

Aval Consulting Group.



Sunlight & Daylight Assessment

52 Avenue Road, St Johns Wood, London, NW8 6HS

DOMVS London

20th July 2022

Project Information

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Disclaimer

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1 Executive Summary

- 1.1. DOMVS London Limited (hereafter referred to as the 'client') is seeking planning consent for construction of 12 x townhouse scheme including communal Health and Wellness Spa, totalling 55-60k sq ft. The 'indicative' townhouse scheme is to be 'best in class' with symmetrical facades of stucco white render, contemporary interiors and 3m plus ceiling heights throughout. The development is to provide exemplar eco/zero carbon credentials, private and communal landscaped gardens, concierge, 24 hr gated security etc at 52 Avenue Road, St Johns Wood, London, NW8 6HS (hereafter referred to as the 'proposed development'), which is within the London Borough of Camden.
- 1.2. AVAL Consulting Group Limited (ACGL) was instructed by the client to produce a Sunlight and Daylight Report to accompany the planning application to the London Borough of Camden for consent to undertake the proposed development work.
- 1.3. The purpose of this report is to demonstrate whether the proposed development and its neighbouring properties receive satisfactory levels of daylight and sunlight to windows, habitable rooms, and amenity space.
- 1.4. The study is based on criteria set out in the Building Research Establishment (BRE) guide BR-209-2022 Site Layout Planning for Daylight and Sunlight: a good practice guide, 3rd Edition 2022. The tests prescribed by the BRE Guide are approved by the Department of the Environment and provide a clear methodology for comprehensive testing.
- 1.5. Compliance with the BRE Guide is not a planning criterion and the introduction to the Guide is careful to make this point. There are therefore no minimum mandatory requirements for Sunlight & Daylight in Building Regulations for England & Wales but the guidance set out in BRE Guide is widely accepted as the approved methodology when calculating Sunlight & Daylight availability.
- 1.6. Appendix 1 identifies the windows analysed in this study. Detailed assessment results containing numerical values and or graphical representation is provided in the appendices.
- 1.7. The report also considered the new changes of reducing East and West buildings further 1.5m into the site from Avenue Road. This is inline with the advice from the Conservation Area Advisory Committee (CACC). No significant affect or change in terms of light to the neighbouring property (50 Avenue Road) has been identified due to this minor alteration in the site layout plan.
- 1.8. The proposed development performs well against the BRE recommendations. In our opinion, as the proposed development achieves an overall high level of compliance, there is no basis for refusal of the application.

2 Information Sources

2.1. The baseline conditions are based on

- View of the site in 2D & 3D form from Google earth and Google maps;
- Topographical survey maps of the location and blocks; and
- Site survey and photographs in some cases.

2.2. The proposed conditions are based on the following drawings

- 208-252B PROPOSED SITE PLAN - 12 UNIT SCHEME
- 208-272A WEST BUILDING PROPOSED ELEVATIONS - 12 UNIT SCHEME
- 208-273A EAST BUILDING PROPOSED ELEVATIONS - 12 UNIT SCHEME
- 208-274A NORTH BUILDING PROPOSED ELEVATIONS - 12 UNIT SCHEME
- 208-290A PROPOSED SECTION A - A - 12 UNIT SCHEME
- 208-291A PROPOSED SECTION B - B - 12 UNIT SCHEME
- 208-304A PROPOSED LOWER GROUND FLOOR UNIT PLANS - 12 UNIT SCHEME
- 208-305A PROPOSED GROUND FLOOR UNIT PLANS - 12 UNIT SCHEMES
- 208-306A PROPOSED FIRST FLOOR UNIT PLANS - 12 UNIT SCHEMES
- 208-307A PROPOSED SECOND FLOOR UNIT PLANS - 12 UNIT SCHEMES

3 Relevant policies and guidelines

3.1. National Legislation

- 3.1.1. There is no current, specific national planning policy or legislation relating to developments and their potential effects on Daylight, Sunlight and Overshadowing.

3.2. National Planning Policy Framework NPPF (2021)

- 3.2.1. The Building Research Establishment (BRE) guide BR-209-2022 Site Layout Planning for Daylight and Sunlight: a good practice guide, 3rd Edition 2022 should be considered in the context of the National Planning Policy Framework (NPPF), which stipulates that local planning authorities should take a flexible approach to daylight and sunlight to ensure the efficient use of land. The NPPF states:

“Where there is an existing or anticipated shortage of land for meeting identified housing needs, it is especially important that planning policies and decisions avoid homes being built at low densities and ensure that developments make optimal use of the potential of each site. In these circumstances:

c) Local planning authorities should refuse applications which they consider fail to make efficient use of land, taking into account the policies in this Framework. In this context, when considering applications for housing, authorities should take a flexible approach in applying policies or guidance relating to daylight and sunlight, where they would otherwise inhibit making efficient use of a site (as long as the resulting scheme would provide acceptable living standards).”

3.3. National Planning Practice Guidance NPPG (2014)

- 3.3.1. There is no specific policy and or guidance relating to developments and their potential effects on Sunlight, Daylight and Overshadowing within the Planning Practice Guidance.

3.4. Regional Planning Policy

- 3.4.1. There is no current, specific regional planning policy or legislation relating to developments and their potential effects on Daylight, Sunlight and Overshadowing.

3.5. Local Planning Policy

- 3.5.1. We understand that the Local Authority take the conventional approach of considering daylight and sunlight amenity with reference to the various numerical tests laid down in the Building Research Establishment (BRE) guide BR-209-2022 Site Layout Planning for Daylight and Sunlight: a good practice guide, 3rd Edition 2022.

3.6. Other relevant Policies, Standards and Guidance

3.6.1. Building Research Establishment (BRE) BR-209-2022

- 3.6.1.1. Detailed guidance on Daylight, Sunlight and Overshadowing was published by the BRE in 2022. The Daylight, Sunlight and Overshadowing assessments have been undertaken in accordance with the methodologies and numerical guidelines recommended in BRE Report 209 'Site layout planning for daylight and sunlight: A guide to good practice'.
- 3.6.1.2. The BRE document gives guidance on-site layout to retain good daylight and sunlight in existing surrounding buildings. It enables an assessment to be made as to whether the proposals will adversely affect the daylight and sunlight reaching existing habitable rooms and relevant external amenity spaces.
- 3.6.1.3. Whilst the guide is intended for use by designers, consultants and planning officers and gives numerical guidelines, the advice given is not mandatory and should not be used as an instrument of planning policy, as it states:
- “...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 the Site layout design. 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” (Section 1, Paragraph 6).
- 3.6.1.4. When considering the BRE Guide's requirements, it is important to remember that the Guide is not a set of planning rules and used as an aid to planning officers and designers by giving objective means of making assessments. The target values in the BRE Guide may not be obtainable in dense urban areas where the grain of development is tight, while higher values might well be desirable in suburban or rural areas where the grain is contrastingly open. This is recognised by the BRE and made clear in the BRE Guide.
- 3.6.1.5. The need to apply daylight and sunlight advice flexibly was reinforced in the recent National Planning Policy Framework (NPPF) draft revisions (March 2018, at para 123 [c]) and reiterated in the NPPG 'Effective Use of Land' guidance (July 2019). This is particularly relevant in London, and acknowledged in the Greater London Authority's Housing Supplementary Planning Guidance (SPG), March 2016 (para 1.3.46), which states:
- “The degree of harm on adjacent properties and the daylight targets within a proposed scheme should be assessed drawing on broadly comparable residential typologies within the area and of a similar nature across London.”

