



DAYLIGHT & SUNLIGHT

INTERNAL DAYLIGHT, SUNLIGHT
AND OVERSHADOWING REPORT

Thamesfield Retirement Village

Retirement Villages Group (RVG)

22 November 2024

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Client **Retirement Villages Group (RVG)**
Architect **Design Engine**
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1 EXECUTIVE SUMMARY

GIA have been instructed by Retirement Villages Group (RVG) to provide a daylight, sunlight and overshadowing report for the residential accommodation within the Proposed Development at Thamesfield Retirement Village (the "Site") in Remenham. The Proposed Development consists of part demolition of an existing building and replacement with a three-storey extension to provide additional care units.

The purpose of this report is to ascertain whether the Proposed Development will provide residential accommodation considered acceptable in terms of daylight, sunlight and overshadowing. GIA have worked alongside the design team to make the most of daylight and sunlight amenity within the Proposed Development, whilst balancing other compelling design factors such as the risk of overheating, noise, privacy and air quality on Site. Further details can be found in section 5.1.

All the proposed habitable rooms and open spaces have been tested according to the methodology and criteria set out in the BRE guidelines 'Site Layout Planning for Daylight and Sunlight a Guide to Good Practice (2022)' and EN 17037:2018 including the relative UK National Annex.

For daylight, 33 (67%) out of all 49 proposed habitable rooms achieve the minimum levels of spatial Daylight Autonomy (sDA) recommended within the UK National Annex for residential buildings. In addition, a further five rooms would only fall slightly short of recommendation and so a total of 38 (78%) rooms are considered to offer acceptable daylight levels.

As is to be expected in any new development, lower levels of daylight are seen typically on the lowest floors and where rooms are located beneath a balcony. This limits daylight availability, but provides valuable outdoor amenity space and acts as shading device, which reduces overheating risk. Further details can be found in section 5.2.

With regard to sunlight, 14 (82%) out of all 17 units tested meet the first criterion of having at least one main window wall that faces within 90 degrees of due south. This illustrates that the vast majority of units are provided with a southerly aspect.

In addition, these dwellings would also meet the second criterion of at least one habitable room receiving at least 1.5 hours of sunlight on 21st March. This shows that the vast majority of units will also receive good levels of sunlight throughout the year.

The three dwellings seeing lower levels of sunlight do so due to their northerly orientation, which is driven primarily by the Site's layout.

Overall, the design has sought to minimise dwellings which have a predominately northerly aspect on Site as much as practicable. The Proposed Development therefore makes the most of the available sunlight, providing very good amenity to the majority of units.

In relation to overshadowing, the assessments show that 81% of the proposed communal open space sees two or more hours of direct sunlight on 21st March. This exceeds the BRE recommendation of 50% and offers future residents and visitors an excellently sunlit space to enjoy during the year. Further details can be found in section 5.4.

In conclusion, the assessments have demonstrated that the majority of the proposed units and open space will be provided with good daylight and sunlight amenity overall. In the few areas where lower levels of natural light can be seen, this is predominantly due to balancing other design factors such as, overheating constraints and the trade off with externally amenity. On balance, the scheme will therefore offer acceptable daylight amenity to future residents.

2 INTRODUCTION

GIA has been instructed to provide a report upon the potential availability of Daylight and Sunlight to the proposed accommodation within the residential scheme prepared by Design Engine. GIA was specifically instructed to carry out the following:

- To create a 3D computer model of the proposal based upon drawings prepared by Design Engine.
- Carry out a daylight quantum assessment of the proposed residential accommodation using the Illuminance (Spatial Daylight Autonomy/sDA) methodology set out in the BRE Guidelines 2022.
- Carry out a sunlight quantum assessment of the proposed residential accommodation using the Sun Exposure on 21st March methodology set out in the BRE Guidelines 2022.
- Carry out an overshadowing assessment of communal open spaces using the methodology set out in the BRE guidance for Sun Hours On Ground (SHOG) for all relevant amenity areas.
- Prepare a report setting out the analysis and our findings.

3 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 (BR 209 2022)', guidelines and methodology for the measurement and assessment of daylight and sunlight within proposed buildings.

3.1 INTRODUCTION

The BRE published the new edition of 'Site layout planning for daylight and sunlight: a guide to good practice' in June 2022 (BR 209). This is to be read in conjunction with BS EN 17037:2018 "Daylight in buildings", the UK National Annex of the British Standard and the CIBSE publication LG 10 'Daylighting – a guide for designers'.

The BR 209 new edition contains amended methodologies for appraising the daylight and sunlight quality within new developments. Nonetheless, the main aim of the guidance is maintained: *"to help rather than constrain the designer"* as stated in Paragraph 1.5 of the new guidance.

The report provides advice, but also clearly states that it *"is not mandatory and the guide should not be seen as an instrument of planning policy."* The guidance also acknowledges in its introduction that *"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."* (Paragraph 1.6)

3.2 BS EN 17037:2018 AND THE UK ANNEX

The British Standard BS8206-2:2008 was superseded by the new European Standard on daylight BS EN 17037:2018 "Daylight in buildings".

Following on from the review of the European Standard by a dedicated commission of UK experts, the British Standard Institution appended to BS EN 17037:2018 a UK National Annex which brings the recommended light levels in line with those of the former BS8206-2:2008.

The BS EN 17037 includes four criteria: daylighting, views, sunlight access and glare. However, daylighting and sunlight access are the only criteria considered relevant for residential buildings and therefore discussed within this report.

View out and Glare are mostly relevant in offices and schools, where occupants are more fixed to a certain location within a room. In residential habitable rooms, occupants tend to move more freely and therefore view out and glare are not assessed within residential buildings.

In relation to sunlight access, the assessment considers the hours of sunlight reaching a window on the 21st March.

3.3 DAYLIGHT

The BRE set out the methods for assessing daylight within a proposed building within section 2.1 and Appendix C of the handbook. This is based on the methods detailed in the BS EN 17037.

BS EN 17037 suggests two possible methodologies for appraising daylight:

- Illuminance Method
- Daylight Factor Method

These methodologies are discussed in more detail below.

Whilst Vertical Sky Component (VSC) is no longer directly used to calculate the levels of daylight indoors, this is still referenced within the BRE guidance as a metric to appraise the level of obstruction faced by a building and the potential for good daylight indoors.

This method of assessment may also be used to appraise the daylight quality in the early stages of the design, when room layouts or window locations are still undecided.

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.

Illuminance method

Climate Based Daylight Modelling (CBDM) is used to predict daylight illuminance using sun and sky conditions derived from standard meteorological

data (often referred to as climate or weather data). This analytical method allows the prediction of absolute daylight illuminance based on the location and building orientation, in addition to the building's daylight systems (shading systems, for example). Annex A within the BS EN 17037 proposes values of target illuminances and minimum target illuminances to exceed 50 % of daylight hours.

