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CHARTERED SURVEYORS

DAYLIGHT & SUNLIGHT

INTERNAL DAYLIGHT AND SUNLIGHT ASSESSMENT

B&Q Cricklewood

24 February 2020

GIA No: **15075**

PROJECT DATA:

Client	**Montreaux Cricklewood Developments Ltd**
Architect	**EPR Architects**
Project Title	**B&Q Cricklewood**
Project Number	**15075**

REPORT DATA:

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Prepared by	**MM**
Checked by	**JF**
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Map data

CONTENTS

1 BRE GUIDELINES

The Building Research Establishment (BRE) have set out in their handbook 'Site Layout Planning for Daylight and Sunlight a Guide to Good Practice (2011)', guidelines and methodology for the measurement and assessment of daylight and sunlight within proposed buildings.

This document states that it is also intended to be used in conjunction with the interior daylight recommendations found within the British Standard BS8206-2:2008 and The Applications Manual on Window Design of the Chartered Institution of Building Services Engineers (CIBSE).

The guide also provides advice on site layout planning to determine the quality of daylight and sunlight within open spaces between buildings.

It is important to note, however, that this document is a guide and states that its aim *"is to help rather than constrain the designer"*.

The document provides advice, but also clearly states that it *"is not mandatory and this document should not be seen as an instrument of planning policy."* The report also acknowledges in its introduction that *"in special circumstances the developer or planning authority may wish to use different target values. For example, in a historic city centre a higher degree of obstruction may be unavoidable if new developments are to match the height and proportions of existing buildings."*

It is an inevitable consequence of the built up urban environment that daylight and sunlight will be more limited in these 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.

1.1 DAYLIGHT

The BRE set out various methods for assessing the daylight within a proposed building within section 2.1 and Appendix C of the handbook. These are summarised below.

Vertical Sky Component (VSC)

This method of assessment can be undertaken using a skylight indicator or a Waldram diagram. It measures from a single point, at the centre of the window (if known at the early design stage), the quantum of sky visible taking into account all external obstructions. Whilst these obstructions can be either other buildings or the general landscape, trees are usually ignored unless they form a continuous or dense belt of obstruction.

The VSC method is a useful 'rule of thumb' but has some significant limitations in determining the true quality of daylight within a proposed building. It does not take into account the size of the window, any reflected light off external obstructions, any reflected light within the room, or the use to which that room is put. Appendix C of the guide goes into more detail on these matters and sets forward alternative methods for assessment to overcome these limitations.

Appendix C of the BRE guide: Interior Daylighting Recommendations, states:

"The British Standard for daylighting, and the CIBSE Applications manual: window design, contain advice and guidance on interior daylighting. This guide to good practice is intended to be used in conjunction with them, and its guidance is intended to fit in with their recommendations.

For skylight, the British Standard and the CIBSE manual put forward three main criteria, based on the average daylight factor, room depth, and the position of the no skyline."

These assessments are set out below.

Average Daylight Factor (ADF)

"If a predominantly daylit appearance is required, then DF should be 5% or more if there is no supplementary electric lighting, or 2% or more if supplementary electric lighting is provided. There are additional recommendations for dwellings, of 2% for kitchens, 1.5% for living rooms and 1%

for bedrooms. These last are minimum values of Average Daylight Factor, and should be attained even if a predominantly daylit appearance is not required."

This method of assessment takes into account the total glazed area to the room, the transmittance quality of the glazing proposed, the total area of the room surfaces including ceilings and floors, and the internal average reflectance for the room being assessed. The method also takes into account the Vertical Sky Component and the quantum of reflected light off external surfaces.

This is, therefore, a significantly more detailed method of assessment than the Vertical Sky Component method set out above.

Room Depth Criterion (RDC)

Where it has access to daylight from windows in one wall only, the depth of a room can become a factor in determining the quantity of light within it. The BRE guidance provides a simple method for examining the ratio of room depth to window area. However, whilst it does take into account internal surface reflections, this method also has significant limitations in that it does not take into account any obstructions outside the window and therefore draws no input from the quantity of light entering the room.

No Sky Line (NSL)

This third method of assessment is a simple test to establish where within the proposed room the sky will be visible through the windows, taking into account external obstructions. The assessment is undertaken at working plane height (850mm above floor level) and the method of calculation is set out in Appendix D of the BRE handbook.

Appendix C of the BRE handbook states *"if a significant area of the working plane lies beyond the no skyline (i.e., it receives no direct skylight), then the distribution of daylight in the room will look poor and supplementary electric lighting will be required."* To guarantee a satisfactory daylight uniformity, the area which does not receive direct skylight should not exceed 20% of the floor area, as quantified in the BS 8206 Part2 2008.

Summary

The Average Daylight Factor gives a more detailed assessment of the daylight within a room and takes into account the highest number of factors in establishing a quantitative output.

However, the conclusion of Appendix C of the BRE guide states:

"All three of the criteria need to be satisfied if the whole of the room is to look adequately daylit. Even if the amount of daylight in a room (given by the Average Daylight Factor) is sufficient, the overall daylight appearance will be impaired if its distribution is poor."

In most urban areas it is important to recognise that the distribution of daylight within a room may be difficult to achieve, given the built up nature of the environment. Consequently, most local authorities seek to ensure that there is sufficient daylight within the room as determined by the Average Daylight Factor calculation. However, the additional recommendations of the BRE and British Standard for residential accommodation, set out above, ought not to be overlooked.

1.2 FURTHER RELEVANT INFORMATION

Further information can be found in The Daylight in Urban Areas Design Guide (Energy Saving Trust CE257, 2007) which provides the following recommendation with regards to VSC levels in urban areas:

"If 'theta' (Visible sky angle) is greater than 65° (obstruction angle less than 25° or VSC at least 27 percent) conventional window design will usually give reasonable results.

If 'theta' is between 45° and 65° (obstruction angle between 25° and 45°, VSC between 15 and 27 percent), special measures such as larger windows and changes to room layout are usually needed to provide adequate daylight.

If 'theta' is between 25° and 45° (obstruction angle between 45° and 65°, VSC from 5 to 15 percent), it is very difficult to provide adequate daylight unless very large windows are used.

If 'theta' is less than 25° (obstruction angle more than 65°, VSC less than 5 percent) it is often impossible to achieve reasonable daylight, even if the whole window wall is glazed."

1.3 OVERSHADOWING

The BRE guidance in respect of overshadowing of amenity spaces is set out in section 3.3 of the handbook. Here it states as follows:

"Sunlight in the spaces between 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)*
- *To make outdoor activities, like sitting out and children's play more pleasant (mainly during the warmer months)*
- *To encourage plant growth (mainly in spring and summer)*
- *To dry out the ground, reducing moss and slime (mainly during the colder months)*
- *To melt frost, ice and snow (in winter)*
- *To dry clothes (all year)"*

Again, 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.

The summary of section 3.3 of the guide states as follows:

"3. 3 .17 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. If a detailed calculation cannot be carried out, it is recommended that the centre of the area should receive at least two hours of sunlight on 21 March.

2 METHODOLOGY

In order to undertake the daylight and sunlight assessments set out in the previous pages, we have prepared a three dimensional computer model and used specialist lighting simulation software.

The three dimensional representation of the proposed development has been modelled using the scheme drawings provided to us by EPR Architects This has been placed in the context of its surrounding buildings which have been modelled from photogrammetry and OS. This allows for a precise model, which in turn ensures that analysis accurately represents the amount of daylight and sunlight available to the building facades, internal and external spaces, considering all of the surrounding obstructions and orientation.

3 CONCLUSIONS

The purpose of this report is to ascertain whether the proposed development has the potential to provide acceptable daylight and sunlight amenity.

Owing to the outline nature of the application, the façades and internal layouts are yet to be designed, therefore at this stage the assessments have focussed on the massing.

Three types of assessments have been undertaken:

- Daylight potential assessments on the elevations (Vertical Sky Component);
- Sunlight potential assessments on the elevations within 90° of due south (Probable Sunlight Hours both annually and for the winter months); and
- Overshadowing assessments for the public/ communal areas of outdoor amenity (Sun Hours on Ground).

The massing of Blocks A, C and D is arranged in courtyards, with the taller elements of these blocks located to the north and southwest-facing communal outdoor areas. In Block A, the taller tower is rotated to create a more open, south-facing courtyard.

Block B comprises lower parallel elements, with connecting elements in between which form northeast-facing courtyards.

The daylight and sunlight potential assessments have been undertaken on flat facades, therefore the façade articulation is not taken into consideration at this stage. However, it is worth pointing out that recesses and balconies will inevitably reduce the amount of daylight and sunlight available on the facades.

The results of the three assessments undertaken are discussed under separate headings below.

3.1 DAYLIGHT POTENTIAL

The results of the daylight potential assessments are illustrated through a false-colour scale, which can be found on page 11.

As can be seen in the diagrams, the northeast elevations have excellent daylight potential. Good levels of daylight availability can also be found on the upper floors and southwest-facing elevations of the blocks oriented northeast-southwest. A standard design of the internal layouts and facades would lead to adequate daylighting within the rooms located in these areas (shown as yellow in the diagrams).

As is typical of courtyard arrangements, lower daylight availability can be seen in the inner corners and on the lower-rise linking elements. Such levels of daylight are common within urban environments and generally unavoidable within dense developments of this size. In these areas, shown as orange/red in the diagrams, a careful detailed design of the internal layouts and elevations would be required to allow for adequate daylight levels indoors. This may entail shallower rooms and larger fenestration, as well internal layouts designed so as to prioritise the daylight ingress into living areas, where it is generally regarded as more important than in bedrooms. Particular attention should be paid to the location of balconies, as these inherently reduce the amount of light reaching the windows below (if projecting) or behind them (if recessed).

Just very small areas, shown as dark red/purple in the diagrams, have lower daylight availability. This occurs on the lowest floors of the inner corners of courtyards, on side returns, as well as on the northeast elevations of the linking elements of Block B and of the southern element of Block A. The sky visibility from these areas is restricted and it would be challenging to achieve adequate daylighting within any living areas located here. However, a number of strategies are available to mitigate the low daylight potential in these areas, the most relevant of which are summarised below:

- maximising the fenestration would allow greater daylight ingress into the rooms;
- balconies should be avoided or located so as not to obstruct living areas;
- shallow layouts would allow for more uniform light distribution within the rooms;
- dual-aspect rooms in areas shown as dark red/ purple can achieve acceptable daylight levels, provided at least one window has greater access to daylight. This window should be generous in size and not obstructed by a balcony;
- if rooms without an expectation for daylight, such as bathrooms, are nonetheless provided with windows, these would be best located in the areas of lowest daylight availability;
- non-residential uses such as cores would be best located in the areas of lowest daylight availability. For instance, the core of the southern element of Block A should be located on the

northeast elevation.