3.6.2. Other standards

- 3.6.2.1. The British Standard publication BS EN 17037:2018+A1:2021 Daylight in buildings.
- 3.6.2.2. The CIBSE publication Lighting Guide LG 10: Daylighting – a guide for designers.

4 Site Details

4.1. Existing condition

The existing condition includes the current condition of the site with its neighbouring properties and the amount of sunlight and daylight received by them.



Fig.1: Satellite image showing existing site along with its neighbouring properties (Source: Google).

4.2. Proposed condition

The proposed condition includes the site with the proposed development along with its neighbouring properties.



Fig.2: Computer Model showing the proposed development along with its neighbouring properties.

5 Assessment Methodology

5.1. Extent of the assessment area

- 5.1.1. The BRE guidelines state in paragraph 2.2.2: *“The guidelines given here are 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. The guidelines may also be applied to any existing non-domestic building where the occupants have a reasonable expectation of daylight; this would normally include schools, hospitals, hotels and hostels, small workshops and some offices.”*
- 5.1.2. In general, most commercial properties are not treated as having a reasonable expectation of daylight or sunlight. This is because they are generally designed to rely on electric lighting to provide sufficient light by which people can work, rather than natural daylight or sunlight, and have therefore been scoped out of this assessment.

5.2. Introduction of the assessment parameter

The BRE Guide (SLPDS) describes various parameters to be assessed to measure the amount of Daylight and Sunlight availability in a building or open space. They are as follows:

#	Study Parameter		New Development	Existing Building	Adjoining Land	Amenity Space
1.	Daylight	Vertical Sky Component	✓	✓	✓	✗
2.	Sunlight	Window Orientation	✓	✗	✗	✗
3.		Direct Sunlight Hours	✓	✗	✗	✗
4.		Annual Probable Sunlight Hours	✗	✓	✓	✗
5.		Sun on Ground	✗	✗	✓	✓

Table.1: List of parameters to be tested

5.2.1. Daylight

Daylight is the light received from the sun which is diffused through the sky's clouds. 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 also known as diffuse light. Any reduction in the total amount of daylight can be calculated by finding the Vertical Sky Component.

5.2.1.1. Vertical Sky Component (VSC)

- 5.2.1.1.1. The Vertical Sky Component (VSC) is the ratio of the direct skylight illuminance falling on a vertical face at a reference point (usually the centre of a window), to the simultaneous horizontal illuminance under an unobstructed sky.
- 5.2.1.1.2. Whilst the VSC test is a useful guide to predict the potential impact of a proposed neighbouring development; the test only measures the light falling on a single point, and therefore does not consider the size of a window or the benefit of other windows serving the same room.

5.2.2. Sunlight

Sunlight is the unobstructed light received on the surface from the sun. An obstructed sky with clouds impacts the sunlight reception on the surface. Reduction in amount of sunlight can be quantified by the methods outlined in following sections.

5.2.2.1. Window Orientation

- 5.2.2.1.1. A south-facing window will, in general, receive most sunlight, while a north-facing one will only receive it on a handful of occasions (early morning and late evening in summer). East- and west-facing windows will receive sunlight only at certain times of the day. A dwelling with no main window wall within 90° of due south is likely to be perceived as insufficiently sunlit. This is usually only an issue for flats. Sensitive layout design of flats will attempt to ensure that each individual dwelling has at least one main living room which can receive a reasonable amount of sunlight. In both flats and houses, a sensible approach is to try to match internal room layout with window wall orientation. Where possible, living rooms should face the southern or western parts of the sky and kitchens towards the north or east.

5.2.2.2. Direct Sunlight Hours

- 5.2.2.2.1. BS EN 17037[1] recommends that a space should receive a minimum of 1.5 hours of direct sunlight on a selected date between 1 February and 21 March with cloudless conditions. It is suggested that 21 March (equinox) be used. The medium level of recommendation is three hours and the high level of recommendation four hours. For dwellings, at least one habitable room, preferably a main living room, should meet at least the minimum criterion. One of the sunpath indicators in Appendix A (Figures A5, A6, or A7) can be used to calculate hours of sunlight received.
- 5.2.2.2.2. The BS EN 17037 criterion applies to rooms of all orientations, although if a room faces significantly north of due east or west it is unlikely to be met.

5.2.2.3. Annual Probable Sunlight Hours (APSH)

- 5.2.2.3.1. Annual Probable Sunlight Hours (APSH) means the total number of hours in the year that the sun is expected to shine on unobstructed ground, allowing for average levels of cloudiness for the location in question. Criterion applies to all rooms of all orientations, although if a room faces significantly north of due east or west it is unlikely to be met.
- 5.2.2.3.2. In accordance with the BRE guidelines, windows that face within 90 degrees of due south need to be checked for Annual Probable Sunlight Hours (APSH). Further, it is not necessary to assess the effect of obstructions within 90 degrees of due north of the existing windows. North facing windows and/or properties to the south of the site have therefore not been tested for APSH.

5.2.2.4. Sun on Ground

- 5.2.2.4.1. The availability of sunlight should be checked for all open spaces where it will be required. This would normally include
- Residential gardens, usually the main back garden of a house
 - Parks and playing fields
 - Children's playgrounds
 - Outdoor swimming 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

5.2.2.4.2. Sunlight at an altitude of 10 degrees or less does not count because it is likely to be blocked by low level planting anyway. In working out the total area to be considered, driveways and hard standings for cars should be left out. Around, housing, front gardens which are relatively small and visible from public footpaths should be omitted; only main back garden should be analysed.

5.3. Significance criteria of the assessment parameters

5.3.1. Based on the recommendation of the BRE Guide 209:2022 the significance criteria and the classification of the magnitude of the impact is presented in following tables for Sunlight and Daylight assessment parameters.

5.3.2. Based on section 5.2 the numerical criteria applied in this report to classify the magnitude of the daylight, sunlight and overshadowing impacts are as follows.