This is considered to be the most accurate approach when using climate data, however, it provides a very large amount of data for each assessed room, which then needs to be interrogated. One of the methodologies that can be used to interrogate this data is Spatial Daylight Autonomy (sDA).

Spatial Daylight Autonomy (sDA)

The sDA assessment is designed to understand how often each point of the room's task area sees illuminance levels at or above a specific threshold.

BS EN 17037 sets out minimum illuminance levels (300lx) that should be exceeded over 50% of the space for more than half of the daylight hours in the year. It also includes recommendations for medium and high daylighting levels within a space (500lx and 700lx respectively). It should be noted here, however, that these targets are specified irrespective of a space's use or design.

The National Annex suggests that these targets can be challenging to achieve within residential settings, particularly in areas of higher density and so suggests lower targets can be considered in this situation. It should be noted here that the reduced targets suggested within the BS EN 17037:2018 National Annex are provided so as to be comparable with the previous BR209's recommendations for ADF. These targets are:

- 100 lux for bedrooms
- 150 lux for living rooms
- 200 lux for living/kitchen/diners, kitchens, and studios.

It is however stated in paragraph C17 of the BRE that: *"Where a room has a shared use, the highest target should apply. For example in a bed sitting room in student accommodation, the value for a living room should be used if students would often spend time in their rooms during the day. Local authorities could use discretion here. For example, the target for*

a living room could be used for a combined living/dining/kitchen area if the kitchens are not treated as habitable spaces, as it may avoid small separate kitchens in a design”.

Daylight Factor method

This method involves calculating the median daylight factor on a reference plane (assessment grid).

“The daylight factor is the illuminance at a point on the reference plane in a space, divided by the illuminance on an unobstructed horizontal surface outdoors. The CIE standard overcast sky is used, and the ratio is usually expressed as a percentage.”

This method of assessments considers an overcast sky, and therefore the orientation and location of buildings is not relevant. In order to account for different climatic conditions, Annex A within the BS EN 17037 sets equivalent daylight factor targets (D) for various locations in Europe.

The median daylight factor (MDF) should meet or exceed the target daylight factor relative to a given illuminance for more than half of daylight hours, over 50% of the reference plane.

3.4 SUNLIGHT

The BRE provide guidance in respect of sunlight quality for new developments within section 3.1 of the handbook. It is generally acknowledged that the presence of sunlight is more significant in residential accommodation than it is in commercial properties, and this is reflected in the BRE document.

It states, “in housing, the main requirement for sunlight is in living rooms, where it is valued at any time of the day, but especially in the afternoon. Sunlight is also required in conservatories. It is viewed as less important in bedrooms and in kitchens where people prefer it in the morning rather than the afternoon.”

The BRE guide considers the critical aspects of orientation and overshadowing in determining the availability of sunlight at a proposed development site.

The guide proposes minimising the number of dwellings whose living room face solely north unless there is some compensating factor such as an appealing view to the north, and it suggests a number of techniques to do so. Furthermore, it discusses massing solutions with a sensitive approach to overshadowing, so as to maximize access to sunlight.

At the same time, it acknowledges that the site’s existing urban environment may impose orientation or overshadowing constraints which may not be possible to overcome.

To quantify sunlight access for interiors where sunlight is expected, it refers to the BS EN 17037 criterion that the minimum duration of sunlight exposure in at least one habitable room of a dwelling should be 1.5 h on March 21st. Table A.5 also establishes medium and high sunlight targets (3 and 4 hours).

This is to be checked at a reference point located centrally to the window’s width and at the inner surface of the aperture (façade and/or roof). For multiple apertures in different façades it is possible to cumulate the time of sunlight availability if not occurring at the same time. The reference point is minimum 1.2 m above the floor and 0.3 m above the window sill if present.

The summary of section 3.1 of the guide states as follows:

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

- *At least one main window faces within 90 degrees of due south, and*
- *a habitable room, preferably a main living room, can receive a total of at least 1.5 hours of sunlight on 21 March. This is assessed at the inside centre of the window(s); sunlight received by different windows can be added provided they occur at different times and sunlight hours are not double counted.. "*

3.5 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 and around buildings has an important impact on the overall appearance and ambience 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).*

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 that can receive two hours of sun on 21 March is less than 0.80 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.."

3.6 FURTHER RELEVANT INFORMATION

CIBSE LG 10 'Daylighting – a guide for designers'.

This guide details the process of designing for daylighting. It outlines considerations of form, orientation, and other aspects involved in designing the building envelope to optimise natural light.

The guidance in this document is written primarily for buildings located within the UK, and will be most applicable to projects in northern hemisphere. However, the principles are universal, and can be applied to other locations if the appropriate weather data is used and local standards and regulations are respected

4 SIMULATION ASSUMPTIONS

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.

Calculation model

The three dimensional representation of the proposed development has been modelled using the model and drawings prepared by Design Engine, received in August 2023. These have been placed in the context of their surrounding buildings which have been modelled from survey information, photogrammetry, OS and site photographs. This allows for a precise model, which ensures that the analysis accurately represents the amount of daylight and sunlight available to the building façades, internal and external spaces, considering all of the surrounding obstructions and orientation.

The weather file recorded at Gatwick Airport was considered the most relevant for this assessment.

Surfaces reflectance

The client and design team have confirmed that the following materials will be used within the proposed dwellings and as such, the associated reflectance's have been used within the assessment:

- Interior walls - White paint finish 0.7
- Ceilings - White paint finish 0.8
- Floors - Light timber veneer (or similar) 0.4

The reflectance value to be applied to surfaces in the computational modelling unspecified by the design team follows the BR 209 Annex C. Assumptions applied are:

- Exterior ground and external obstructions - 0.2

Assessment Grids

For the daylight assessments, an analysis 'grid' is located within each room at working plane height (850 mm from FFL) and offset by 0.3m from the walls as recommended by BR 209.

Grid points are spaced by 0.2m .

Assessment Resolution

The climate-based daylight assessments have been undertaken on an hourly basis, whilst the sunlight exposure assessment has been undertaken for every minute on the relevant days.

Glazing transmittance

A glazing visible light transmittance (VLT) of 65% has been used as in agreement with the wider design team. A framing factor has been taken from the 3D model supplied. Maintenance factors have been applied as per BR209 with 0.92 for windows not beneath an overhang and 0.76 for windows beneath an overhang.

The final transmittance values are shown in the table below.