Overall, the proposed development has the potential to offer adequate daylight amenity to its future occupants. Whilst there are a few areas of lower daylight availability, as is typical of any scheme of this size and density, these can be addressed through a careful detailed design of the internal layouts and facades.

3.2 SUNLIGHT

Sunlight assessments have been undertaken for the elevations facing within 90° of due south both for the whole year and for the winter months. The results are presented through two false-coloured diagrams for each view.

It is worth noting that courtyard elevations and parallel facades in close proximity of one another typically have limited access to sunlight, as the massing inevitably acts as an obstruction. Nevertheless, the assessments show very good sunlight availability across the scheme, with the majority of southerly elevations meeting or exceeding BRE's recommendations both over the whole year and in winter.

Block A and Block D enjoy excellent access to sunlight on all their elevations, with just the lower floors of the inner corner of Block A receiving less direct sunlight.

Block B also enjoys good access to sunlight, with the majority of assessed elevations meeting or exceeding both sunlight recommendations. Owing to the linking blocks' position to the south of the plot, two areas in the inner corners fall short of the recommended levels of annual and winter sunlight. In winter particularly, the linking blocks obstruct more sunlight owing to its lower angle.

Finally, Block C receives good levels of sunlight overall. Lower levels of sunlight than recommended can be seen within the courtyard, which as explained above is typical of courtyard arrangements.

Overall, it can be concluded that the scheme has the potential to offer acceptable levels of sunlight.

3.3 OVERSHADOWING

The scheme provides a range of public or communal outdoor spaces at ground level, podium level and on the roofs. These areas have been assessed for overshadowing. In addition to the BRE Sun Hours on Ground test, sun exposure assessments have also been undertaken for the equinox and summer solstice in order to provide a better understanding of the sunlight availability throughout the year.

Two large public spaces are provided at ground level, both of which have excellent access to sunlight and well exceed BRE's recommendation for a space to be well sunlit over the whole year.

16 of the 18 areas assessed at podium and roof level also exceed BRE's recommendation and will therefore receive good sunlight levels throughout the year.

The two courtyards within Block B have limited access to direct sunlight owing to their northeast orientation, with massing to the southwest obstructing sunlight before it can reach podium level. However, future occupants of this block will be able to enjoy good levels of sunlight within the five roof terraces as well as within the ground-level generous outdoor space.

Overall, the sunlight amenity within the proposed areas of public or communal amenity is considered to be very good across the scheme.

4 SITE OVERVIEW

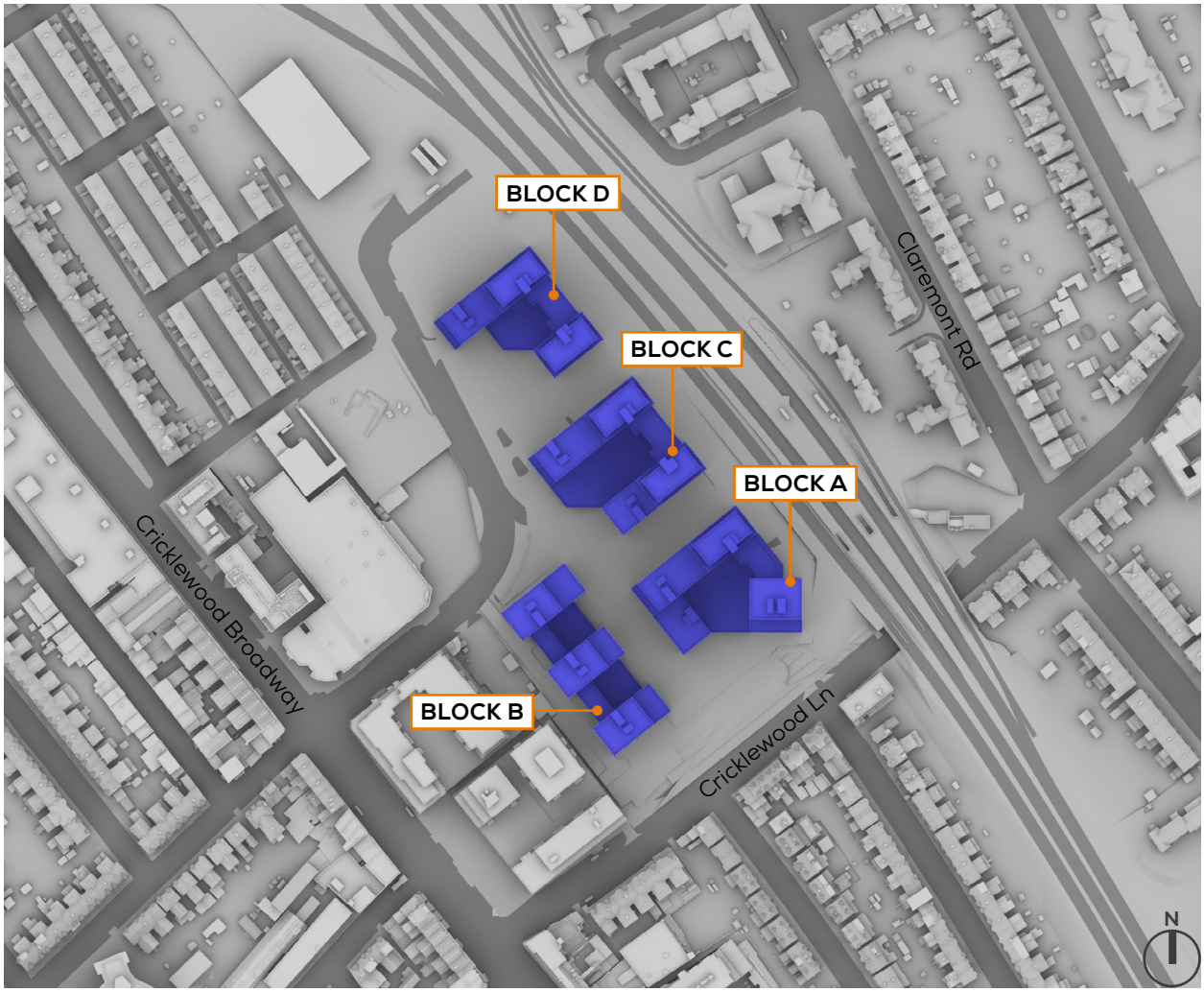


Fig. 01: Top view

Fig. 02: Perspective view

5 DAYLIGHT POTENTIAL ASSESSMENTS

Block A - DAYLIGHT POTENTIAL

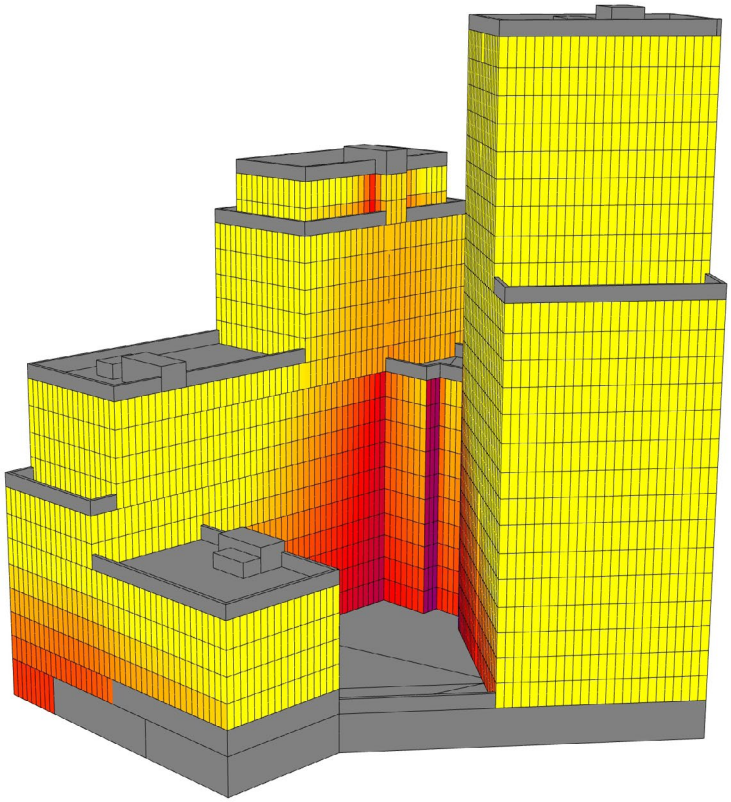
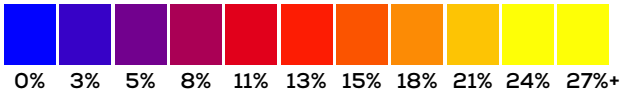


Fig. 03: VSC Diagram

DAYLIGHTING
VERTICAL SKY COMPONENT (VSC)



Block A - DAYLIGHT POTENTIAL

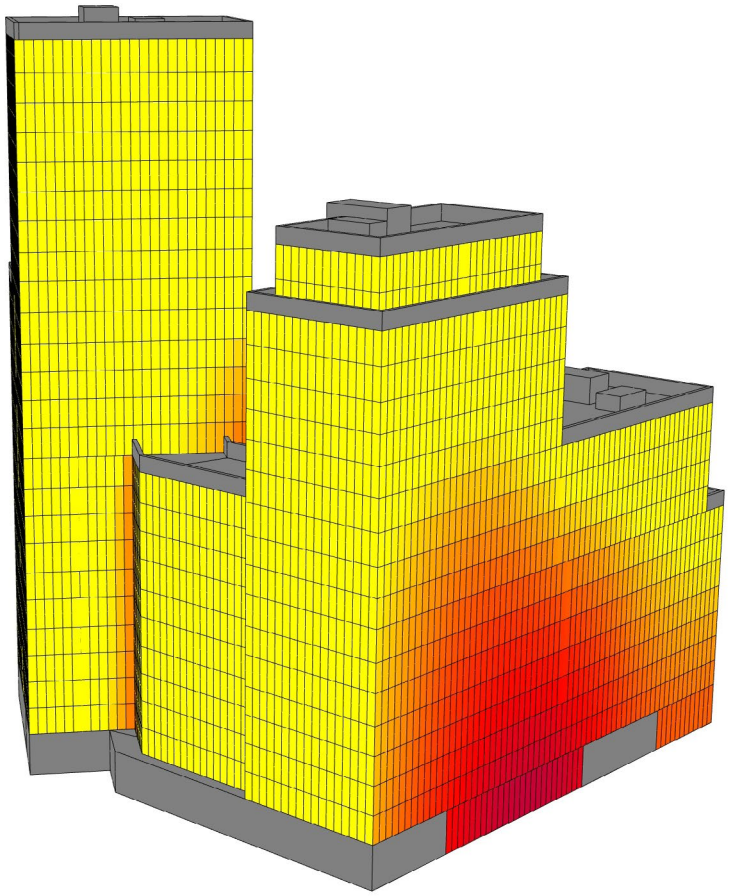
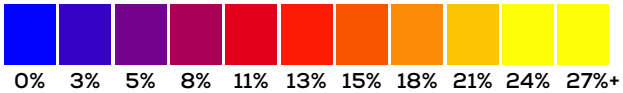