Vertical Sky Component (VSC)			Impact Classification
New Building	Existing Building	Adjoining Land	
≥27%	≥0.8 times former value	≥27%	Meets BRE
≥15%	≥0.6 times former value	≥15%	Minor
≥5%	≥0.4 times former value	≥5%	Moderate
≤5%	≤0.4 times former value	≤5%	Major

Table.2: Vertical Sky Component (VSC) impact classification table

Window Orientation	Impact Classification
At least one main window wall faces within 90° of due south in each individual dwelling?	
Yes	Well Sunlit
No	May appear gloomy

Table.3: Window orientation impact classification

Direct Sunlight Hours	Impact Classification
Hours of sunlight received in at least one habitable room	
≥4 hours (240 minutes)	Highly Exceeds BRE

≥3 hours (180 minutes)	Mediumly Exceeds BRE
≥1.5 hours (90 minutes)	Meets BRE
≥1.2 hours (70 minutes)	Minor
≥0.9 hours (50 minutes)	Moderate
≤0.9 hours (50 minutes)	Major

Table.4: Direct Sunlight Hours impact classification

Annual Probable Sunlight Hours (APSH)			Impact Classification
Summer	Winter	Whole Year	
≥25%	≥5%	≥4%	Meets BRE
Or ≥0.8 times of its former value			
≥18%	≥4%	≥3%	Minor
Or ≥0.6 times of its former value			
≥13%	≥2%	≥2%	Moderate
Or ≥0.4 times of its former value			
≤13%	≤2%	≤2%	Major
Or ≤0.4 times of its former value			

Table.5: Annual Probable Sunlight Hours (APSH) impact classification table

Sun on Ground (Overshadowing)		Impact Classification
New Open Space	Existing Open Space	
≥50% receives 2 hours of sunlight	≥0.8 times former value	Meets BRE
≥37% receives 2 hours of sunlight	≥0.6 times former value	Minor
≥25% receives 2 hours of sunlight	≥0.4 times former value	Moderate
≤25% receives 2 hours of sunlight	≤0.4 times former value	Major

Table.6: Sun on Ground (Overshadowing) impact classification table

- 5.3.3. The BRE Guide Appendix H states that “the assessment of the impact will depend on a combination of factors, and there is no simple rule of thumb that can be applied.
- 5.3.4. The impact assessment was undertaken using detailed computer modelling and simulation software IESVE.2022.1.

6 Assessment Results – Proposed Development

A drawing representing the windows analysed in this study along with their position and reference number is presented in Figure.3 in Appendix 1.

6.1. Daylight - Vertical Sky Component (VSC)

The test shows that out of 100 tested windows as shown in Table.7 in Appendix 2

- 6.1.1. 87 (87%) windows meet the BRE requirement of $\geq 27\%$ VSC value. Therefore, it is considered that the proposed development meets the minimum BRE recommendation of skylight reception at these windows.
- 6.1.2. 13 (13%) windows meet the BRE requirement of $\geq 15\%$ VSC value. Therefore, it is considered that the proposed development may have minor impact on the amount of skylight reception at these windows. However, all the 13 affected windows serve the arrival room which is a space not used by the resident of the house often and therefore is to be considered that the impact is not significant.
- 6.1.3. Whereas the Vertical Sky Component test is applicable only for side lit rooms, whereas the lower ground floor bedroom is provided with horizontal rooflight we have carried out the illuminance test as an alternative to present the daylight availability inside these lower ground floor bedrooms. The results are presented in Appendix 3. All lower ground floor bedrooms receive ≥ 500 lux in more than half of the room space. Therefore, it is considered that the proposed development meets the minimum BRE recommendation of skylight reception at these bedrooms.

6.2. Sunlight – Window Orientation

The test shows that out of 12 tested dwellings as shown in Table.7 in Appendix 2

- 6.2.1. All 12 (100%) individual dwelling has at least one main window wall faces within south direction. Therefore, it is considered that these dwellings in the proposed development meets the minimum BRE recommendation of sunlight reception and are well sunlit.

6.3. Sunlight – Direct Sunlight Hours

The test shows that out of 12 tested individual dwellings as shown in Table.7 in Appendix 2

- 6.3.1. All 12 (100%) individual dwellings meet the BRE requirement of receiving ≥ 2 hours of direct sunlight on 21st March in at least one habitable room. Therefore, it is considered that the proposed development meets the minimum BRE recommendation of sunlight reception at these dwellings.

6.4. Sunlight – Sun on Ground

The test shows that out of 12 tested amenity spaces

- 6.4.1. All 12 (100%) amenity spaces meet BRE requirement of receiving two hours of sunlight in $\geq 50\%$ of their space. Therefore, it is considered that the proposed development meets the minimum BRE recommendation of sunlight reception on these amenity space.

7 Assessment Results – Neighbouring Properties

A drawing representing the windows analysed in this study along with their position and reference number is presented in Figure.4 in Appendix 1.

7.1. Daylight - Vertical Sky Component (VSC)

The test shows that out of 30 tested windows as shown in Table.8 in Appendix 2

- 7.1.1. 26 (87%) windows meet the BRE requirement of $\geq 27\%$ and or ≥ 0.8 times of its former VSC value. Therefore, it is considered that the proposed development meets the minimum BRE recommendation of daylight reception at these windows.
- 7.1.2. 2 (6.5%) windows meet the BRE requirement of $\geq 5\%$ and or ≥ 0.4 times of its former VSC value. However, these windows serve washrooms which is an uninhabitable room and therefore is not considered for this assessment based on the BRE Guideline. The results are mentioned for completeness and for information only. Therefore, it is considered that the proposed development meets the minimum BRE recommendation of daylight reception at these windows.
- 7.1.3. 2 (6.5%) windows meet the BRE requirement of $\leq 5\%$ and or < 0.4 times of its former VSC value. However, these windows are in a room which is served by another unobstructed window and therefore, it is considered that the proposed development meets the minimum BRE recommendation of daylight reception at these windows.

7.2. Sunlight - Annual Probable Sunlight Hours (APSH)

The test shows that out of 30 tested windows as shown in Table.8 in Appendix 2

- 7.2.1. 27 (90%) windows meet the BRE requirement of $\geq 25\%$ and or ≥ 0.8 times of its former APSH value in Summertime between 21st March to 21st September. Therefore, it is considered that the proposed development meets the minimum BRE recommendation of sunlight reception at these windows.
 - 7.2.1.1. 3 (10%) window meet would receive sunlight $\geq 13\%$ and or ≥ 0.4 times of its former APSH value in Summertime between 21st March to 21st September. However, these windows serve washrooms which is an uninhabitable room and therefore is not considered for this assessment based on the BRE Guideline. The results are mentioned for completeness and for information only. Therefore, it is considered that the proposed development meets the minimum BRE recommendation of daylight reception at these windows.
- 7.2.2. All 30 (100%) windows meet the BRE requirement of $\geq 5\%$ and or ≥ 0.8 times of its former APSH value in Wintertime between 21st September to 21st March. Therefore, it is considered that the proposed development meets the minimum BRE recommendation of daylight reception at these windows.