GLAZING TYPE AND MAINTENANCE FACTORS:		TV(Normal)	FRAMING FACTOR	MAINT. FACTOR	TV(Total)
	Window type 1 - Not Sheltered	0.65	1	0.96	0.62
	Window type 2 - Sheltered	0.65	1	0.88	0.57
	Window type 3 - Not Sheltered	0.65	1	0.88	0.57

Table 01: Glazing type

4.1 MAINTENANCE FACTOR - WINDOW MAPS

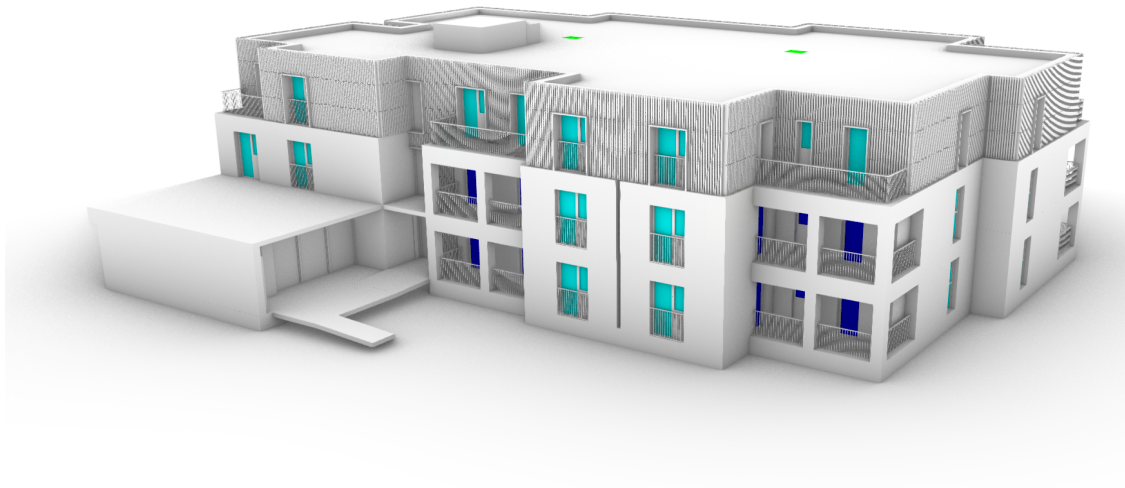


Fig. 01: North-east view

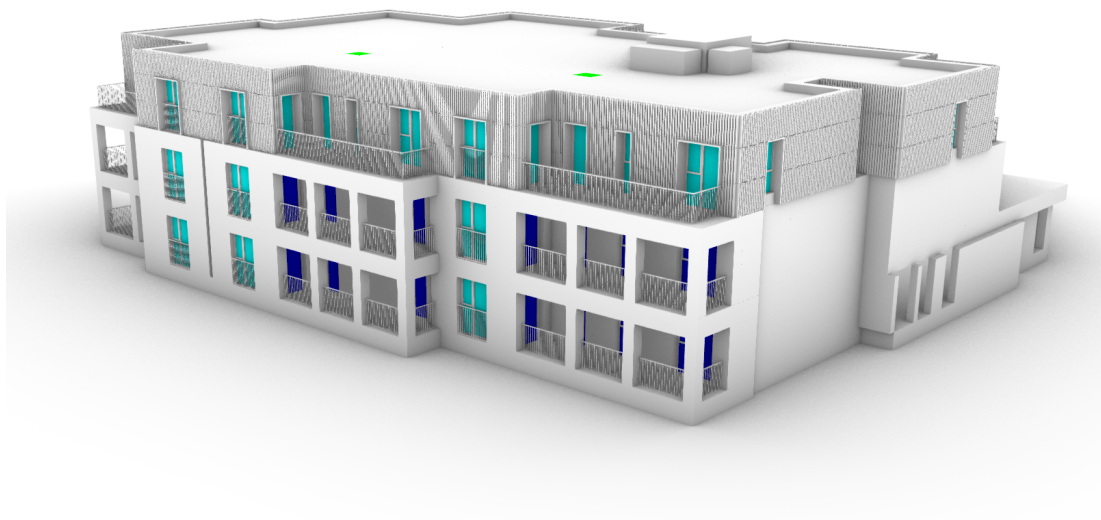


Fig. 02: South-west view



5 CONCLUSIONS

5.1 DESIGN EVOLUTION

GIA have worked alongside the design team to ensure that adequate levels of light are provided within the proposed accommodation overall.

GIA provided an initial review of the proposed layouts and advised on potential design solutions for internal arrangement and façade design to make the most of the daylight available on Site, such as:

- Reducing the depth of rooms to provide more uniform indoor light distribution
- Larger windows for the rooms with higher daylight requirements, i.e. living spaces
- Effect of balconies and daylight and the trade-off with the provision of private outdoor amenity space
- Adoption of lighter internal finishes to improve the daylight appearance of rooms
- Considerations on privacy, overlooking, noise, air-quality and overheating

Following the initial review, Design Engine architects prepared a set of drawings for all proposed units, which were fully tested by GIA. Multiple workshops have been held to discuss results together with the wider design team including, among others, the overheating consultant.

The design proved to be challenging in relation to overheating, especially when future climate files are considered to respond to climate change. The overheating constraints have resulted in the adoption of spandrel panels to the bottom of windows on the southern elevation and reduced glazing area throughout the scheme to reduce solar gains, both of which inherently influence the receipt of daylight.

A breakdown of the daylight, sunlight and overshadowing results is provided in the next section.

5.2 CONCLUSIONS ON DAYLIGHT

In order to ascertain the levels of daylight within the Proposed Development, all habitable rooms have been assessed based on the spatial daylight autonomy (sDA) methodology set out in the BRE guidelines BR209 and EN 17073:2008 including the relative UK National Annex.

The results given on pages 14-19 have shown that of the 49 proposed habitable rooms, 33 (67%) would see levels of sDA that either meet or exceed the BRE recommendation according to their room use. This figure considers 200 lux for combined Living/Kitchen/Dining spaces (LKDs) and 100 lux for bedrooms.

A further four LKDs and one bedroom would only fall slightly short of recommendation (i.e. seeing 200 lux and 100 lux respectively on more than 40% of their space for half the daylight hours in the year). A total of 38 (78%) rooms are therefore considered to offer acceptable daylight levels.

Of the rooms seeing lower levels of light, six are LKD's and five are bedrooms.

All six of the above LKDs would achieve 150 lux (the target for a living room) on more than 30% of their space, for half the daylight hours in the year. This represents about a third of the LKDs where the living zone is located, which if considered in isolation would be well daylight. Overall, all of the proposed open-plan LKDs are considered to offer adequate daylight levels.

The five bedrooms seeing lower levels of light are all provided with balconies which deliver access to valuable private outdoor amenity space. However, whilst balconies naturally reduce daylight ingress, they also help reduce overheating risk by acting as a shading device, and so this is considered an acceptable trade-off of amenities.

