, ice and snow (in winter)*
> - *dry clothes (all year)."*

A 2.35 It must be acknowledged that in urban areas the availability of sunlight on the ground is a factor which is significantly controlled by the existing urban fabric around the site in question and so may have very little to do with the form of the development itself. Likewise, there may be many other urban design, planning and site constraints which determine and run contrary to the best form, siting and location of a proposed development in terms of availability of sun on the ground.

Sun Hours on Ground & Transient Overshadowing

A 2.36 The Sun Hours on Ground method of overshadowing assessment uses specialist software to determine the sunlight exposure across an area of amenity.

A 2.37 The BRE Guidelines suggest that the Spring Equinox (21 March), being the year's midpoint, is a suitable date for the assessment. Paragraph 3.3.17 states:

> *"It is recommended that for it to appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive at least two hours of sunlight on 21 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 21 March is less than 0.8 times its former value, then the loss of sunlight is likely to be noticeable."*

A 2.38 The Transient Overshadowing study is recommended where large buildings are proposed which may affect a number of gardens or open spaces or where an area is particularly sensitive at certain times of day or year. For the purpose of this assessment, the additional shadow cast is mapped and highlighted at hourly intervals from sunrise to sunset on the following dates:

- 21 March (Spring equinox)
- 21 June (Summer solstice)
- 21 December (Winter solstice)

A 2.39 The BRE guidelines do not provide any suggested criteria for Transient Overshadowing, rather it is a qualitative assessment to aid understanding.

BRE GUIDELINES: ADDITIONAL DAYLIGHT AND SUNLIGHT TESTS

Daylight - VSC and APSH to Rooms

A 2.40 As outlined within the BRE Guidelines (paragraph 2.2.6), the VSC value is calculated for each window; however:

> *"If a room has two or more windows of equal size, the mean of their VSCs may be taken".*

A 2.41 Where a room is served by two or more windows of the same or different sizes, the VSC value to the room can be calculated by applying an average weighting calculation to understand the VSC value to the room. The formula used is as follows;

$\Sigma(V_n * A_n) / \Sigma A_n$

Where:

V = window VSC
A = window area
n = the number of windows

A 2.42 The BRE provide a methodology to calculate APSH in relation to the room and window, paragraph 3.1.12 states:

> *"If a room has multiple windows, the amount of sunlight received by each can be added together provided they occur at different times and sunlight hours are not double counted."*

A 2.43 The above extract of the BRE is in relation to proposed units rather than existing buildings. It does, however, make sense to apply this methodology to existing rooms as well, when room layouts are known as a room served by multiple windows could receive the benefit of sunlight from all windows and not just one.

A 2.44 GIA calculate the APSH room assessment in the following way:

1. The sunlight hours (both winter and annual) are calculated for each window. Instead of simply returning the overall per cent pass rate, i.e. one figure for winter, and one for the whole year, the yes/no result of each of the 100 sun spots is tracked. For this accounting to work, each sun dot needs to be assigned a unique identifier, e.g. from 1 to 100;
2. The sets of 100 sun spots are combined for each room using Boolean logic, i.e. conjunctions of yes/no values. The outcome of this step is a set of 100 yes/no values corresponding to the 100 sun spots, but on a per-room basis. Each per-room dot is counted if it is unobstructed for at least one of its windows; and
3. The unobstructed sun dots for the room are summed up and expressed as a percentage of the total number of annual and winter spots.

Balconies/Overhangs

A 2.45 The BRE recognises that existing architectural features on neighbouring buildings such as balconies and overhangs inherently restrict the quantum of skylight to a window. The BRE Guidelines note on page 11, paragraph 2.1.17 and page 16, paragraph 2.2.13:

> *"This is a particular problem if there are large obstructions opposite; with the combined effect of the overhang and the obstruction, it may be impossible to see the sky from inside the room, and hence to receive any direct skylight or sunlight at all."*
>
> *"Existing windows with balconies above them typically receive less daylight. Because the balcony cuts out light from the top part of the sky, even a modest obstruction opposite may result in a large relative impact on the VSC, and on the area receiving direct skylight. One way to demonstrate this would be to carry out an additional calculation of the VSC and the area receiving direct skylight, for both the existing and proposed situations, without the balcony in place."*

A 2.46 As noted by the BRE Guidelines, where there are existing overhanging features, larger reductions in skylight and sunlight may be unavoidable and alternative criteria can be used. The guidance suggests that in such situations a calculation is carried out that excludes the balcony or the obstruction.

DAYLIGHT - MIRROR MASSING & ADJOINING DEVELOPMENT LAND

Alternative target Values for Skylight and Sunlight Access "Mirror Massing"

A 2.47 The BRE Guidelines provide a calculation for the VSC and APSH analysis to quantify an appropriate alternative value based on the context of an environment. This approach is known as the 'mirror image' analysis (see Figure 05).