- 7.2.3. All 30 (100%) windows meet the BRE requirement of $\geq 4\%$ and or ≥ 0.8 times of its former APSH value in whole year between 1st January to 1st December. Therefore, it is considered that the proposed development meets the minimum BRE recommendation of daylight reception at these windows.

7.3. Sunlight – Sun on Ground

The test shows that out of 3 tested amenity spaces

- 7.3.1. All 3 (100%) of amenity spaces meet BRE requirement of receiving two hours of sunlight in $\geq 50\%$ of their space and or ≥ 0.8 times space from its former space value. Therefore, it is considered that the proposed development meets the minimum BRE recommendation of sunlight reception on these amenity spaces.

8 Mitigation Measures

8.1. Proposed development

- 8.1.1. Mitigation measures are not necessary as the proposed development meet the BRE guideline criteria.

8.2. Neighbouring properties

- 8.2.1. Mitigation measures are not necessary as the proposed development meet the BRE guideline criteria.

9 Conclusion

9.1. Proposed development

- 9.1.1. This report provides an outline assessment for the daylight and sunlight analysis that should be carried out as part of the detailed planning submission.
- 9.1.2. In our opinion, the proposed development, achieves an overall high level of compliance with the BRE requirements. Therefore, it should not warrant for refusal of the application.
- 9.1.3. Therefore, it can be considered that the development will not conflict with any national, regional, or local planning policy in relation to the loss of daylight and sunlight because of the proposed development.

9.2. Neighbouring properties

- 9.2.1. This report provides an outline assessment for the daylight and sunlight analysis that should be carried out as part of the detailed planning submission.
- 9.2.2. In our opinion, the proposed development, achieves an overall high level of compliance with the BRE requirements. Therefore, it should not warrant for refusal of the application.
- 9.2.3. Therefore, it can be considered that the development will not conflict with any national, regional, or local planning policy in relation to the loss of daylight and sunlight because of the proposed development.