To conclude, the design sought to find a balance between daylight, overheating, noise, privacy, and air-quality. The majority of units are provided with good daylight amenity. In the instances where less daylight is available, it is mostly due to the effects of balconies which provide valuable private outdoor amenity space. When considered with the wider design team, it was acknowledged this design would reduce overheating risk, therefore the Proposed Development is considered to provide acceptable daylight amenity overall.

5.3 CONCLUSIONS ON SUNLIGHT

All habitable rooms have also been assessed for sunlight. The BRE guidance recommends that for a dwelling to appear reasonably sunlit:

- [criterion 1] at least one main window wall faces within 90 degrees of due south; and
- [criterion 2] a habitable room, preferably a main living room, can receive a total of at least 1.5 hours of sunlight on 21st March.

Once the assessments have been carried out per room, the results have then been interrogated for each unit.

Overall, out of all 17 units tested, 14 (82%) meet the first criterion, illustrating that the vast majority of units are provided with a southerly aspect.

These dwellings would also meet the second criterion, therefore receiving good levels of sunlight throughout the year.

Of the remaining three dwellings, these are served by windows which are not oriented within 90-degrees of due south. The orientation depends mostly on the Site's layout and means that access to sunlight is naturally more restricted.

The design has sought to minimise dwellings which have a predominately north aspect as much as practicable. Overall, we conclude that the proposed development makes the most of the available sunlight.

5.4 CONCLUSIONS ON OVERSHADOWING

As suggested by BRE, all relevant proposed public and communal open spaces have been assessed for overshadowing. The results from these assessments are shown on pages 20-23 of this report.

The communal open space has been tested according to the BRE's criteria of at least two hours of sunlight on more than 50% of the space, on the 21st March (equinox). In addition, sun exposure diagrams showing the number of hours available on 21st March and on 21st June have also been provided.

The vast majority (81%) of the communal open space sees two or more hours of sunlight at the equinox, exceeding the BRE recommendation of 50%. This offers future residents and visitors an excellently sunlit space to enjoy during spring. In the summer months the space would receive a greater amount of sunlight, seeing in excess of six hours for most of its area.

To conclude, the proposed communal open space will provide excellent sunlight amenity throughout the year.