A 2.48 The BRE notes in paragraph F5:

> *"where an existing building has windows that are unusually close to the site boundary and taking more than their fair share of light. Figure F3 shows an example where side windows of an existing building are close to the boundary. To ensure that new development matches the height and proportions of existing buildings, the VSC and APSH targets for these windows could be set to those for a 'mirror-image' building of the same height and size, an equal distance away on the other side of the boundary."*

A 2.49 This analysis is used to understand the levels of Daylight (VSC) and Sunlight (APSH) that would be experienced by an extant neighbouring property if there were a building of the same height and extent opposite.

A 2.50 The mirror image assessment is fairly simplistic and is not, therefore, easily applied to large and complex site footprints which are not all built at equal distances from the site boundary or of the same footprint.

Adjoining Development Land

A 2.51 The "Adjoining Development Land" analysis provided within the BRE Guidelines is a simple test to ensure that a proposal is a reasonable distance from the boundary so as to "enable future nearby developments to enjoy a similar access to daylight." (2.3.1)

A 2.52 The BRE comments in paragraphs 2.3.3, 2.3.6 and 2.3.7 that:

> *"The diffuse daylight coming over the boundary may be quantified in the following way. As a first check, draw a section in a plane perpendicular to the boundary (Figure 21). If a road separates the two sites then the centre line of the road should be taken. Measure the angle to the horizontal subtended at a point 1.6 metres above the boundary by the proposed new buildings. If this angle is less than 43 ° then there will normally still be the potential for good daylighting on the adjoining development site (but see Sections 2.3.6 and 2.3.7)."*
>
> *"The guidelines above should not be applied too rigidly. A particularly important exception occurs when the two sites are very unequal in size and the proposed new building is larger in scale than the likely future development nearby. This is because the numerical values above are derived by assuming the future development will be exactly the same size as the ·proposed new building (Figure 22). If the adjoining sites for development are a lot smaller, a better approach is to make a rough prediction of where the nearest window wall of the future development may be; then to carry out the 'new building' analysis in Section 2.1 for this window wall."*
>
> *"The 43° angle should not be used as a form generator, to produce a building which slopes or steps down towards the boundary. Compare Figure 23 with Figure 22 to see how this can result in a higher than anticipated obstruction to daylight. In Figure 23 the proposed building subtends 34° at its mirror image, rather than the maximum of 25° suggested here. In cases of doubt, the best approach is again to carry out a new building analysis for the most likely location of a window wall of a future development."*

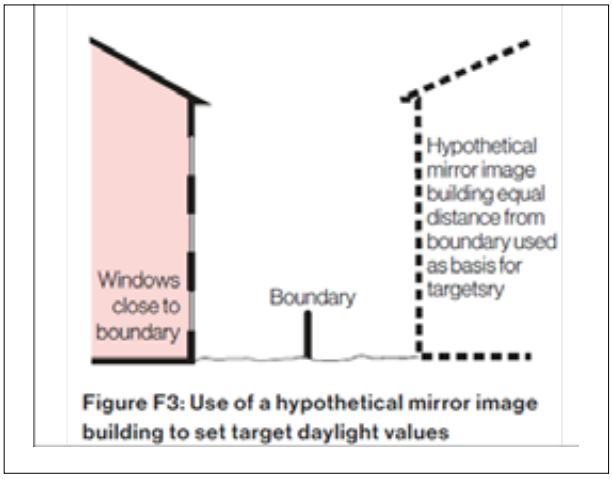

Image © BRE Guidelines

Figure 05: Littlefair, P. (2022). Site Layout Planning for Daylight and Sunlight – A Guide to Good Practice. Hertfordshire: HIS BRE Press p 87 Figure F3

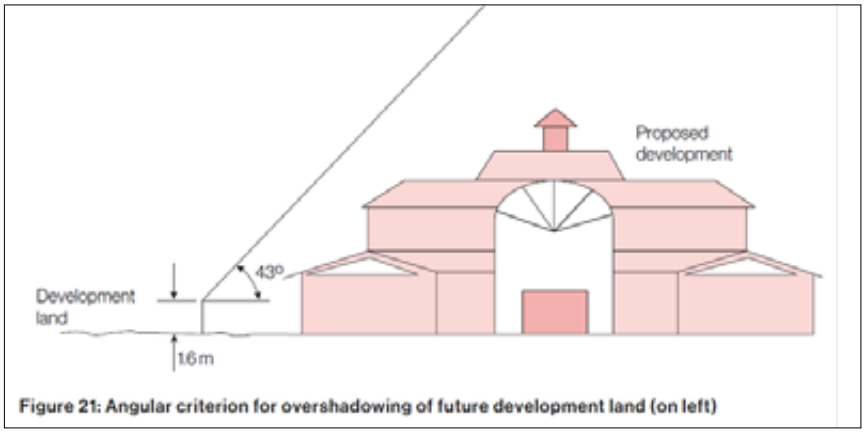

Image © BRE Guidelines

Figure 06: Littlefair, P. (2022). Site Layout Planning for Daylight and Sunlight – A Guide to Good Practice. Hertfordshire: HIS BRE Press p 19 Figure 21