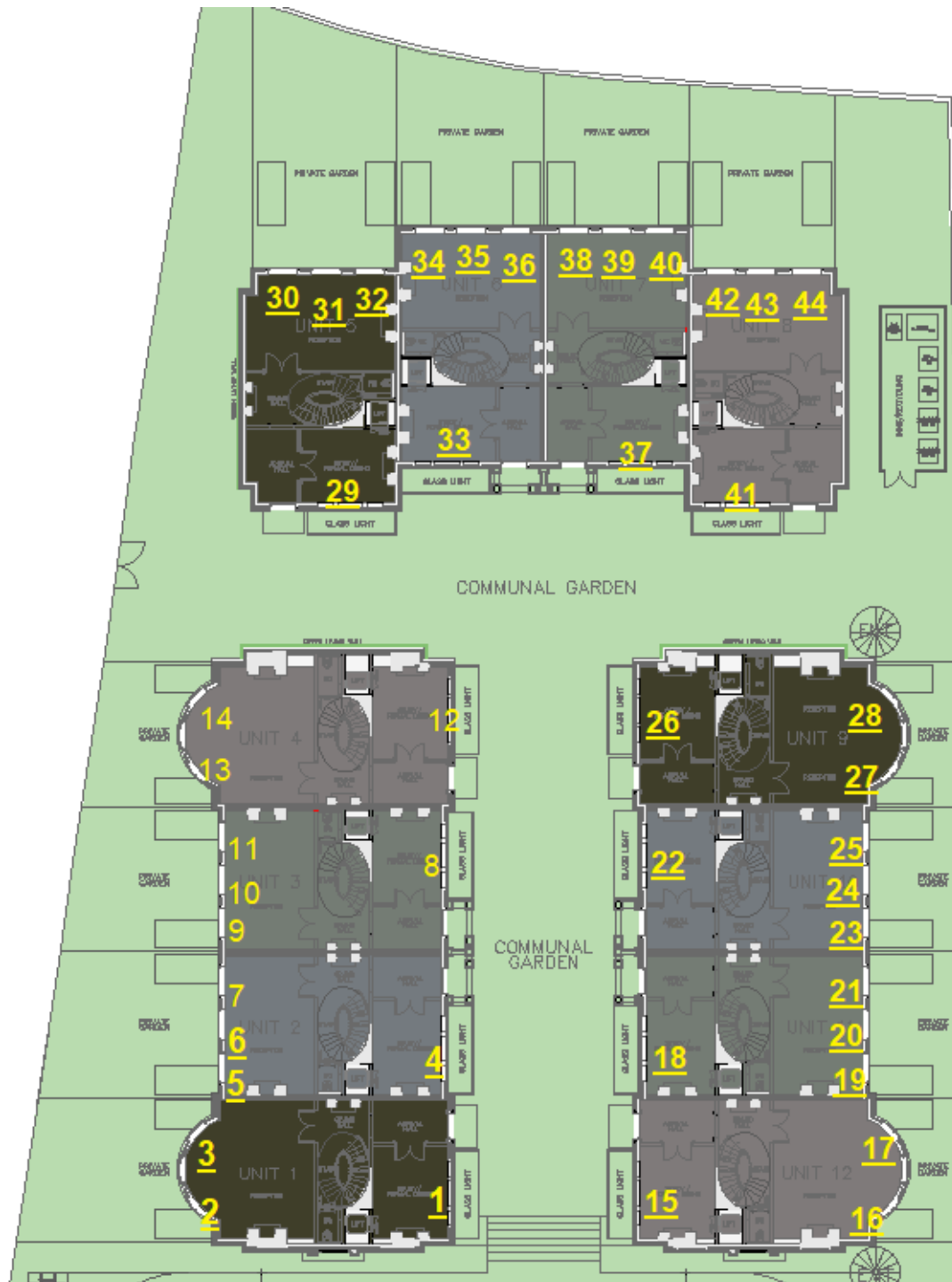
10 Clarifications

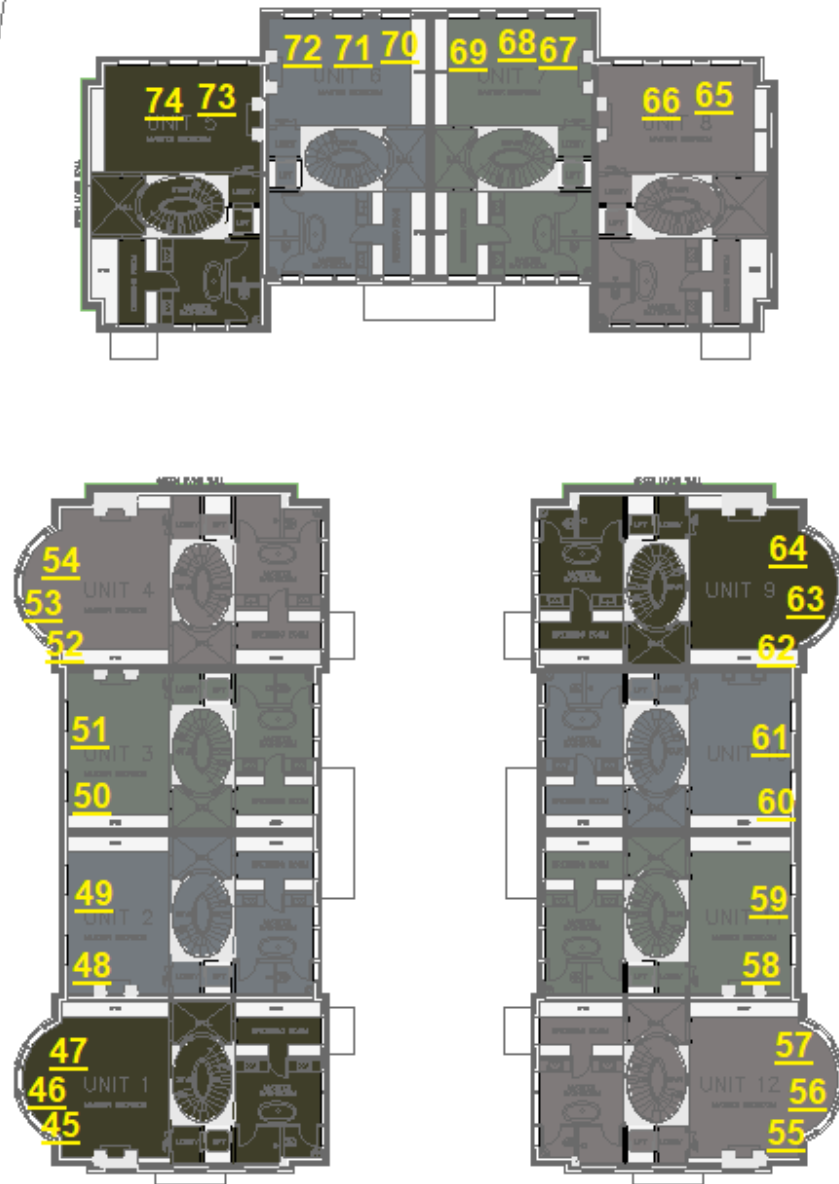
10.1. General

- 10.1.1. The report provided is solely for the use of the client and no liability to anyone else is accepted.
- 10.1.2. The study is limited to assessing daylight, sunlight of the proposed development as set out in sections 2.1, 3.1 and 3.3 of the BRE Guide.
- 10.1.3. The study has been undertaken following access to the proposed development site. We have not had access to neighbouring properties. The study is based on the information listed in section 2 of this report.
- 10.1.4. Where plans or access were not available, the internal layouts have been based on assumptions (where possible from external observation). Where the layouts have been estimated, this has no bearing on the sunlight analysis or the assessment of the vertical sky component daylight test, both of which are considered at the centre of the window.
- 10.1.5. This study does not calculate the effects of trees and hedges on daylight, sunlight and overshadowing to gardens. The BRE guide states that trees should sometimes be taken into account, e.g. where there is concern that future occupants of the dwelling may want the trees to be cutdown if they block too much skylight or sunlight. We are not aware of any such circumstances, in this instance.
- 10.1.6. We have undertaken the survey following the guidelines of the RICS publication "Surveying Safely". Where limited access is available, assumptions will have been made.
- 10.1.7. This report is based upon and subject to the scope of work set out in AVAL Consulting Group's quotation and standard terms and conditions.