6 SITE OVERVIEW

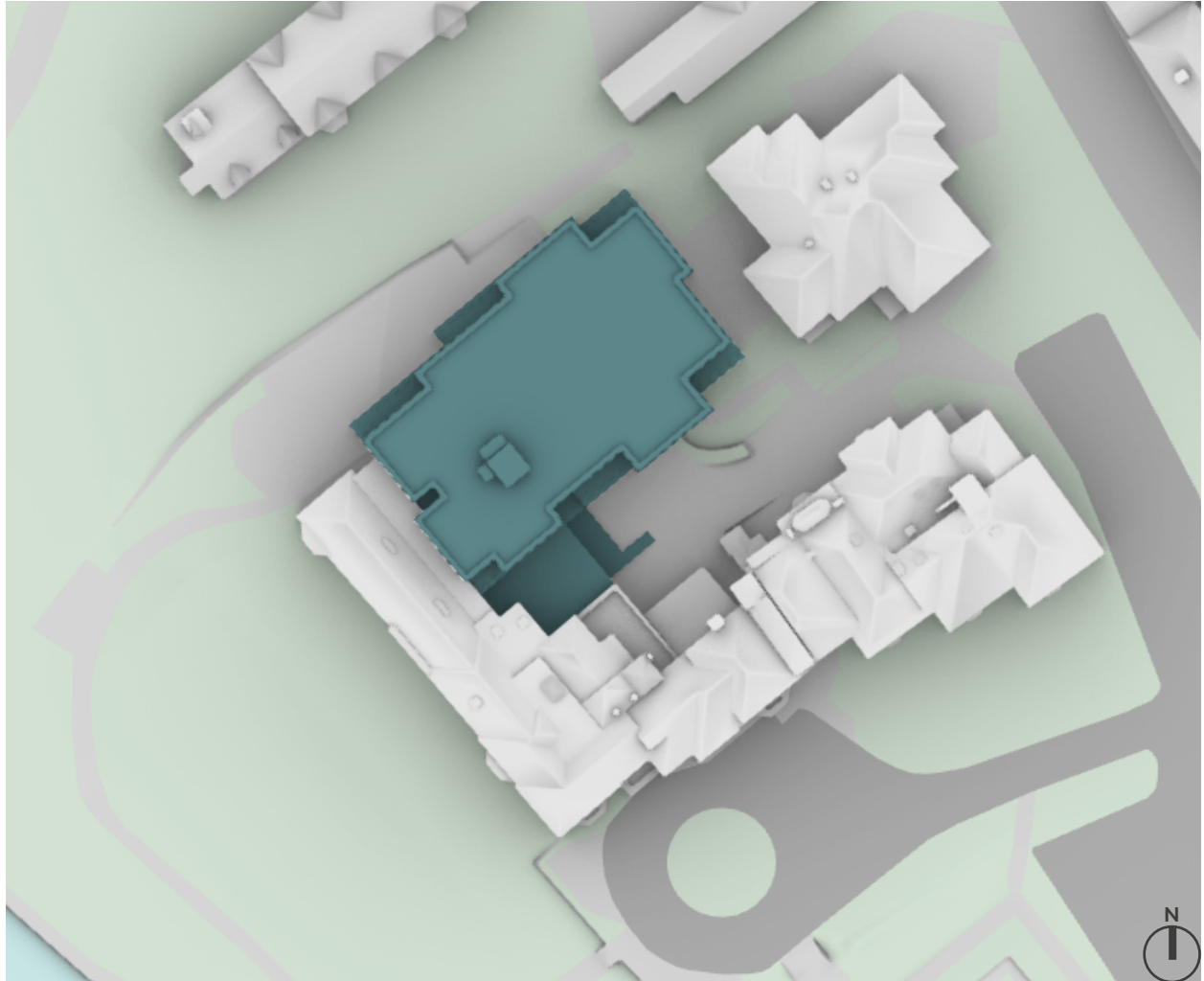


Fig. 03: Top view

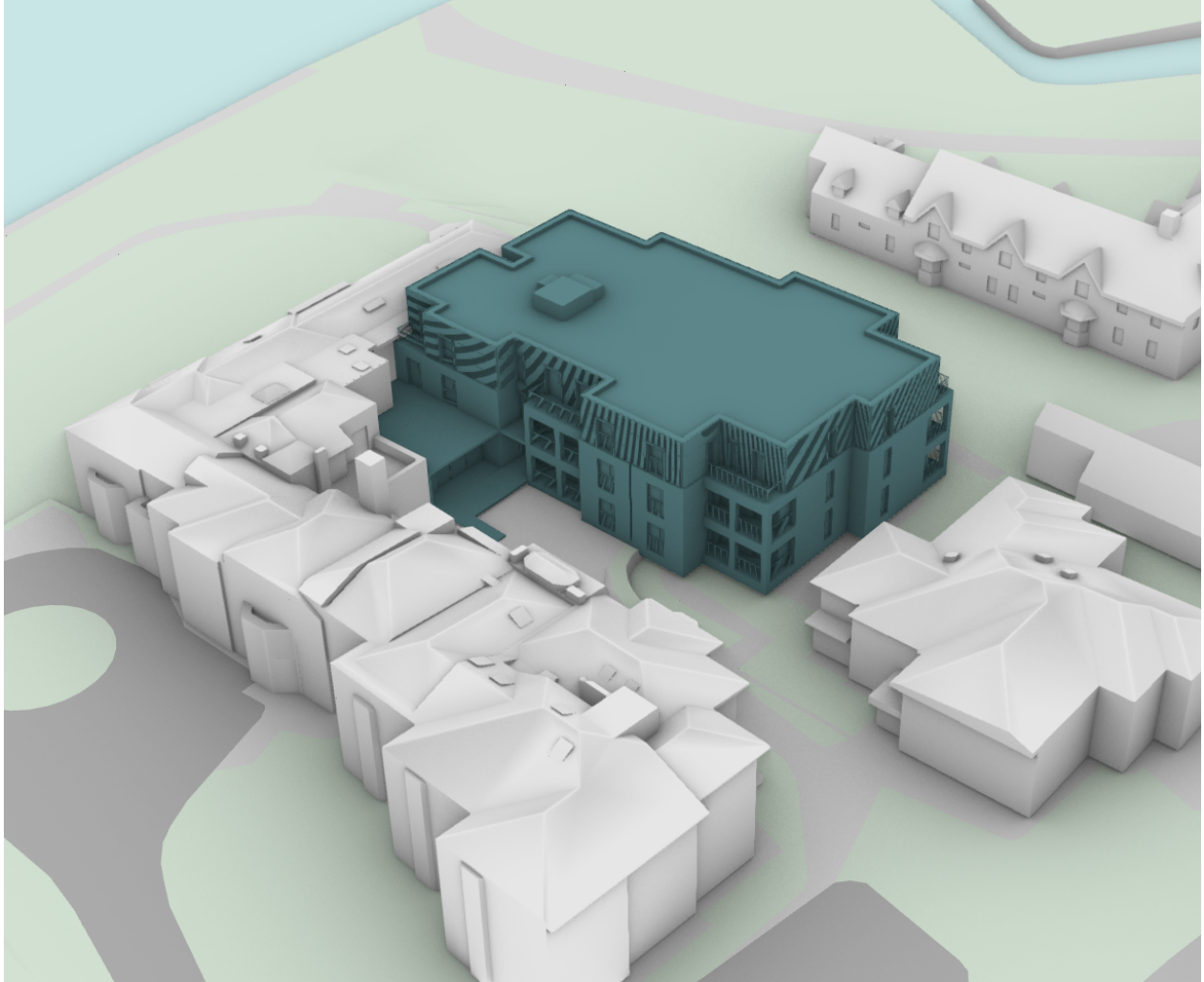


Fig. 04: Perspective view

7 INTERNAL SUNLIGHT ASSESSMENTS

Ground floor

		DAYLIGHT						SUNLIGHT		
ROOM REF.	ROOM USE	EN SPATIAL DAYLIGHT AUTONOMY percentage of room achieving target illuminance for 2190 hrs (50% of daylit hours) Weather File: GBR_Gatwick						HOURS:MIN		
		100	150	200	TARGET	RELEVANT ENSDA		1 FEB	25 FEB	21 MAR
THAMESFIELD - LEVEL 00										
1	BEDROOM	97.6	33.0	12.1	100	97.6		00:00	00:00	00:00
2	L/K/D	64.2	49.4	38.8	200	38.8		00:24	00:32	01:46
3	BEDROOM	74.5	35.2	19.0	100	74.5		00:00	00:00	00:06
4	BEDROOM	75.6	18.6	8.7	100	75.6		00:00	00:00	00:00
5	L/K/D	57.0	44.2	35.4	200	35.4		00:28	00:22	01:37
6	L/K/D	91.8	65.0	49.3	200	49.3		00:00	00:00	00:00
7	BEDROOM	26.2	11.8	5.9	100	26.2		00:00	00:00	00:00
8	BEDROOM	80.8	50.0	30.2	100	80.8		00:00	00:00	00:00
9	BEDROOM	48.8	28.0	19.6	100	48.8		00:00	00:00	00:00
10	BEDROOM	13.1	4.4	1.7	100	13.1		00:42	00:37	00:51
11	L/K/D	56.9	41.5	30.6	200	30.6		01:00	02:29	03:40
12	L/K/D	40.6	31.3	24.8	200	24.8		02:19	03:18	03:58
13	BEDROOM	14.2	3.2	0.0	100	14.2		00:47	00:43	00:47
14	BEDROOM	26.0	10.7	3.3	100	26.0		00:29	01:50	00:28
15	BEDROOM	72.1	36.8	18.2	100	72.1		00:00	00:00	00:06