Fig. 04: VSC Diagram

DAYLIGHTING
VERTICAL SKY COMPONENT (VSC)



Block A - DAYLIGHT POTENTIAL

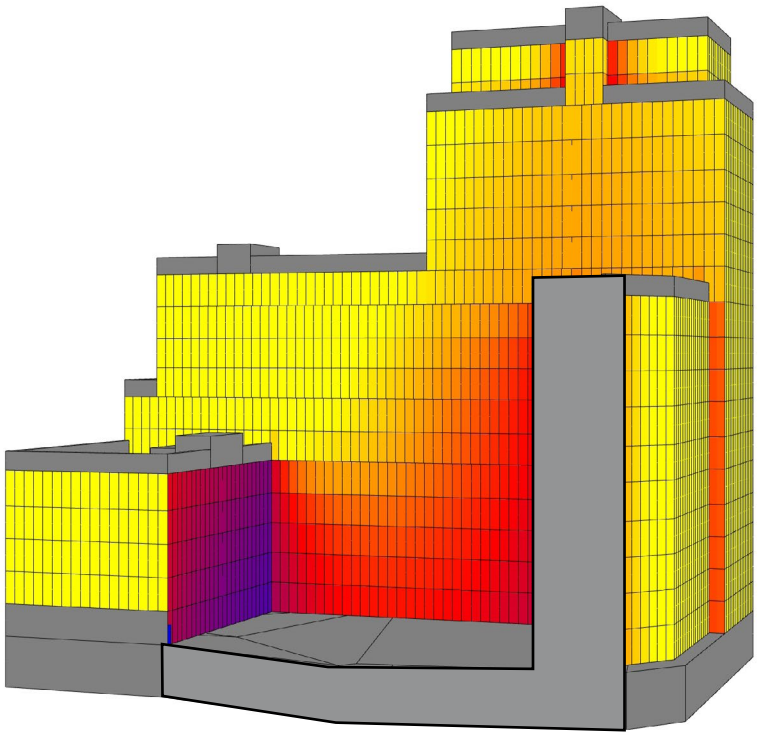
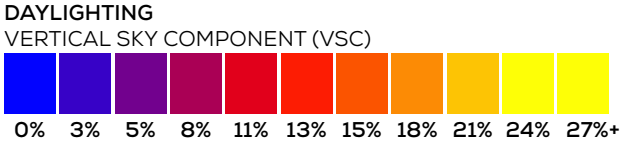


Fig. 05: VSC Diagram



Block B - DAYLIGHT POTENTIAL

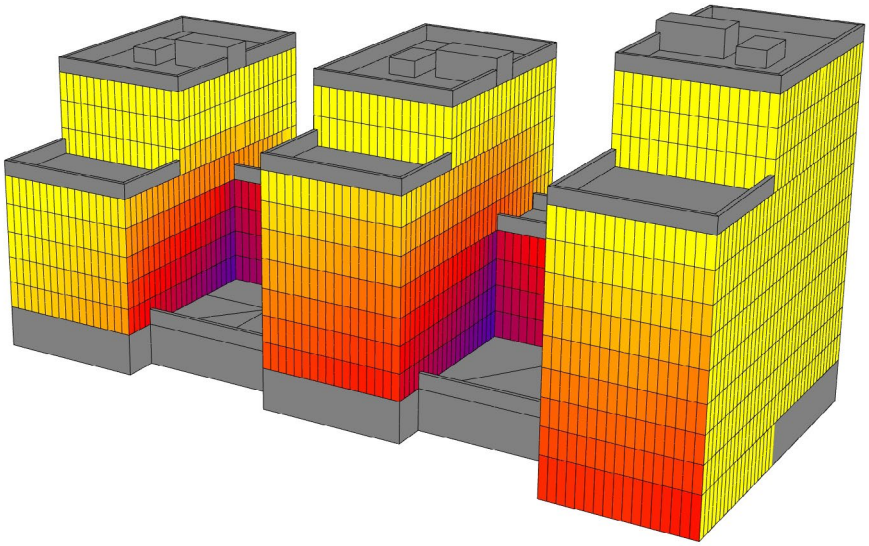
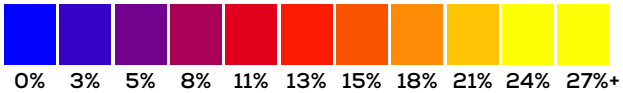


Fig. 06: VSC Diagram

DAYLIGHTING
VERTICAL SKY COMPONENT (VSC)



Block B - DAYLIGHT POTENTIAL

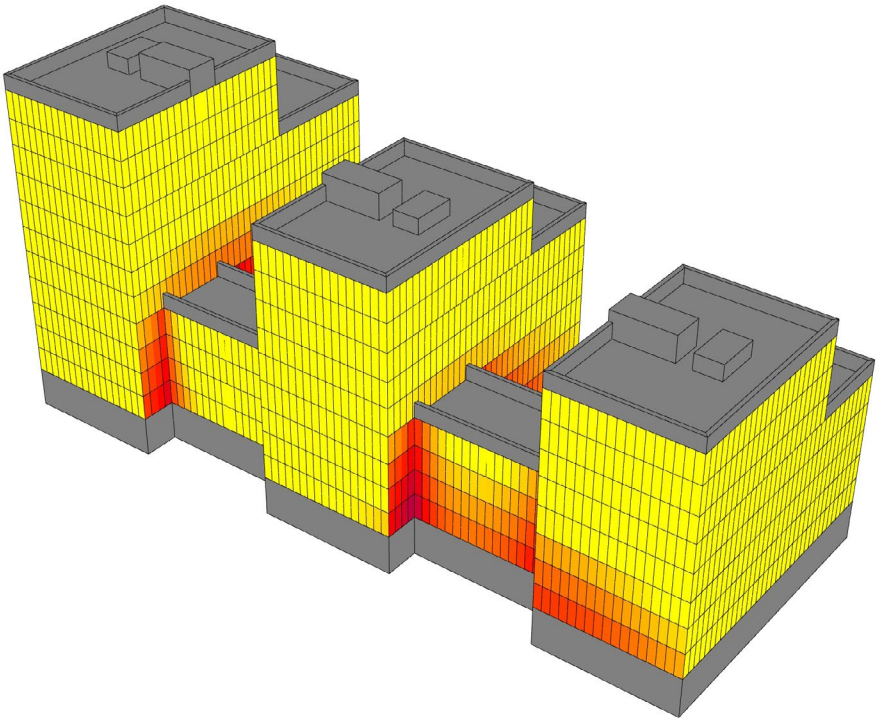
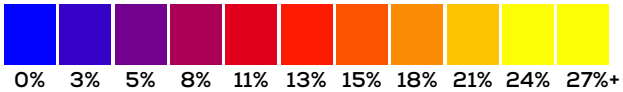


Fig. 07: VSC Diagram

DAYLIGHTING
VERTICAL SKY COMPONENT (VSC)



Block B - DAYLIGHT POTENTIAL

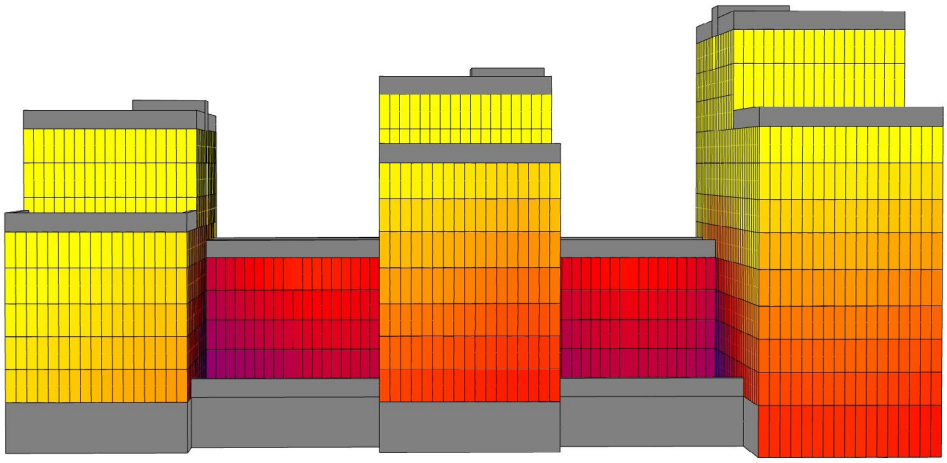
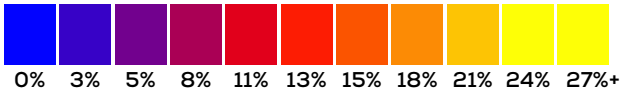


Fig. 08: VSC Diagram

DAYLIGHTING
VERTICAL SKY COMPONENT (VSC)



Block C - DAYLIGHT POTENTIAL

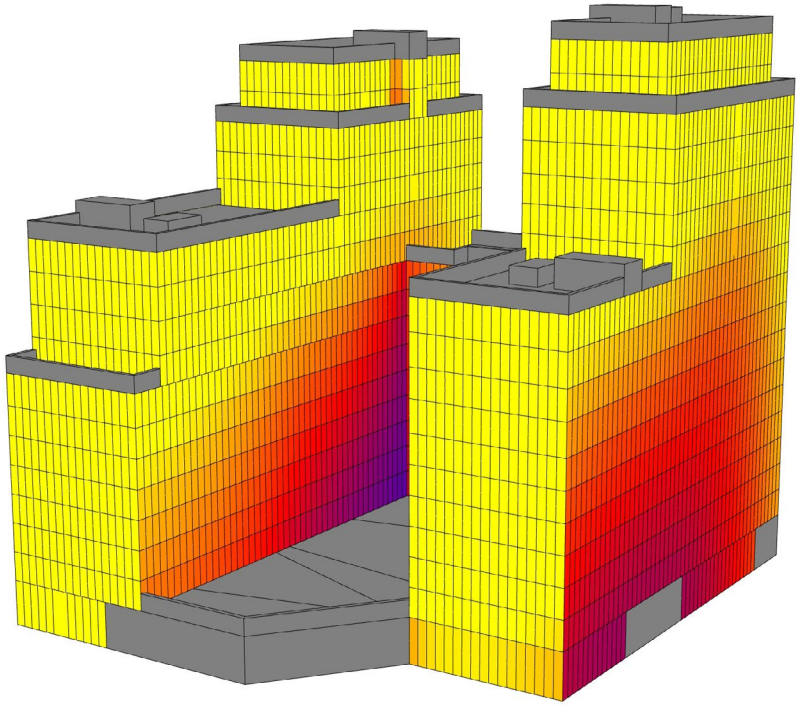
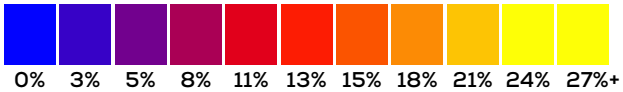