Appendices

Appendix 1: Window reference numbers





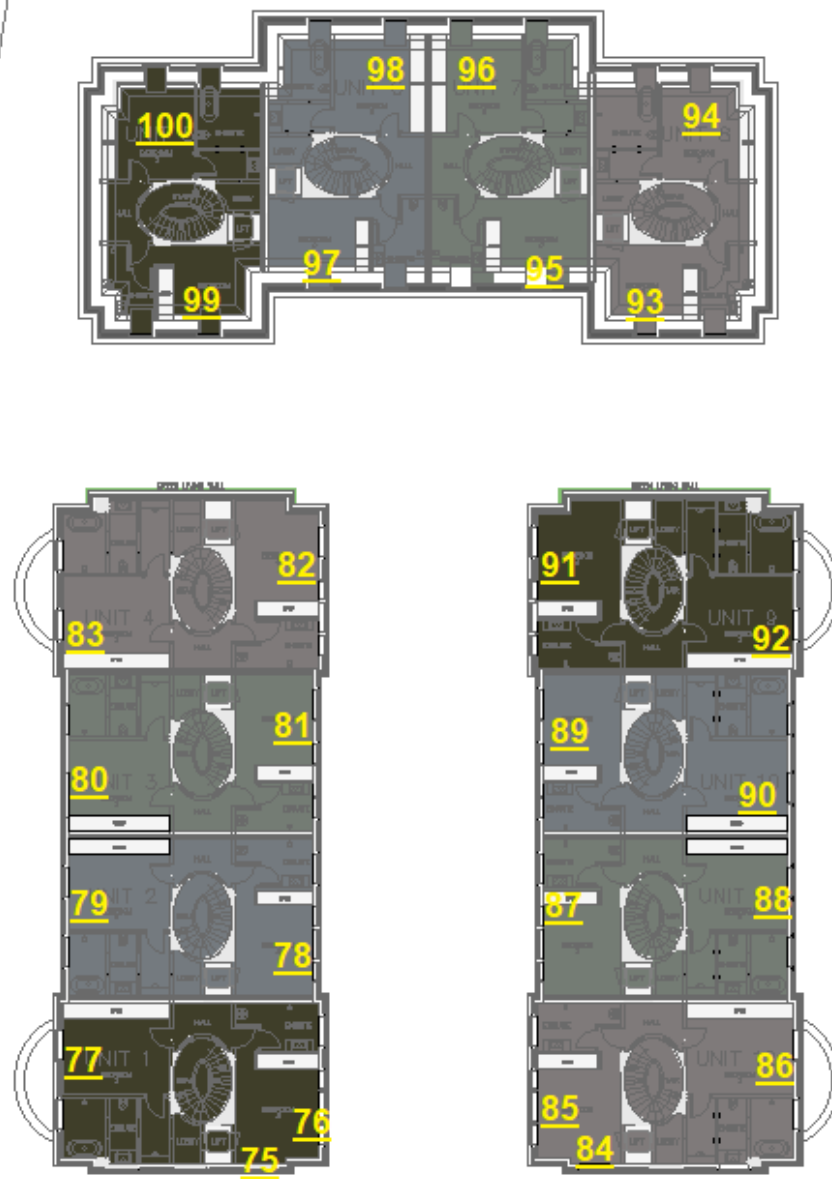


Fig.3: Windows and its numbers within proposed development



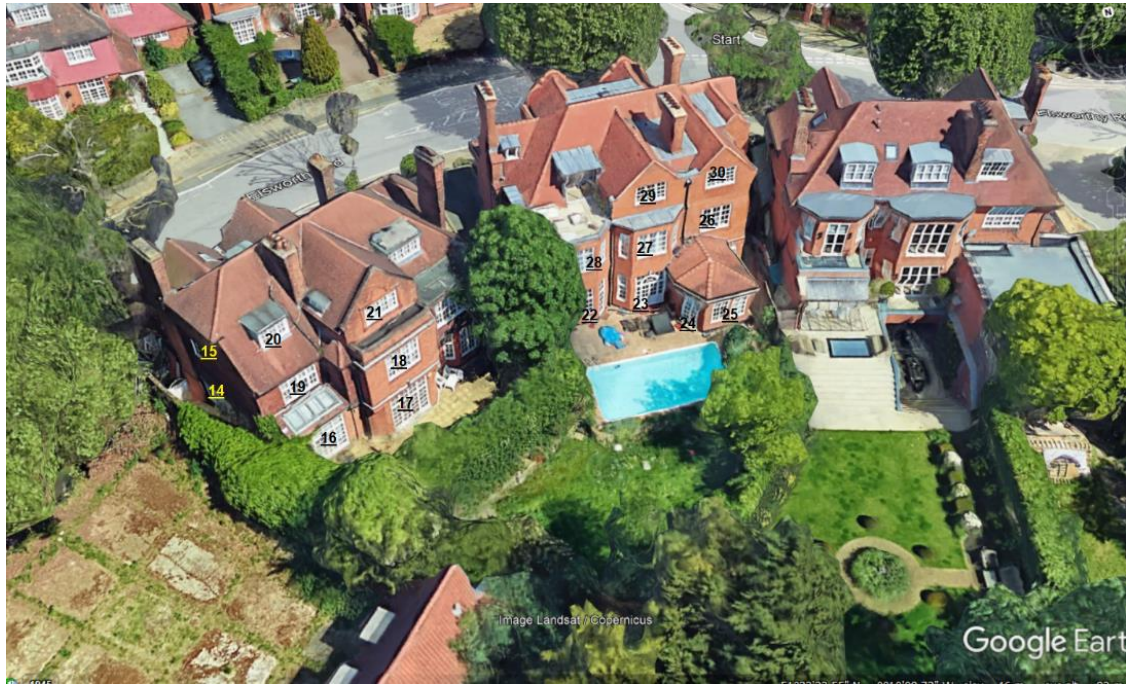


Fig.4: Windows and its numbers in neighbouring properties

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Appendix 2: Detailed numerical test results

					VSC in %			Direct Sunlight Hours			Window Orientation	
House	Floor	Room	Window Reference	Window Direction	Target	Proposed	Impact Descriptor	Target	Proposed	Impact Descriptor	At least is 1 main window faces south?	Impact Descriptor
1	G	Study/Formal/Dining	1	SE	≥27	23.41	Minor impact	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	G	Reception	2	NW	≥27	39	Meets BRE	≥1.5	≥2	Meets BRE		
	G		3	NW	≥27	34		≥1.5	≥2			
2	G	Study/Formal/Dining	4	SE	≥27	17.5	Minor impact	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	G	Reception	5	NW	≥27	37	Meets BRE	≥1.5	≥2	Meets BRE		
	G		6	NW	≥27	37		≥1.5	≥2			
3	G	Study/Formal/Dining	8	SE	≥27	16.9	Minor impact	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	G	Reception	9	NW	≥27	37	Meets BRE	≥1.5	≥2	Meets BRE		
	G		10	NW	≥27	37		≥1.5	≥2			
	G		11	NW	≥27	37		≥1.5	≥2			
4	G	Study/Formal/Dining	12	SE	≥27	19	Minor impact	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	G	Reception	13	NW	≥27	35	Meets BRE	≥1.5	≥2	Meets BRE		
	G		14	NW	≥27	35		≥1.5	≥2			
12	G	Study/Formal/Dining	15	NW	≥27	25.3	Minor impact	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	G	Reception	16	SE	≥27	36	Meets BRE	≥1.5	≥2	Meets BRE		
	G		17	SE	≥27	17		≥1.5	≥2			
11	G	Study/Formal/Dining	18	NW	≥27	17.7	Minor impact	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	G	Reception	19	SE	≥27	17.8	Minor impact	≥1.5	≥2	Meets BRE		
	G		20	SE	≥27	18.38		≥1.5	≥2			
	G		21	SE	≥27	20.71		≥1.5	≥2			
10	G	Study/Formal/Dining	22	NW	≥27	16.4	Minor impact	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	G	Reception	23	SE	≥27	26.15	Meets BRE	≥1.5	≥2	Meets BRE		
	G		24	SE	≥27	28.72		≥1.5	≥2			
	G		25	SE	≥27	30.32		≥1.5	≥2			
9	G	Study/Formal/Dining	26	NW	≥27	19.16	Minor impact	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	G	Reception	27	SE	≥27	28.6	Meets BRE	≥1.5	≥2	Meets BRE		
	G		28	SE	≥27	35.4		≥1.5	≥2			
5	G	Study/Formal/Dining	29	SW	≥27	15.48	Minor impact	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	G	Reception	30	NE	≥27	32.79	Meets BRE	≥1.5	≥2	Meets BRE		
	G		31	NE	≥27	30.82		≥1.5	≥2			