Table 02: Assessment Data

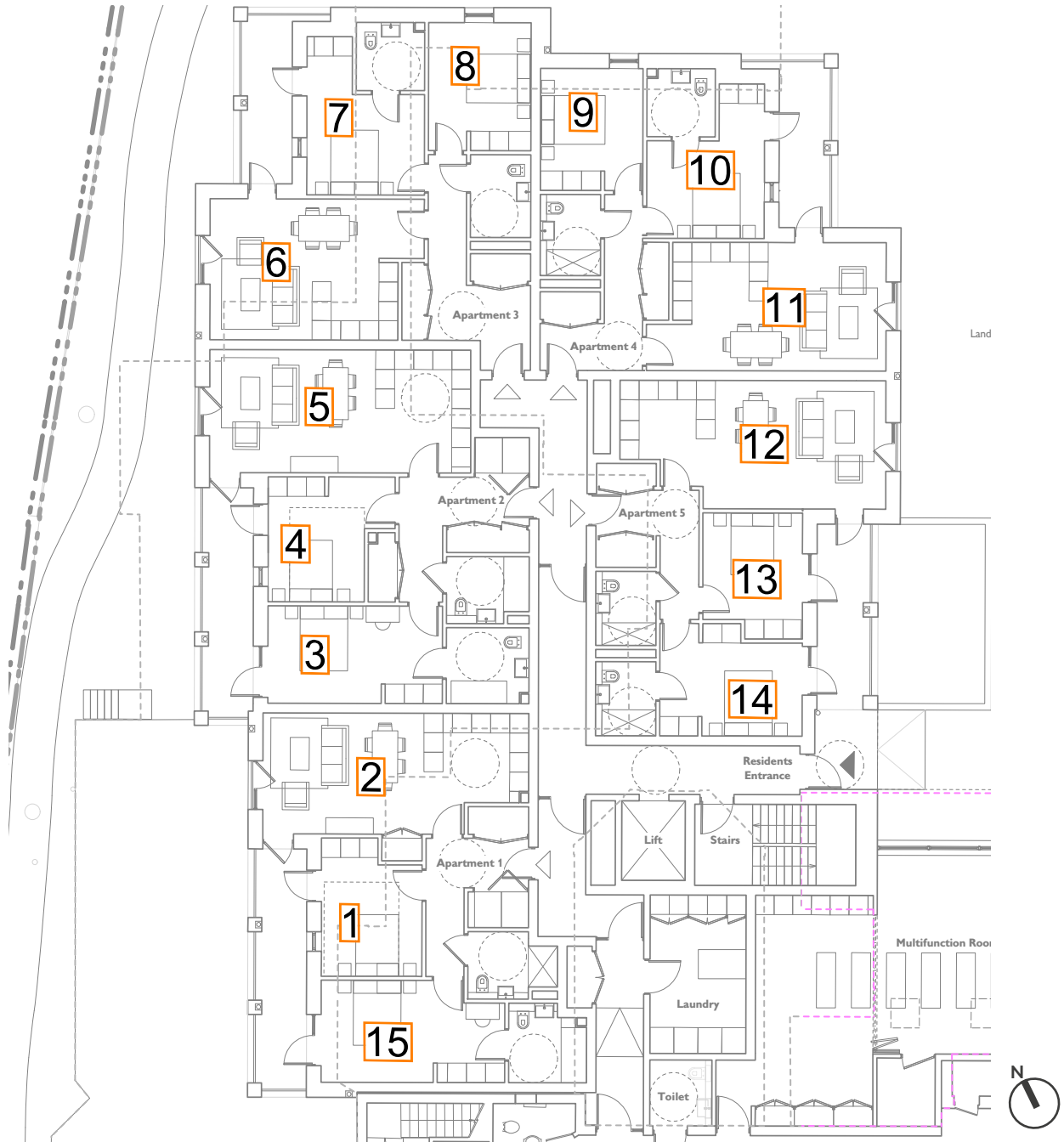


Fig. 05: Floor Plan



First floor

		DAYLIGHT						SUNLIGHT		
ROOM REF.	ROOM USE	EN SPATIAL DAYLIGHT AUTONOMY percentage of room achieving target illuminance for 2190 hrs (50% of daylight hours) Weather File: GBR_Gatwick						HOURS:MIN		
		100	150	200	TARGET	RELEVANT ENSDA		1 FEB	25 FEB	21 MAR
THAMESFIELD - LEVEL 01										
16	BEDROOM	81.8	53.2	26.0	100	81.8		00:00	00:00	00:06
17	BEDROOM	100.0	70.4	21.4	100	100.0		00:00	00:00	00:00
18	L/K/D	75.2	55.2	44.2	200	44.2		00:24	00:32	01:46
19	BEDROOM	87.5	52.8	28.2	100	87.5		00:00	00:00	00:06
20	BEDROOM	97.7	45.9	14.5	100	97.7		00:00	00:00	00:00
21	L/K/D	65.6	50.6	40.6	200	40.6		00:28	00:22	01:37
22	L/K/D	100.0	79.2	60.8	200	60.8		00:00	00:00	00:00
23	BEDROOM	54.4	18.1	11.4	100	54.4		00:00	00:00	00:00
24	BEDROOM	100.0	92.9	61.0	100	100.0		00:00	00:00	00:05
25	BEDROOM	97.0	64.3	37.5	100	97.0		00:00	00:00	00:26
26	BEDROOM	19.2	13.1	7.9	100	19.2		01:55	02:20	02:01
27	L/K/D	76.9	60.7	49.0	200	49.0		02:59	03:46	05:18
28	L/K/D	58.0	45.4	36.1	200	36.1		04:27	05:22	05:14
29	BEDROOM	60.5	20.5	6.8	100	60.5		01:44	02:20	01:31
30	BEDROOM	69.3	34.0	20.7	100	69.3		02:29	02:54	02:11
31	L/K/D	58.4	44.0	35.2	200	35.2		02:33	04:31	04:56
32	BEDROOM	69.9	50.0	36.2	100	69.9		00:00	01:08	05:01