Fig. 09: VSC Diagram

DAYLIGHTING
VERTICAL SKY COMPONENT (VSC)



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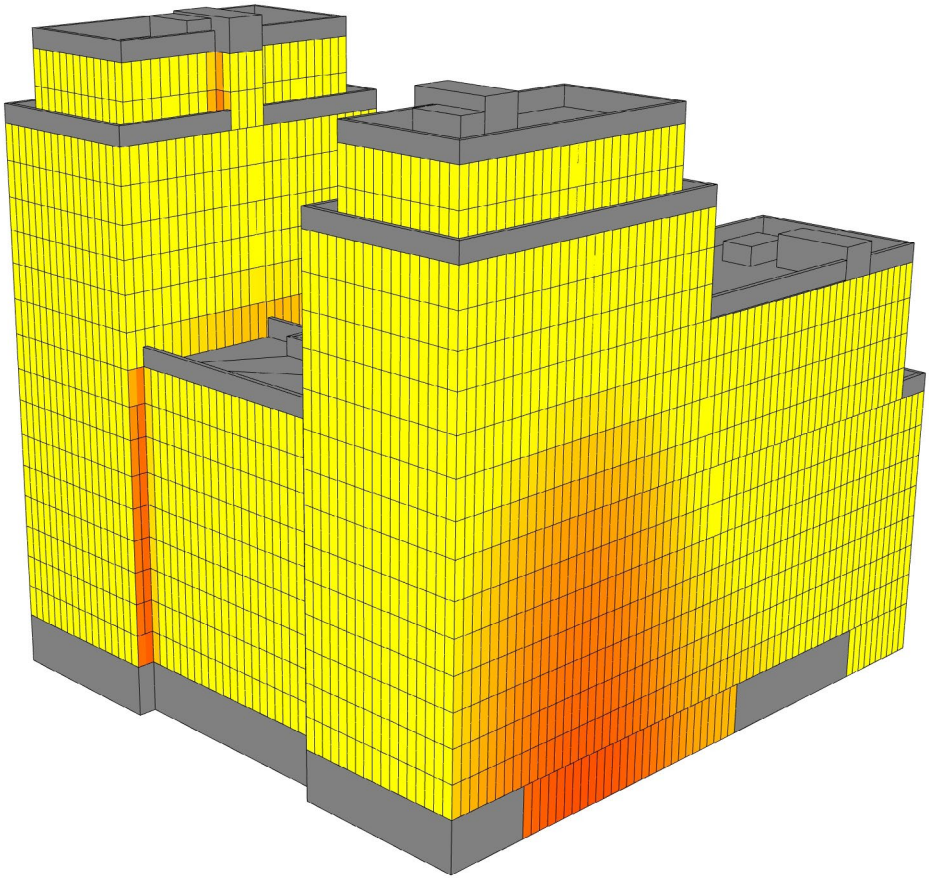
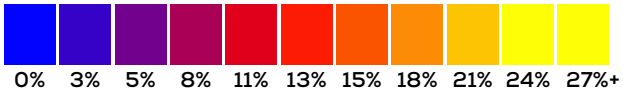


Fig. 10: VSC Diagram

DAYLIGHTING
VERTICAL SKY COMPONENT (VSC)



Block C - DAYLIGHT POTENTIAL

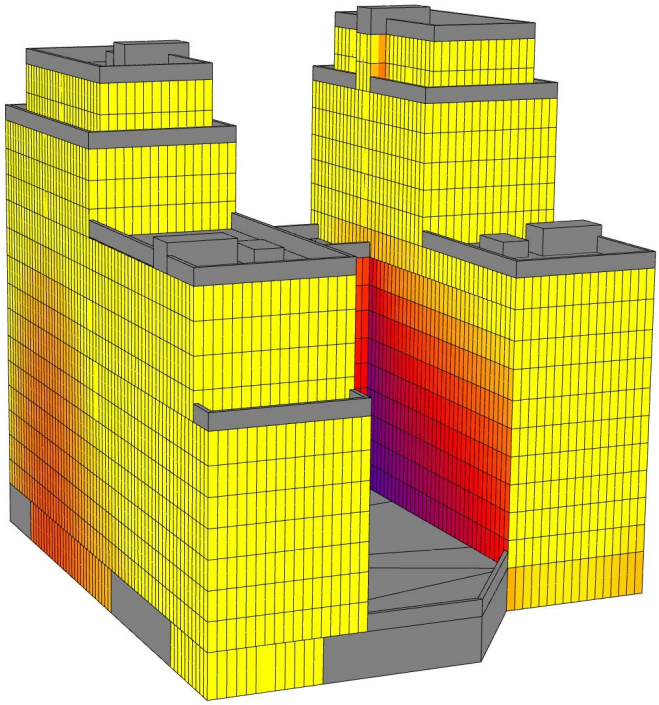
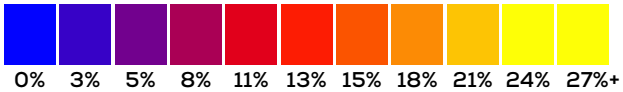


Fig. 11: VSC Diagram

DAYLIGHTING
VERTICAL SKY COMPONENT (VSC)



Block C - DAYLIGHT POTENTIAL

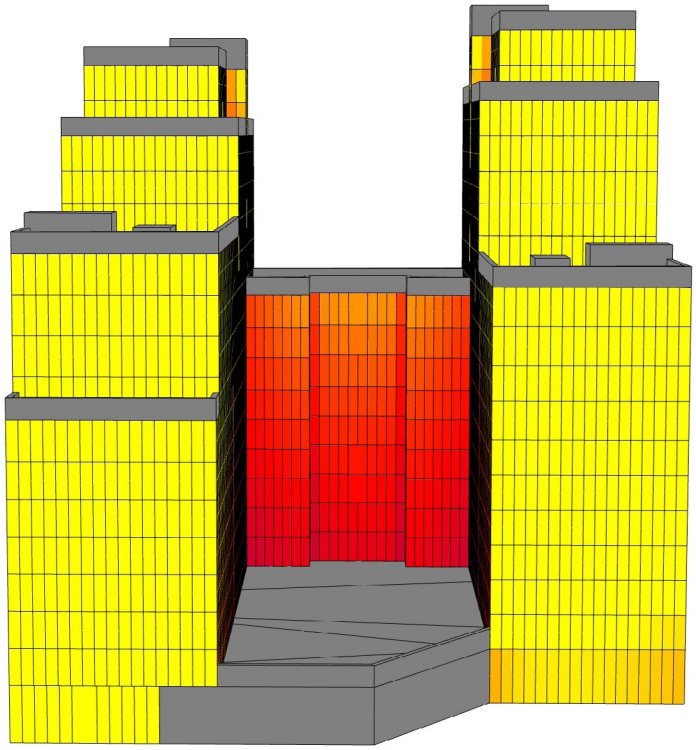
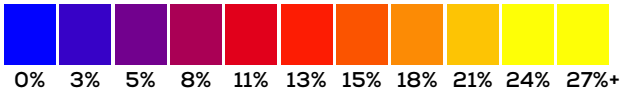


Fig. 12: VSC Diagram

DAYLIGHTING
VERTICAL SKY COMPONENT (VSC)



Block D - DAYLIGHT POTENTIAL

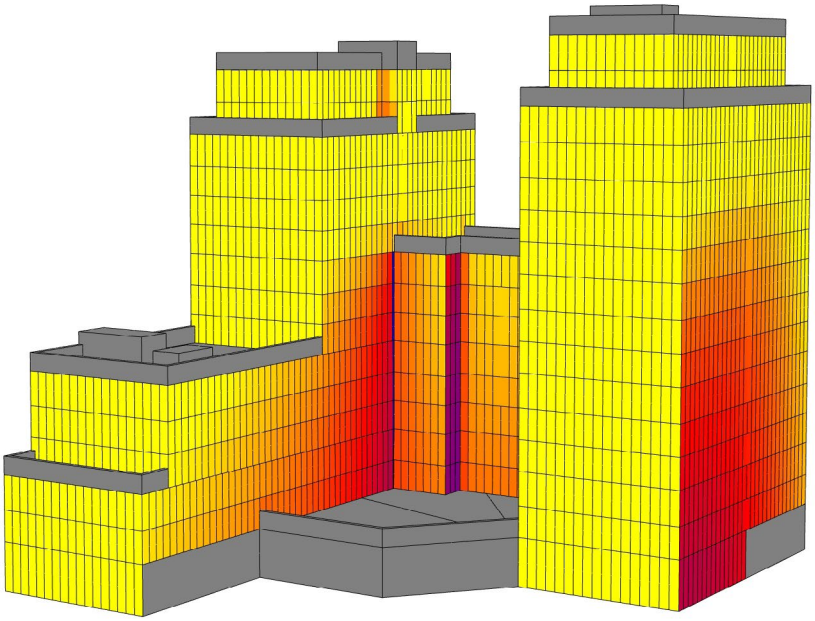
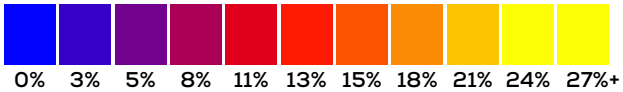


Fig. 13: VSC Diagram

DAYLIGHTING
VERTICAL SKY COMPONENT (VSC)