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	G		32	NE	≥27	24.5		≥1.5	≥2			
6	G	Study/Formal/Dining	33	SW	≥27	19.8	Minor impact	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	G	Reception	34	NE	≥27	30.45	Meets BRE	≥1.5	≥2	Meets BRE		
	G		35	NE	≥27	30.16		≥1.5	≥2			
	G		36	NE	≥27	30.02		≥1.5	≥2			
7	G	Study/Formal/Dining	37	SW	≥27	19.74	Minor impact	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	G	Reception	38	NE	≥27	31.4	Meets BRE	≥1.5	≥2	Meets BRE		
	G		39	NE	≥27	32.22		≥1.5	≥2			
	G		40	NE	≥27	33.67		≥1.5	≥2			
8	G	Study/Formal/Dining	41	SW	≥27	15.39	Minor impact	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	G	Reception	42	NE	≥27	28.45	Meets BRE	≥1.5	≥2	Meets BRE		
	G		43	NE	≥27	32.1		≥1.5	≥2			
	G		44	NE	≥27	34.76		≥1.5	≥2			
1	1	Bedroom	45	NW	≥27	39.6	Meets BRE	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	1		46	NW	≥27	39.9		≥1.5	≥2			
	1		47	NW	≥27	37.35		≥1.5	≥2			
2	1	Bedroom	48	NW	≥27	38.37	Meets BRE	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	1		49	NW	≥27	38.32		≥1.5	≥2			
3	1	Bedroom	50	NW	≥27	38.6	Meets BRE	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	1		51	NW	≥27	38.06		≥1.5	≥2			
4	1	Bedroom	52	NW	≥27	37.54	Meets BRE	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	1		53	NW	≥27	38.3		≥1.5	≥2			
	1		54	NW	≥27	37.88		≥1.5	≥2			
12	1	Bedroom	55	NW	≥27	36.29	Meets BRE	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	1		56	NW	≥27	27.79		≥1.5	≥2			
	1		57	NW	≥27	22.82		≥1.5	≥2			
11	1	Bedroom	58	NW	≥27	26	Meets BRE	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	1		59	NW	≥27	27.14		≥1.5	≥2			
10	1	Bedroom	60	NW	≥27	32.08	Meets BRE	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	1		61	NW	≥27	33.95		≥1.5	≥2			
9	1	Bedroom	62	NW	≥27	31.09	Meets BRE	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	1		63	NW	≥27	36.76		≥1.5	≥2			
	1		64	NW	≥27	37.17		≥1.5	≥2			
8	1	Bedroom	65	NE	≥27	37.08	Meets BRE	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	1		66	NE	≥27	34.84		≥1.5	≥2			
7	1	Bedroom	67	NE	≥27	36.12	Meets BRE	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	1		68	NE	≥27	35.8		≥1.5	≥2			
	1		69	NE	≥27	35.08		≥1.5	≥2			
6	1	Bedroom	70	NE	≥27	34.56	Meets BRE	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	1		71	NE	≥27	34.27		≥1.5	≥2			

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	1		72	NE	≥27	34.38		≥1.5	≥2			
5	1	Bedroom	73	NE	≥27	33.8	Meets BRE	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	1		74	NE	≥27	35.86		≥1.5	≥2			
1	2	Bedroom	75	SW	≥27	39.8	Meets BRE	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	2		76	SE	≥27	33.3		≥1.5	≥2			
	2	Bedroom	77	NW	≥27	39.6	Meets BRE	≥1.5	≥2	Meets BRE		
2	2	Bedroom	78	SE	≥27	33.77	Meets BRE	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	2	Bedroom	79	NW	≥27	39.7	Meets BRE	≥1.5	≥2	Meets BRE		
3	2	Bedroom	80	NW	≥27	39.67	Meets BRE	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	2	Bedroom	81	SE	≥27	33.22	Meets BRE	≥1.5	≥2	Meets BRE		
4	2	Bedroom	82	SE	≥27	33.64	Meets BRE	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	2	Bedroom	83	NW	≥27	39.5	Meets BRE	≥1.5	≥2	Meets BRE		
12	2	Bedroom	84	SW	≥27	39.97	Meets BRE	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	2		85	NW	≥27	33.19		≥1.5	≥2			
	2	Bedroom	86	SE	≥27	38.29	Meets BRE	≥1.5	≥2	Meets BRE		
11	2	Bedroom	87	NW	≥27	31.23	Meets BRE	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	2	Bedroom	88	SE	≥27	38.53	Meets BRE	≥1.5	≥2	Meets BRE		
10	2	Bedroom	89	NW	≥27	31.16	Meets BRE	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	2	Bedroom	90	SE	≥27	39.13	Meets BRE	≥1.5	≥2	Meets BRE		
9	2	Bedroom	91	NW	≥27	31.31	Meets BRE	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	2	Bedroom	92	SE	≥27	39.33	Meets BRE	≥1.5	≥2	Meets BRE		
8	2	Bedroom	93	SW	≥27	28.88	Meets BRE	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	2	Bedroom	94	NE	≥27	38.91	Meets BRE	≥1.5	≥2	Meets BRE		
7	2	Bedroom	95	SW	≥27	29.96	Meets BRE	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	2	Bedroom	96	NE	≥27	39.36	Meets BRE	≥1.5	≥2	Meets BRE		
6	2	Bedroom	97	SW	≥27	29.93	Meets BRE	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	2	Bedroom	98	NE	≥27	39.26	Meets BRE	≥1.5	≥2	Meets BRE		
5	2	Bedroom	99	SW	≥27	28.93	Meets BRE	≥1.5	≥2	Meets BRE	Yes	Meets BRE
	2	Bedroom	100	NE	≥27	38.85	Meets BRE	≥1.5	≥2	Meets BRE		