Table 03: Assessment Data

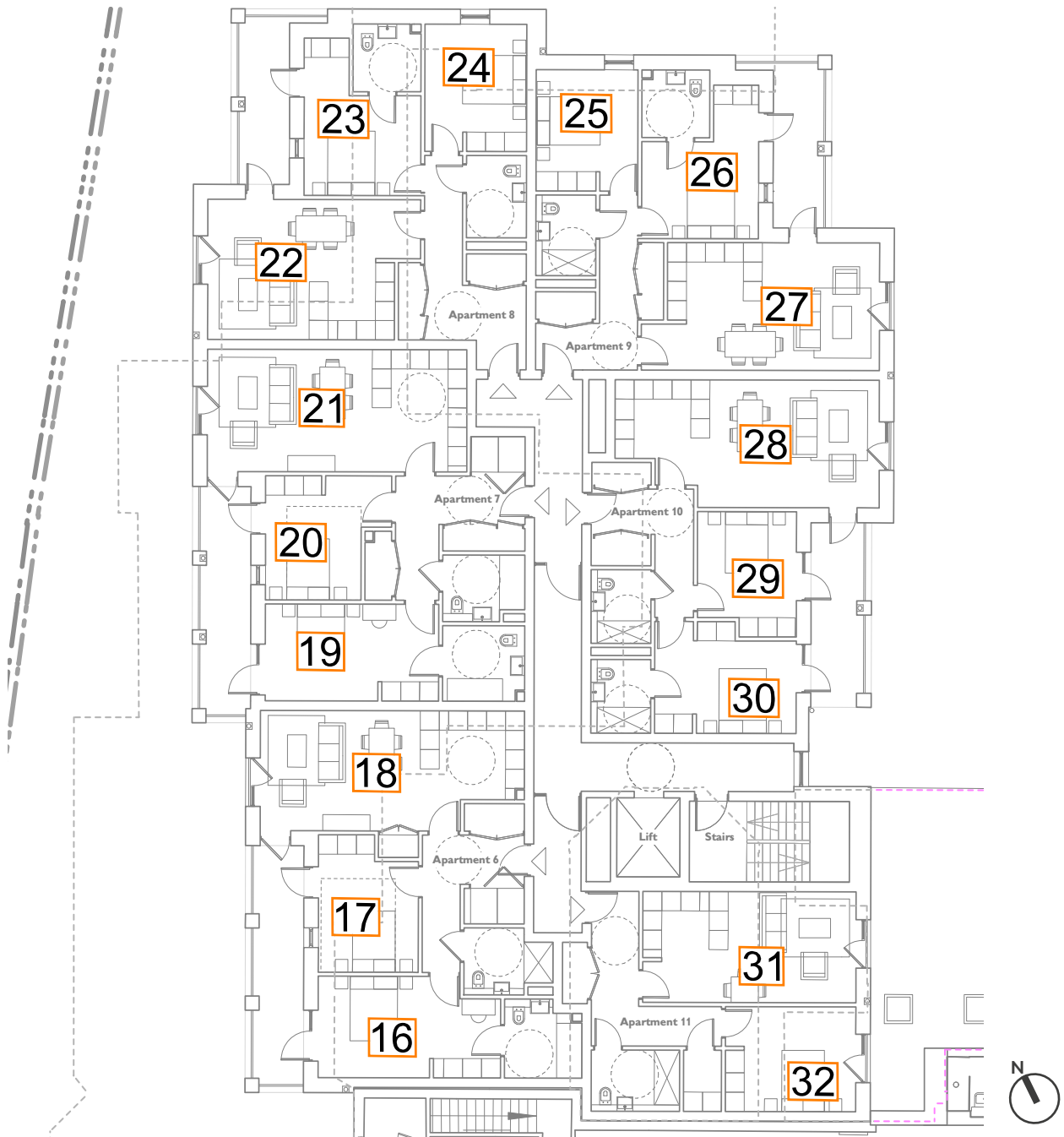


Fig. 06: Floor Plan



Second floor

		DAYLIGHT						SUNLIGHT		
ROOM REF.	ROOM USE	EN SPATIAL DAYLIGHT AUTONOMY percentage of room achieving target illuminance for 2190 hrs (50% of daylight hours) Weather File: GBR_Gatwick						HOURS:MIN		
		100	150	200	TARGET	RELEVANT ENSDA		1 FEB	25 FEB	21 MAR
THAMESFIELD - LEVEL 02										
33	BEDROOM	100.0	100.0	100.0	100	100.0		03:53	04:45	05:35
34	BEDROOM	100.0	100.0	100.0	100	100.0		00:00	00:00	00:00
35	L/K/D	100.0	100.0	100.0	200	100.0		06:50	10:18	11:56
36	BEDROOM	100.0	99.2	73.6	100	100.0		00:00	00:00	00:25
37	BEDROOM	100.0	100.0	99.5	100	100.0		00:00	00:00	00:00
38	L/K/D	100.0	100.0	99.2	200	99.2		08:50	10:19	11:53
39	L/K/D	100.0	98.0	75.0	200	75.0		00:00	00:00	00:18
40	BEDROOM	100.0	97.4	62.6	100	100.0		00:00	00:00	00:00
41	BEDROOM	100.0	100.0	77.6	100	100.0		00:00	00:00	00:00
42	BEDROOM	99.4	75.9	50.0	100	99.4		00:00	00:00	00:00
43	BEDROOM	100.0	89.5	54.8	100	100.0		03:50	05:00	04:38
44	L/K/D	100.0	83.0	67.5	200	67.5		04:54	05:13	05:51
45	L/K/D	83.4	64.4	52.2	200	52.2		07:11	08:03	08:19
46	BEDROOM	100.0	100.0	100.0	100	100.0		04:29	05:01	04:40
47	BEDROOM	100.0	100.0	100.0	100	100.0		04:12	05:01	05:25
48	L/K/D	100.0	83.1	62.7	200	62.7		08:26	08:44	08:31
49	BEDROOM	100.0	100.0	100.0	100	100.0		08:49	10:08	10:21