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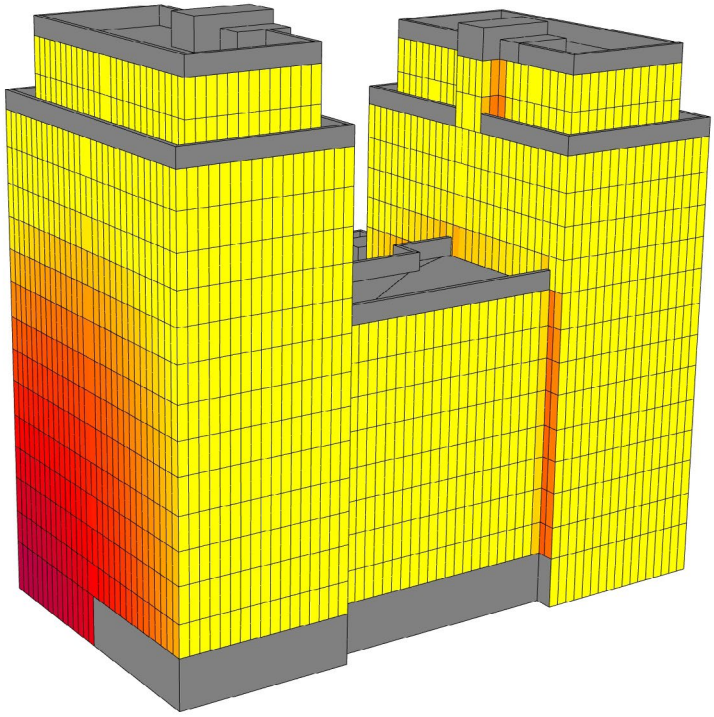
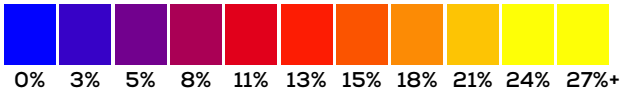


Fig. 14: VSC Diagram

DAYLIGHTING
VERTICAL SKY COMPONENT (VSC)



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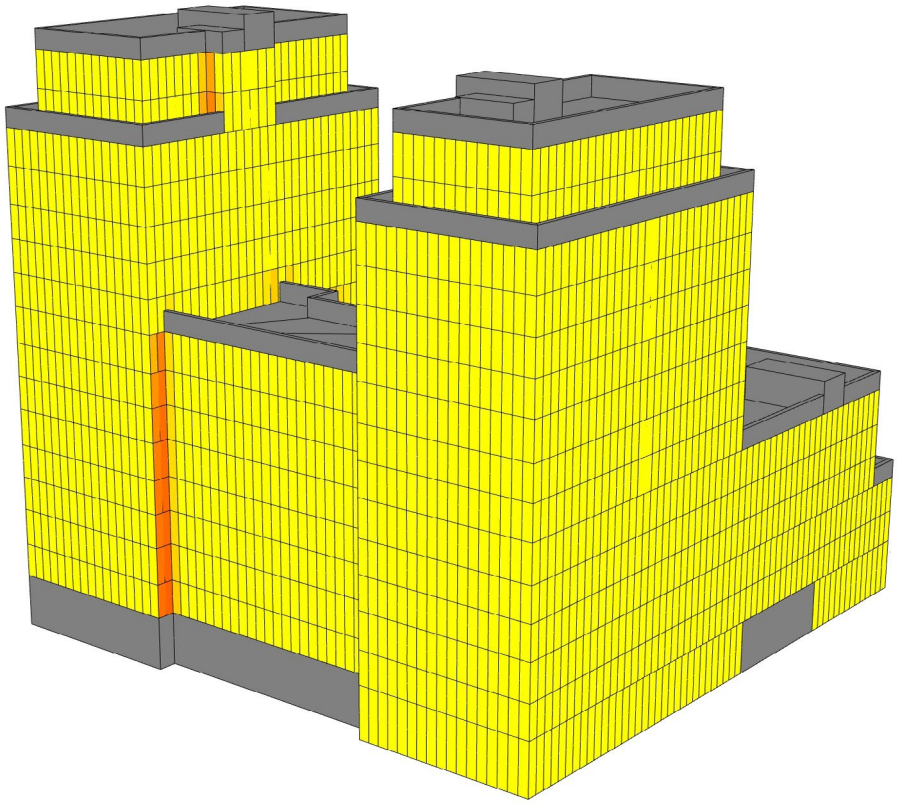
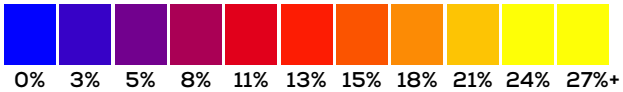
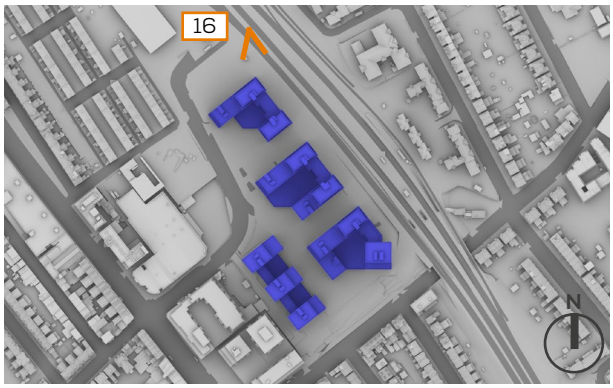


Fig. 15: VSC Diagram

DAYLIGHTING
VERTICAL SKY COMPONENT (VSC)





Block D - DAYLIGHT POTENTIAL

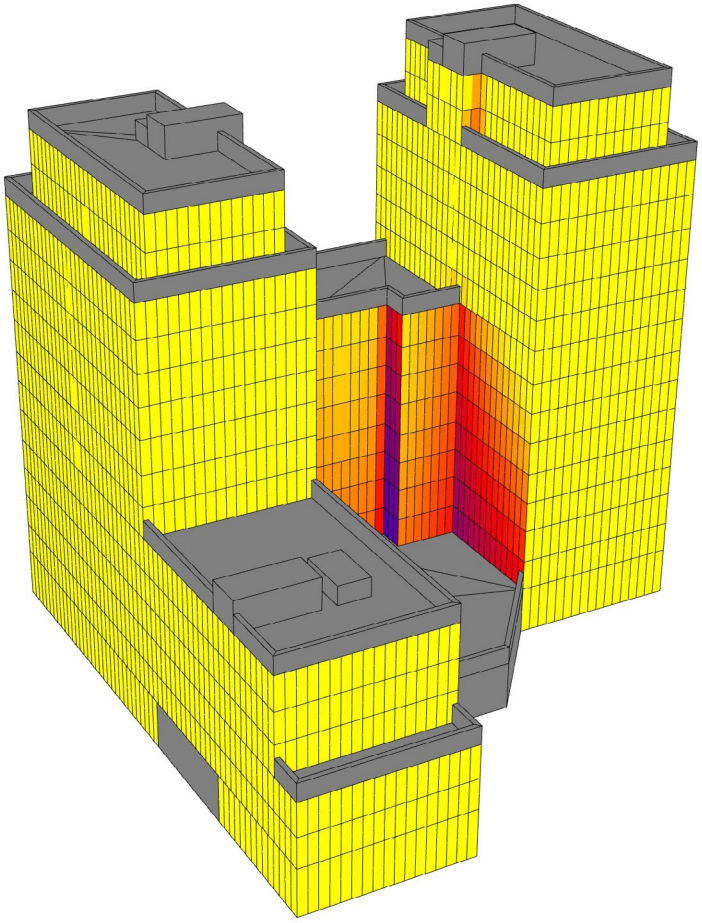
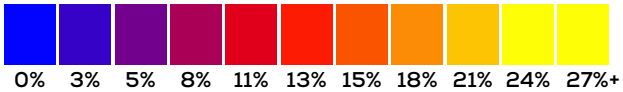
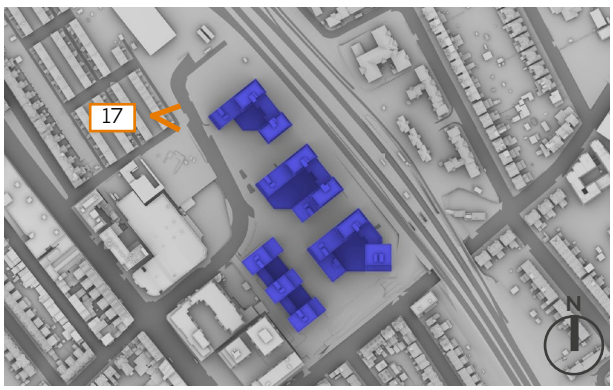


Fig. 16: VSC Diagram

DAYLIGHTING
VERTICAL SKY COMPONENT (VSC)





6 SUNLIGHT ASSESSMENTS

Block A - ANNUAL PROBABLE SUNLIGHT HOURS

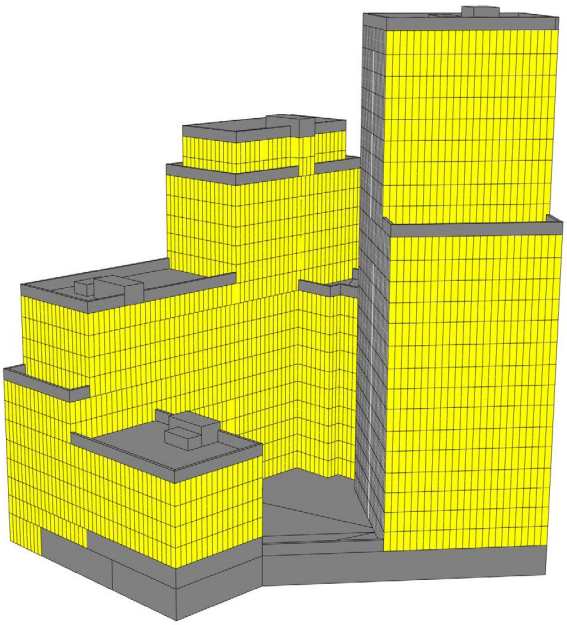


Fig. 17: Annual Probable Sunlight Hours

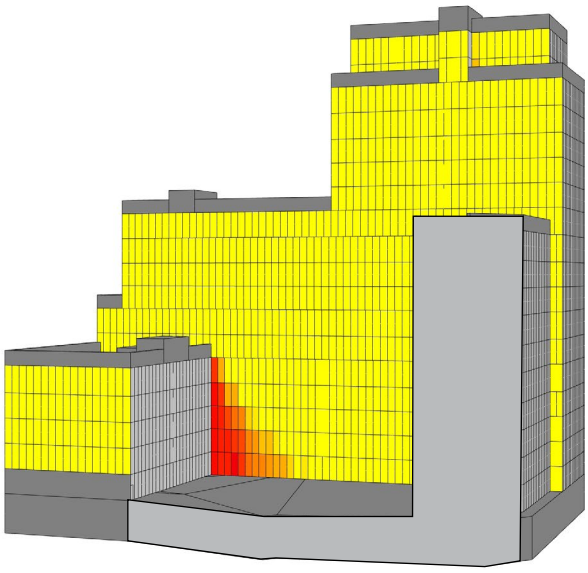
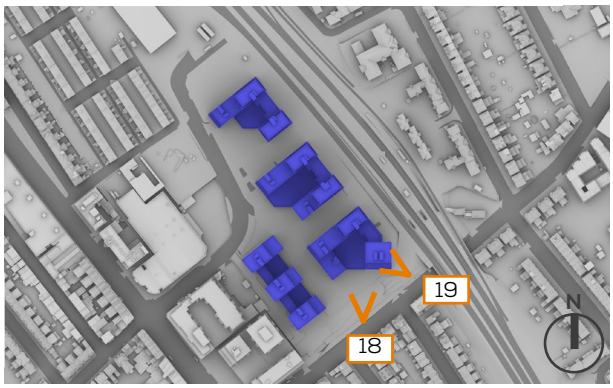