Table.7: Detailed numerical test results within proposed development

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House	Room	Floor	Window Reference	Window Direction	VSC in %					APSH Summer in %					APSH Winter in %					APSH Whole Year in %				
					Target	Before	After	Loss Ratio	Opinion	Target	Before	After	Loss Ratio	Opinion	Target	Before	After	Loss Ratio	Opinion	Target	Before	After	Loss Ratio	Opinion
50 Avenue Road	Kitchen, Living & Dining	G	1	NE	≥27	35.27	29.91	0.85	Meets BRE	≥25	≥25	≥25	1	Meets BRE	≥5	≥5	≥5	1	Meets BRE	≥4	≥4	≥4	1	Meets BRE
		G	2	NE	≥27	34.76	33.35	0.96	Meets BRE	≥25	≥25	≥25	1	Meets BRE	≥5	≥5	≥4	0.8	Meets BRE	≥4	≥4	≥4	1	Meets BRE
		G	3	NE	≥27	28.51	28.2	0.99	Meets BRE	≥25	≥20	≥13	0.52	Meets BRE	≥5	0	0	1	Meets BRE	≥4	≥4	≥4	1	Meets BRE
	Bedroom	1	4	NE	≥27	32.45	31.6	0.97	Meets BRE	≥25	≥25	≥25	1	Meets BRE	≥5	≥5	≥5	1	Meets BRE	≥4	≥4	≥4	1	Meets BRE
	Living	1	5	NE	≥27	37.5	36.27	0.97	Meets BRE	≥25	≥25	≥25	1	Meets BRE	≥5	≥5	≥5	1	Meets BRE	≥4	≥4	≥4	1	Meets BRE
	Bedroom	1	6	NE	≥27	37.82	33.13	0.88	Meets BRE	≥25	≥25	≥25	1	Meets BRE	≥5	≥5	≥5	1	Meets BRE	≥4	≥4	≥4	1	Meets BRE
	Bedroom	2	7	NE	≥27	39.53	35.91	0.91	Meets BRE	≥25	≥25	≥25	1	Meets BRE	≥5	≥5	≥5	1	Meets BRE	≥4	≥4	≥4	1	Meets BRE
	Washroom	2	8	NE	≥27	39.48	38.04	0.96	Meets BRE	≥25	≥25	≥25	1	Meets BRE	≥5	≥5	≥5	1	Meets BRE	≥4	≥4	≥4	1	Meets BRE
	Bedroom	2	9	NE	≥27	37.77	37.4	0.99	Meets BRE	≥25	≥25	≥25	1	Meets BRE	≥5	≥5	≥5	1	Meets BRE	≥4	≥4	≥4	1	Meets BRE
	Washroom	G	10	NW	≥27	37.58	8.1	0.22	Meets BRE	≥25	≥25	≥13	0.52	Meets BRE	≥5	≥5	≥5	1	Meets BRE	≥4	≥4	≥4	1	Meets BRE
	Washroom	1	11	NW	≥27	38.72	13.27	0.34	Meets BRE	≥25	≥25	≥13	0.52	Meets BRE	≥5	≥5	≥5	1	Meets BRE	≥4	≥4	≥4	1	Meets BRE
	Bedroom	2	12	NW	≥27	39.6	21.24	0.54	Meets BRE	≥25	≥25	≥20	0.8	Meets BRE	≥5	≥5	≥5	1	Meets BRE	≥4	≥4	≥4	1	Meets BRE
57 Elsworth Road	Bedroom	2	13	NW	≥27	39.49	19.74	0.5	Meets BRE	≥25	≥25	≥20	0.8	Meets BRE	≥5	≥5	≥5	1	Meets BRE	≥4	≥4	≥4	1	Meets BRE
	Kitchen	G	14	SW	≥27	31.3	25.07	0.8	Meets BRE	≥25	≥25	≥25	1	Meets BRE	≥5	≥5	≥5	1	Meets BRE	≥4	≥4	≥4	1	Meets BRE
	Bedroom	2	15	SW	≥27	37.48	30.14	0.8	Meets BRE	≥25	≥25	≥25	1	Meets BRE	≥5	≥5	≥5	1	Meets BRE	≥4	≥4	≥4	1	Meets BRE
	Breakfast room	G	16	SE	≥27	33.79	31.75	0.94	Meets BRE	≥25	≥25	≥25	1	Meets BRE	≥5	≥5	≥5	1	Meets BRE	≥4	≥4	≥4	1	Meets BRE
	Dining	G	17	SE	≥27	35.6	34.49	0.97	Meets BRE	≥25	≥25	≥25	1	Meets BRE	≥5	≥5	≥5	1	Meets BRE	≥4	≥4	≥4	1	Meets BRE
	Bedroom	1	18	SE	≥27	37.76	36.57	0.97	Meets BRE	≥25	≥25	≥25	1	Meets BRE	≥5	≥5	≥5	1	Meets BRE	≥4	≥4	≥4	1	Meets BRE
	Bedroom	1	19	SE	≥27	36.96	34.29	0.93	Meets BRE	≥25	≥25	≥25	1	Meets BRE	≥5	≥5	≥5	1	Meets BRE	≥4	≥4	≥4	1	Meets BRE
	Bedroom	2	20	SE	≥27	38.8	36.91	0.95	Meets BRE	≥25	≥25	≥25	1	Meets BRE	≥5	≥5	≥5	1	Meets BRE	≥4	≥4	≥4	1	Meets BRE
	Bedroom	2	21	SE	≥27	39.37	38.58	0.98	Meets BRE	≥25	≥25	≥25	1	Meets BRE	≥5	≥5	≥5	1	Meets BRE	≥4	≥4	≥4	1	Meets BRE

Table.8: Detailed numerical test results within neighbouring properties

Appendix 3: Daylight availability in lower ground floor bedroom

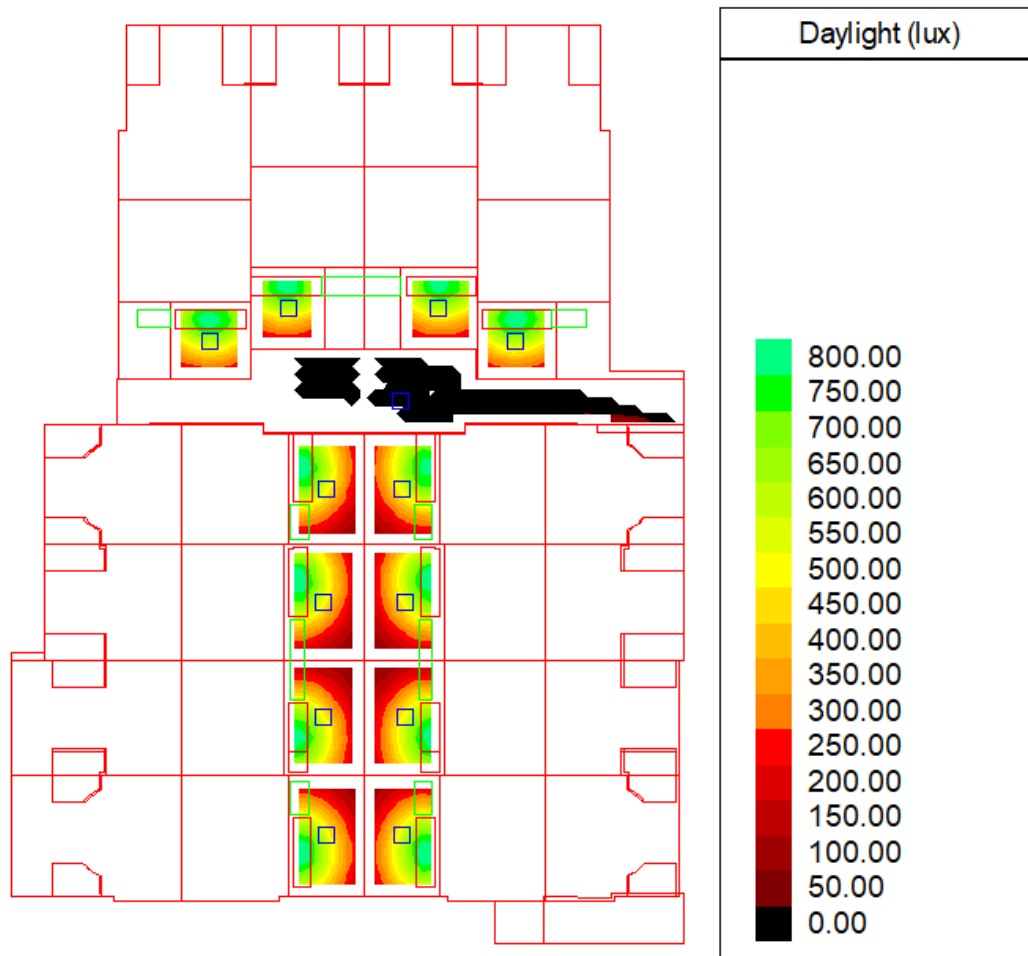


Fig.5: Daylight availability contour diagram for lower ground floor bedrooms