Table 04: Assessment Data

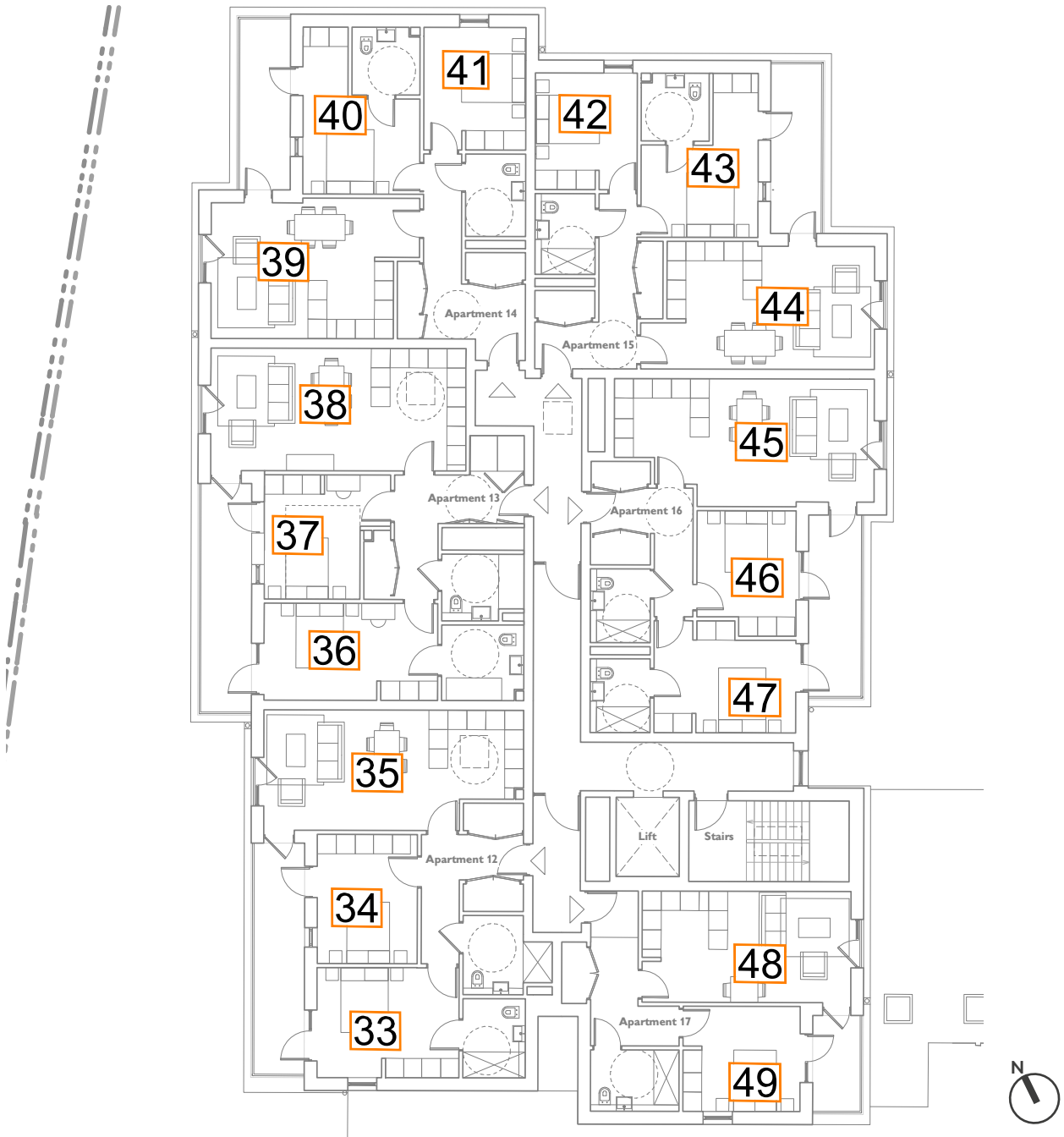


Fig. 07: Floor Plan



8 OVERSHADOWING ASSESSMENTS

OVERSHADOWING ASSESSMENT - OPEN SPACE SUN HOURS ON GROUND - BRE TEST



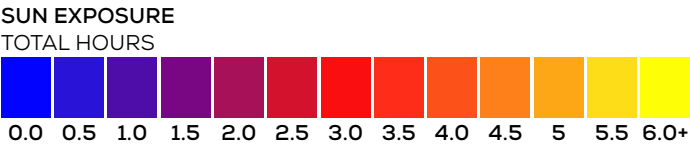
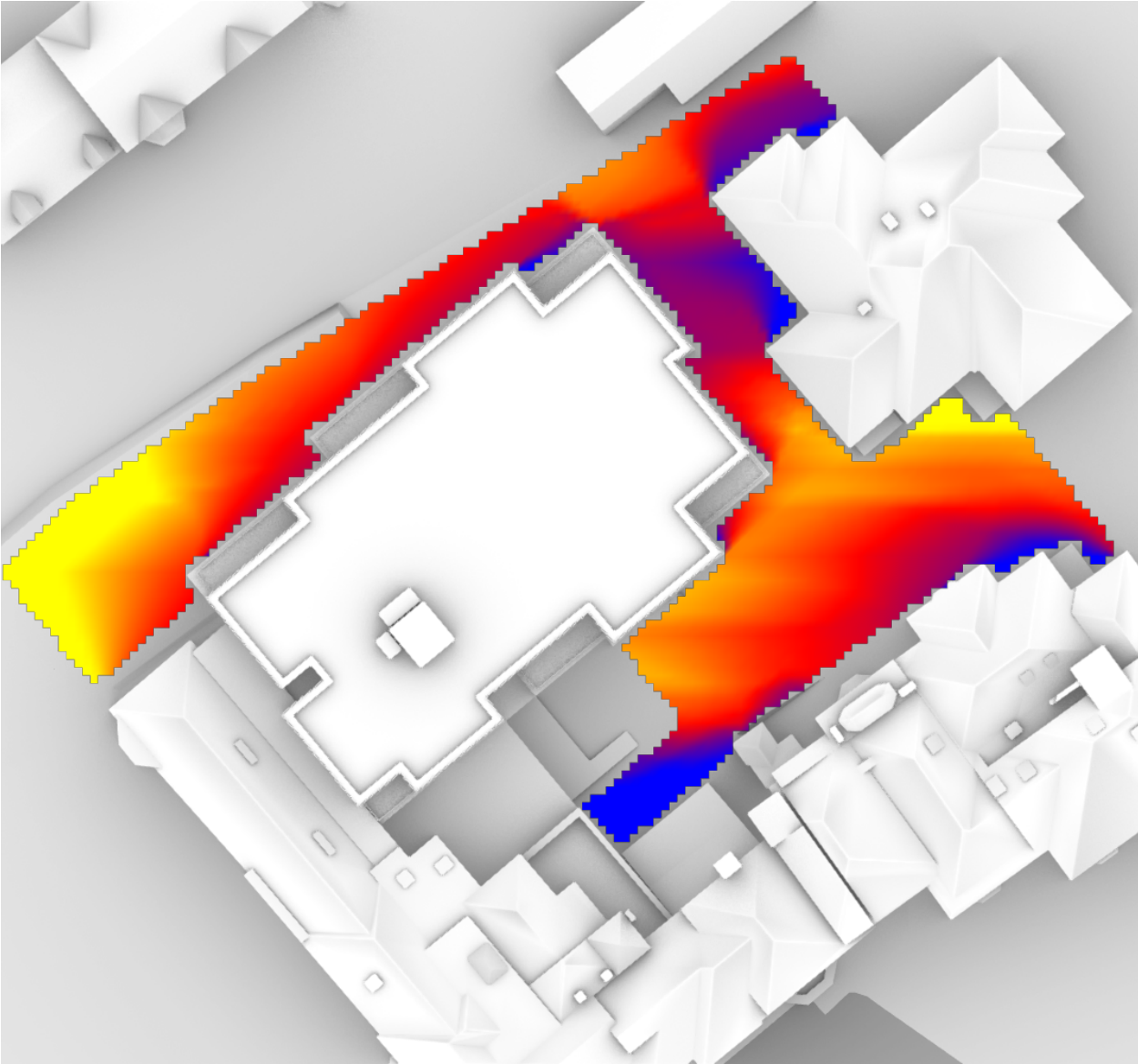
(BRE RECOMMENDS 2+ HOURS OF SUNLIGHT ON 21ST MARCH FOR AT LEAST 50% OF THE OPEN SPACE)
COMPLIANCE: 81%

SUN HOURS ON GROUND
BRE TEST - 21ST MARCH



INTENTIONALLY BLANK

OVERSHADOWING ASSESSMENT - OPEN SPACE
SUN EXPOSURE ON GROUND - 21ST MARCH (SPRING EQUINOX)

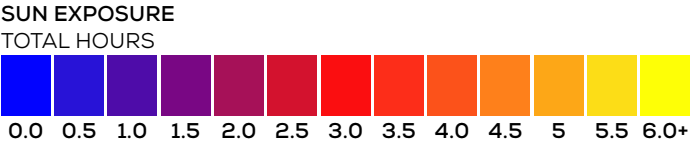


21ST MARCH
(SPRING EQUINOX)

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

Total Available Sunlight:
12hrs 12mins

OVERSHADOWING ASSESSMENT - OPEN SPACE
SUN EXPOSURE ON GROUND - 21ST JUNE (SUMMER SOLSTICE)



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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