Fig. 18: Annual Probable Sunlight Hours



Block A - WINTER PROBABLE SUNLIGHT HOURS

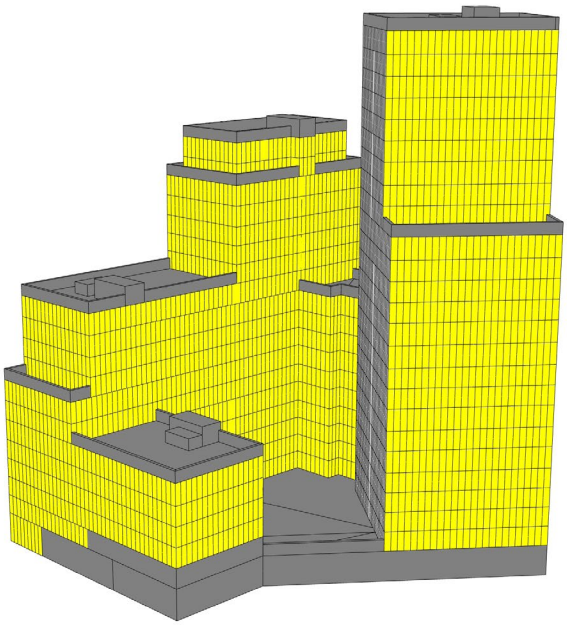


Fig. 19: Winter Probable Sunlight Hours

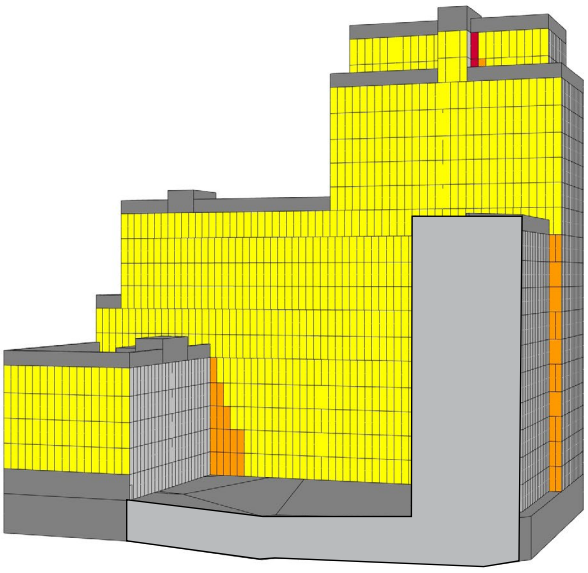
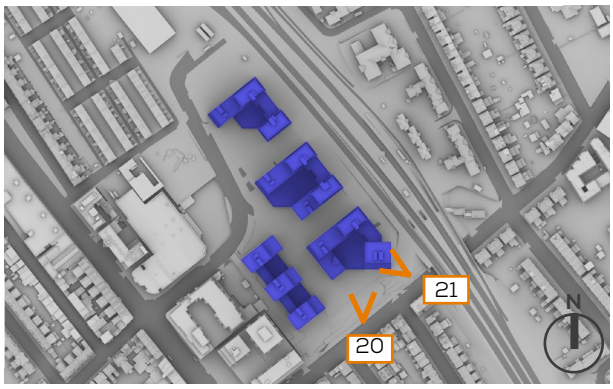


Fig. 20: Winter Probable Sunlight Hours



Block B - ANNUAL PROBABLE SUNLIGHT HOURS

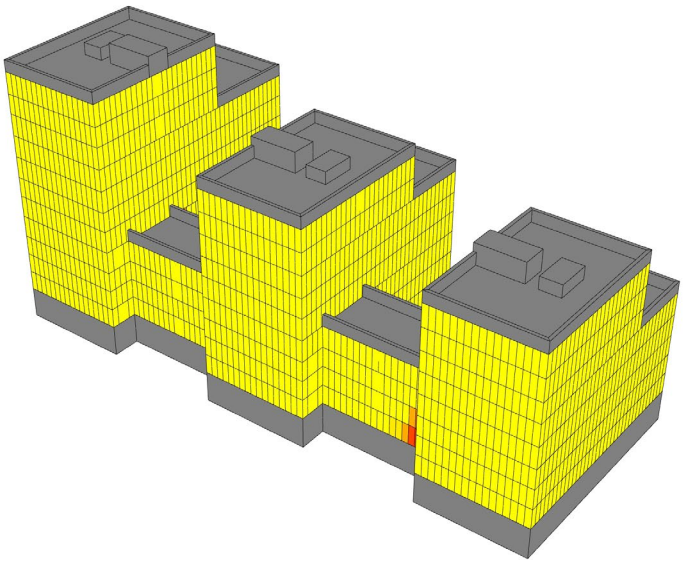


Fig. 21: Annual Probable Sunlight Hours

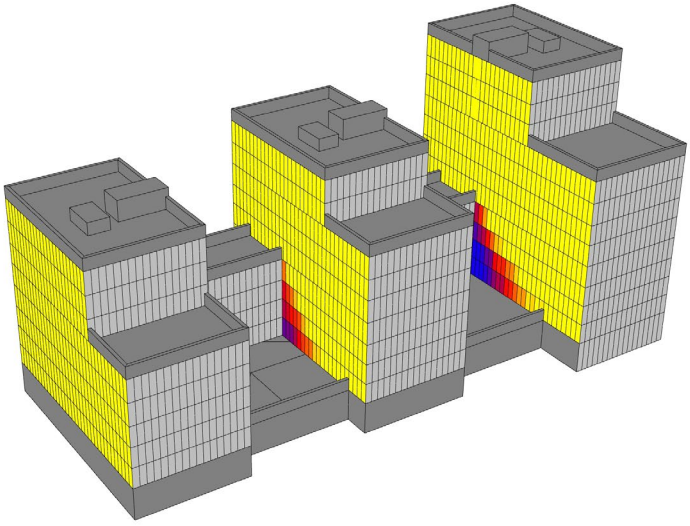


Fig. 22: Annual Probable Sunlight Hours

Block B - WINTER PROBABLE SUNLIGHT HOURS

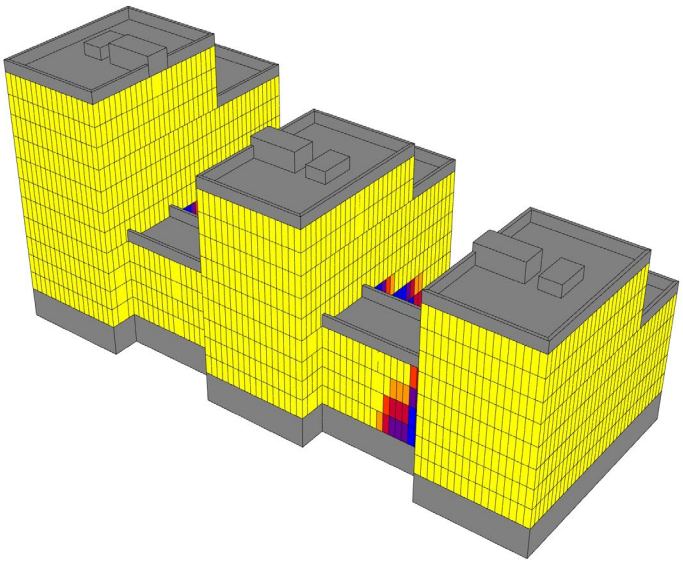


Fig. 23: Winter Probable Sunlight Hours

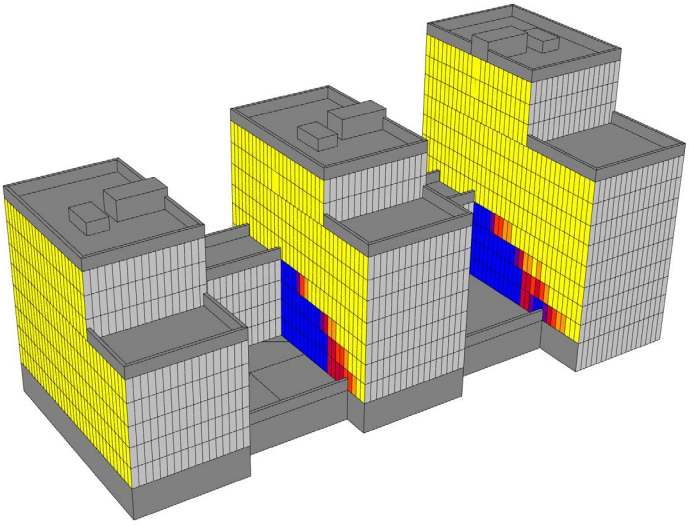
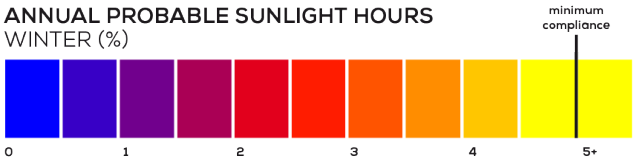
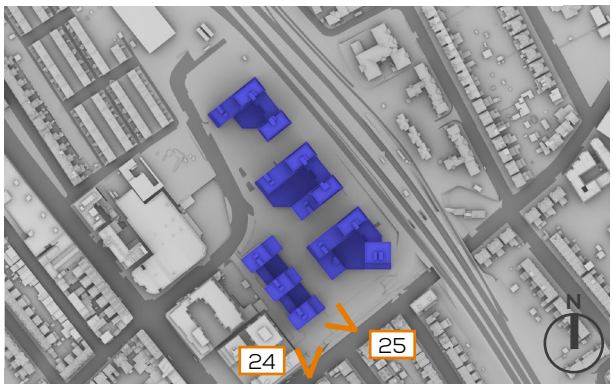