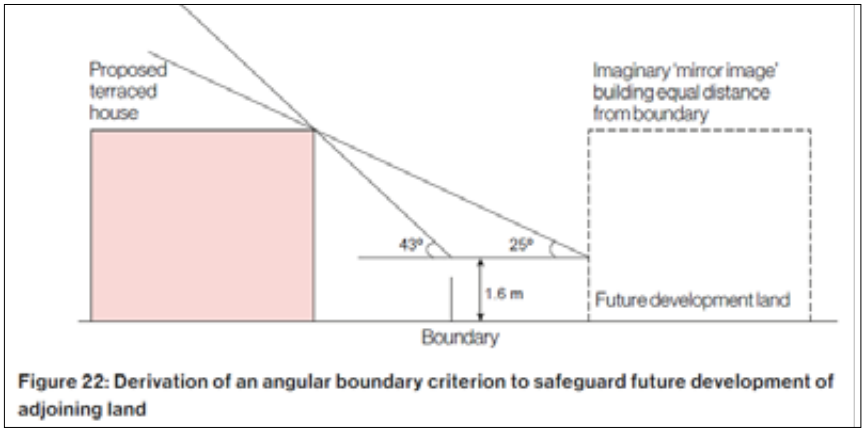

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Figure 07: Littlefair, P. (2022). Site Layout Planning for Daylight and Sunlight – A Guide to Good Practice. Hertfordshire: HIS BRE Press p 20 Figure 22

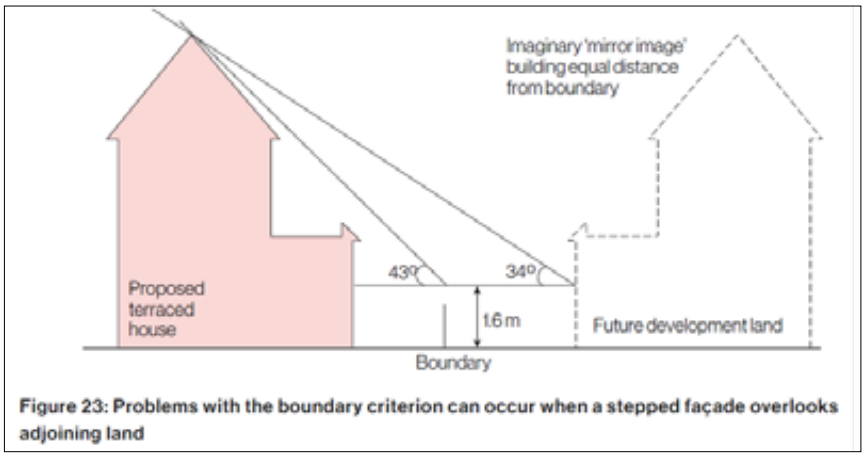

Image © BRE Guidelines

Figure 08: Littlefair, P. (2022). Site Layout Planning for Daylight and Sunlight – A Guide to Good Practice. Hertfordshire: HIS BRE Press p 20 Figure 23

A 2.53 As outlined above, the Adjoining Development Land analysis is predicated on ensuring that a proposal next to future development land is not negatively impacting the ability to develop in consideration of light matters.

PHOTOVOLTAICS

A 2.54 Paragraph 4.5.2 states that *"where a proposed development may result in loss of radiation to existing solar panels (either photovoltaic or solar thermal), an assessment should be carried out."*

A 2.55 Paragraph 4.5.8 states that *"Where the annual probable sunlight hours received by a solar panel with the new development in place is less than 0.90 times the value before, a more detailed calculation of the loss of solar radiation should be undertaken. This is a specialist type of assessment and expert advice should be sought. The assessment should include both direct solar and diffuse sky radiation; over a whole year, around 60% of the radiation received on a horizontal roof comes from the sky. However, reflected radiation from the ground and obstructions need not be included. The modelling should take account of the effects of cloud in reducing direct solar radiation at different times of year, and include a realistic simulation of the way that incoming solar radiation varies from different parts of the sky."*

A 2.56 Paragraph 4.5.9 states that *"if over the whole year the ratio of total solar radiation received with the new development, to the existing value is less than the values given in Table 2, then the loss of radiation is significant."*

Table 2. Recommended minimum ratios of solar radiation received.

Slope of solar panel in degrees to horizontal	Recommended minimum ratio of radiation received after/before
0-30	0.90
30.01-59.99	0.85
60-90	0.80

Image © BRE Guidelines

Figure 09: Table 2 from BRE Guidance Section 4, page 36

A 2.57 Finally, paragraph 4.5.10 notes that *"numerical values given are purely advisory. Different criteria may be used based on the requirements for solar energy in an area viewed against other site layout constraints. Another important issue is whether the existing solar panels are reasonably sited, at a sensible height and distance from the boundary. A greater loss of solar radiation may be inevitable if panels are mounted close to the ground and near to the site boundary."*

OTHER AMENITY CONSIDERATIONS

A 2.58 Daylight and sunlight is one factor among many under the heading of residential amenity considerations for any given development design or planning application; others include:

- View;
- Privacy;
- Security;
- Access;
- Enclosure;
- Microclimate;
- Solar Dazzle; and
- Solar Convergence.

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