Fig. 24: Winter Probable Sunlight Hours





Block C - ANNUAL PROBABLE SUNLIGHT HOURS

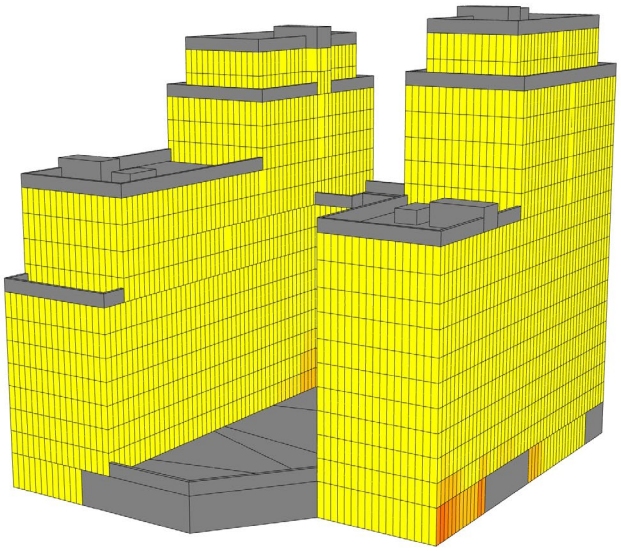


Fig. 25: Annual Probable Sunlight Hours

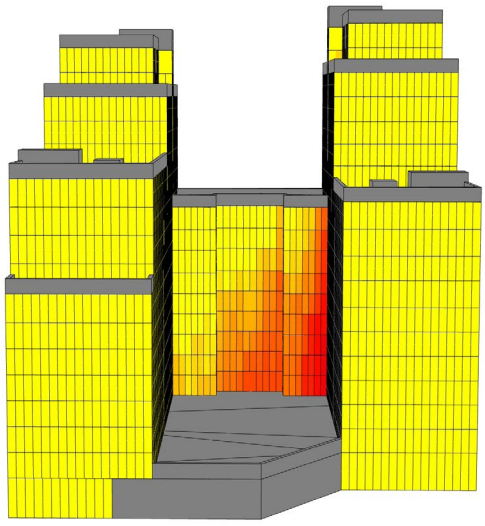


Fig. 26: Annual Probable Sunlight Hours

Block C - WINTER PROBABLE SUNLIGHT HOURS

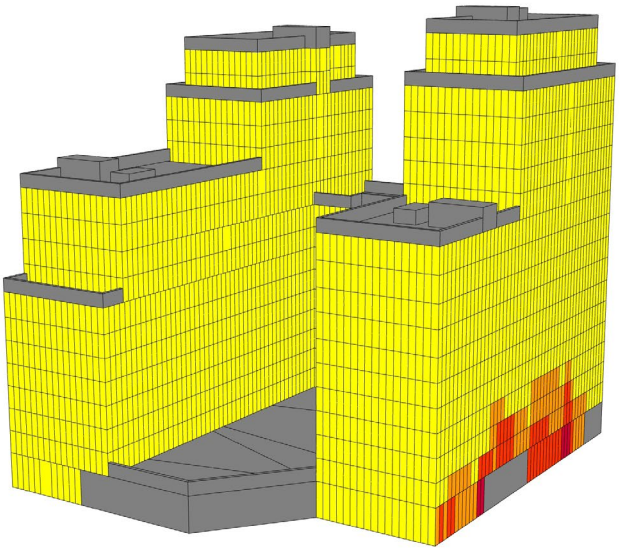


Fig. 27: Winter Probable Sunlight Hours

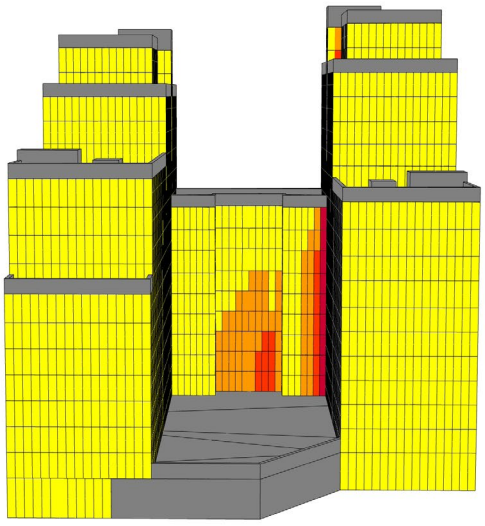


Fig. 28: Winter Probable Sunlight Hours

Block D - ANNUAL PROBABLE SUNLIGHT HOURS

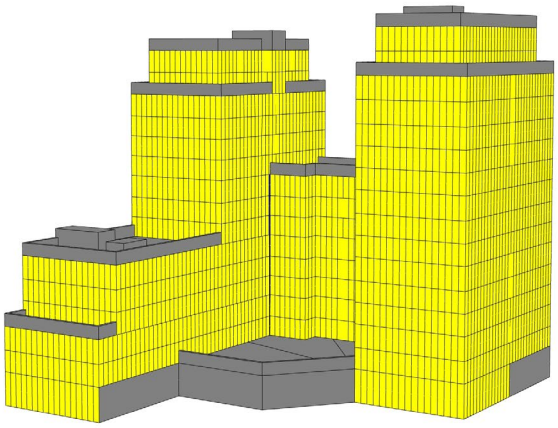


Fig. 29: Annual Probable Sunlight Hours

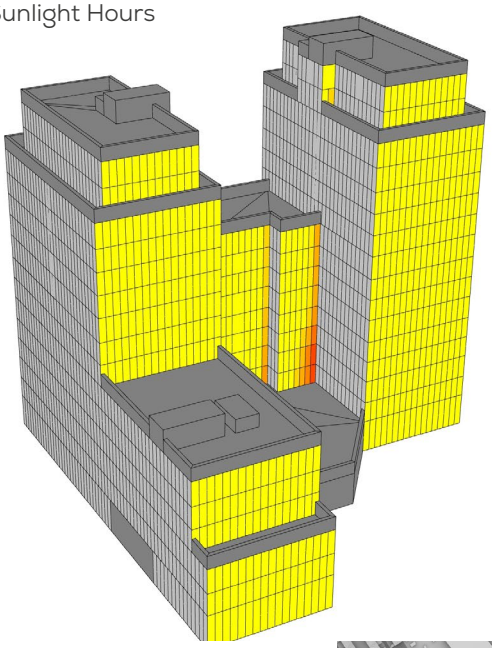
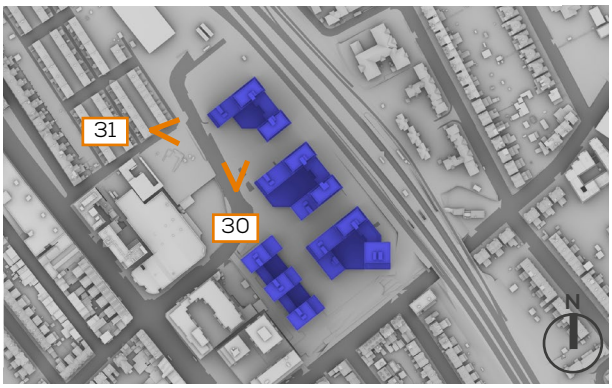
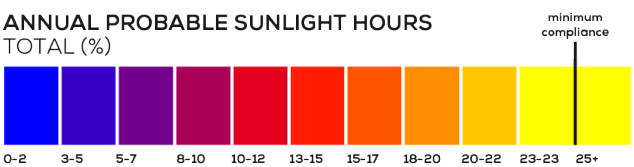


Fig. 30: Annual Probable Sunlight Hours





Block D - WINTER PROBABLE SUNLIGHT HOURS

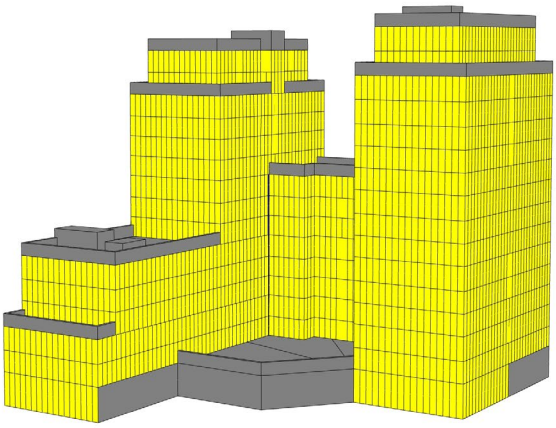


Fig. 31: Winter Probable Sunlight Hours

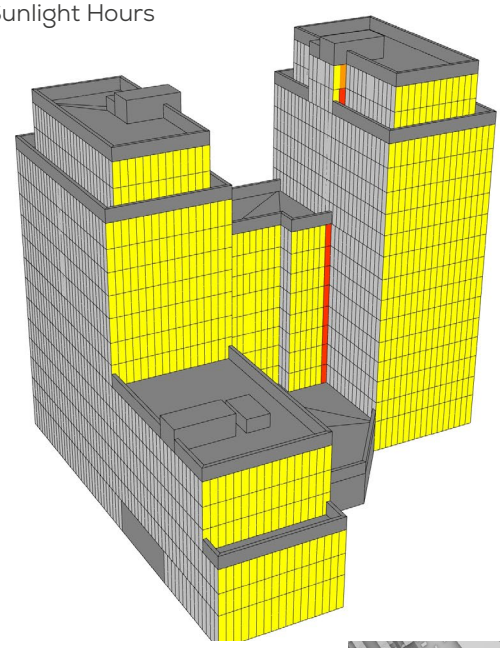
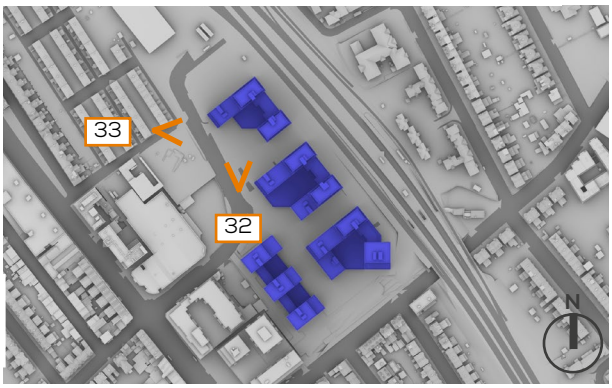
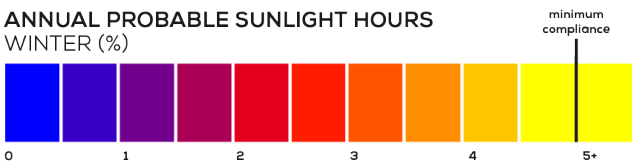


Fig. 32: Winter Probable Sunlight Hours





7 OVERSHADOWING ASSESSMENTS

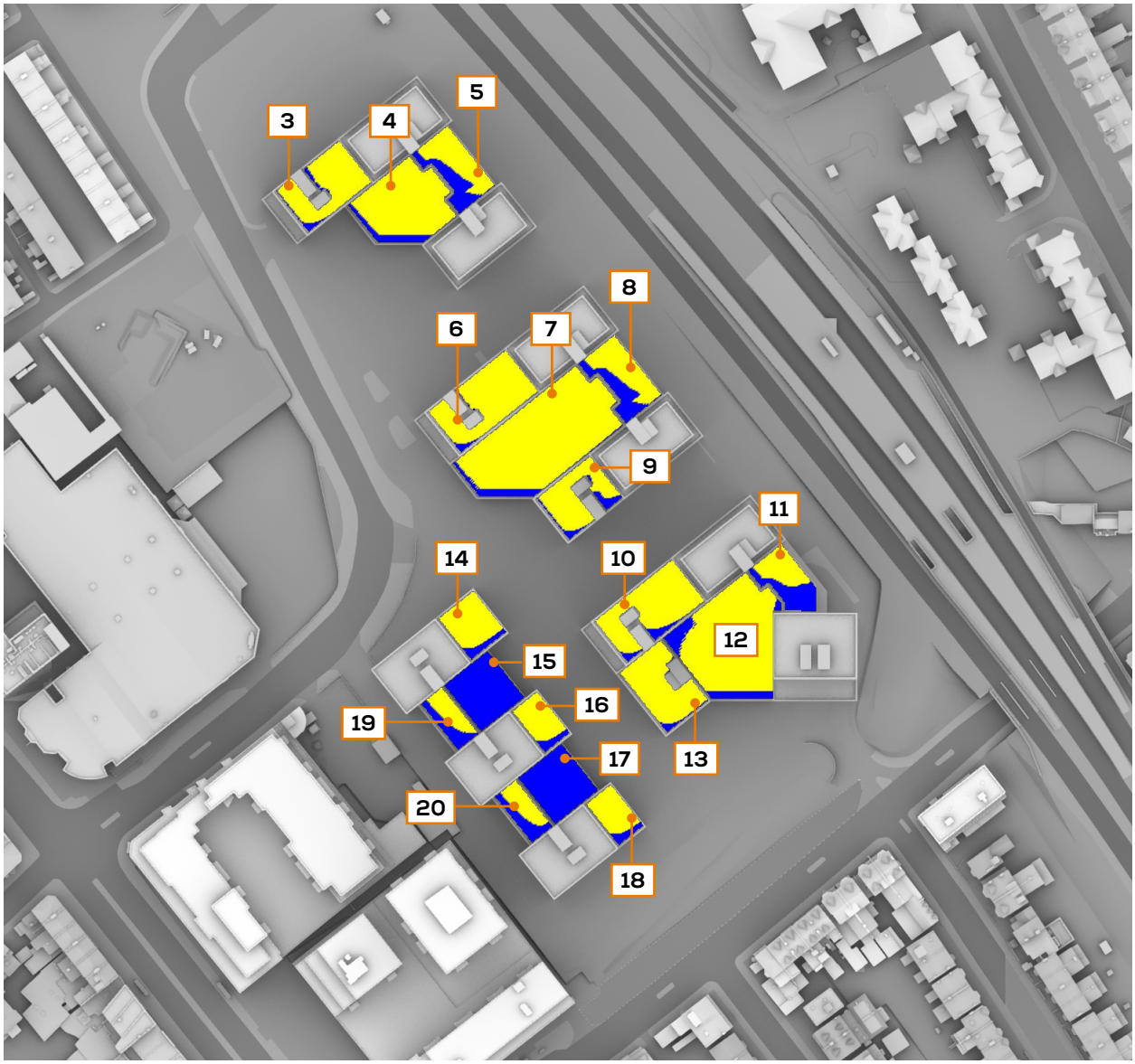
OVERSHADOWING ASSESSMENT - PROPOSED SCENARIO - GROUND FLOOR OPEN SPACE
SUN HOURS ON GROUND - BRE TEST

(BRE RECOMMENDS 2+ HOURS OF SUNLIGHT ON 21ST MARCH FOR AT LEAST 50% OF THE OPEN SPACE)

AREA 1: 86%
AREA 2: 99%

SUN HOURS ON GROUND
BRE TEST - 21ST MARCH

OVERSHADOWING ASSESSMENT - PROPOSED SCENARIO - PODIUM/TERRACE AMENITY SPACE
SUN HOURS ON GROUND - BRE TEST

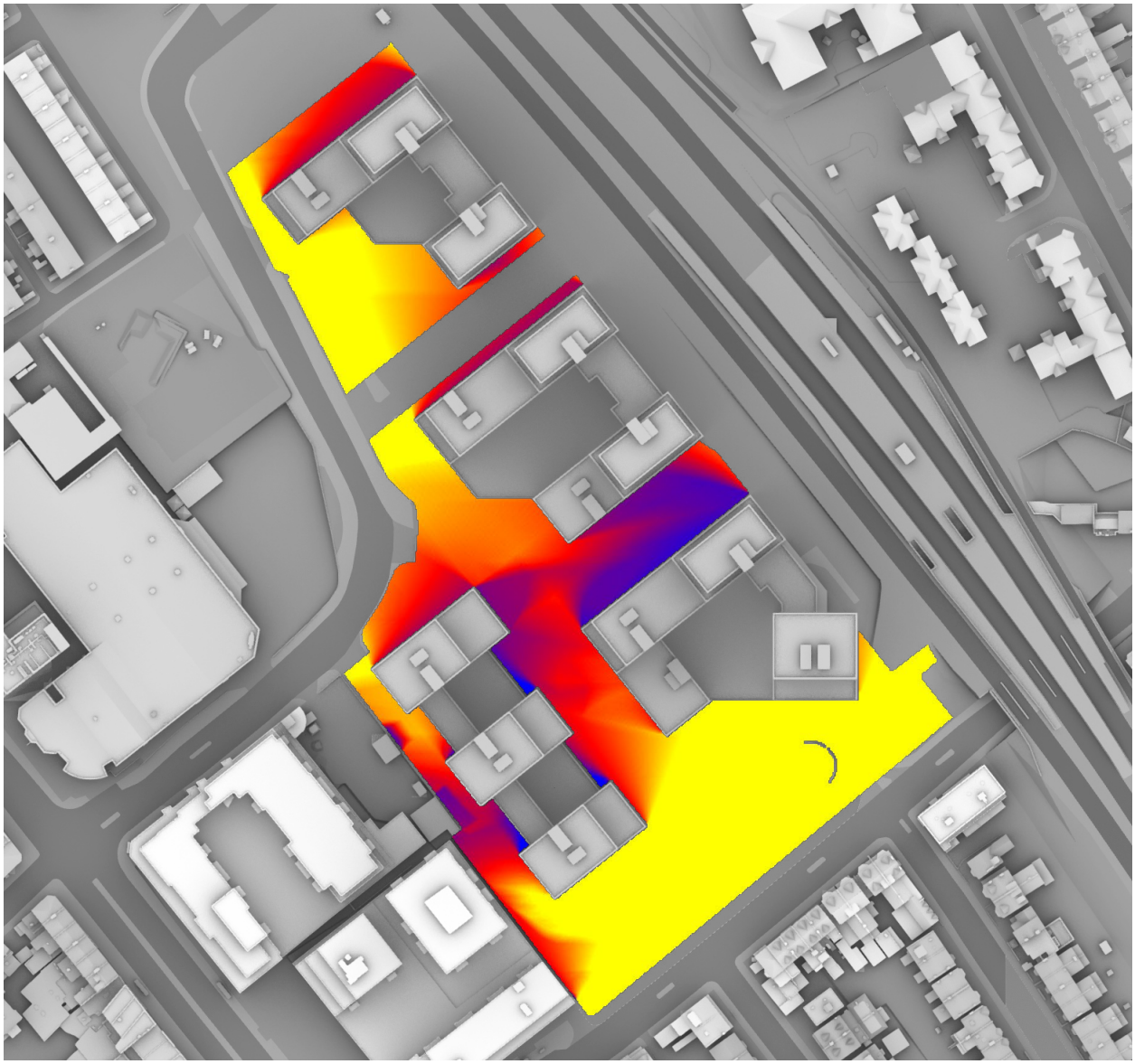


(BRE RECOMMENDS 2+ HOURS OF SUNLIGHT ON 21ST MARCH FOR AT LEAST 50% OF THE OPEN SPACE)

AREA 3: 90%
AREA 4: 90%
AREA 5: 63%
AREA 6: 95%
AREA 7: 93%
AREA 8: 63%
AREA 9: 84%
AREA 10: 92%
AREA 11: 52%
AREA 12: 88%
AREA 13: 94%
AREA 14: 86%
AREA 15: 0%
AREA 16: 84%
AREA 17: 0%
AREA 18: 84%
AREA 19: 57%
AREA 20: 56%

SUN HOURS ON GROUND
BRE TEST - 21ST MARCH

OVERSHADOWING ASSESSMENT - PROPOSED SCENARIO - GROUND FLOOR OPEN SPACE
SUN EXPOSURE ON GROUND - 21ST MARCH



SUN EXPOSURE
TOTAL HOURS

21st MARCH
(SPRING EQUINOX)

LONDON

Latitude:	51.4
Longitude:	0.0
Sunrise:	06:02 GMT
Sunset:	18:14 GMT

Total Available Sunlight:
12hrs 12mins

OVERSHADOWING ASSESSMENT - PROPOSED SCENARIO - PODIUM/TERRACE AMENITY SPACE
SUN EXPOSURE ON GROUND - 21ST MARCH

SUN EXPOSURE
TOTAL HOURS

21st MARCH
(SPRING EQUINOX)

LONDON

Latitude:	51.4
Longitude:	0.0
Sunrise:	06:02 GMT
Sunset:	18:14 GMT

Total Available Sunlight:
12hrs 12mins

OVERSHADOWING ASSESSMENT - PROPOSED SCENARIO - GROUND FLOOR OPEN SPACE
SUN EXPOSURE ON GROUND - 21ST JUNE

SUN EXPOSURE
TOTAL HOURS

21st JUNE
(SUMMER SOLSTICE)

LONDON

Latitude:	51.4
Longitude:	0.0
Sunrise:	04:43 GMT
Sunset:	21:21 GMT

Total Available Sunlight:
16hrs 38mins

OVERSHADOWING ASSESSMENT - PROPOSED SCENARIO - PODIUM/TERRACE AMENITY SPACE
SUN EXPOSURE ON GROUND - 21ST JUNE

SUN EXPOSURE
TOTAL HOURS

21st JUNE
(SUMMER SOLSTICE)

LONDON

Latitude:	51.4
Longitude:	0.0
Sunrise:	04:43 GMT
Sunset:	21:21 GMT

Total Available Sunlight:
16hrs 38mins

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