Railpark West LRD, MAYNOOTH, CO. KILDARE

Daylight & Sunlight Assessment

Project Ref: 20872

Client: Maynooth Montane Developments

Date: 11/12/2025

BPC ENGINEERS

BUILDING PERFORMANCE CONSULTING

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P2-01	Draft Report for Comment	05/12/2025	JG	J.Gleeson (CEng MIEI, CMVP (AEE))
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P2-03	Final Report	10/12/2025	JG	J.Gleeson (CEng MIEI, CMVP (AEE))

Contents

Glossary

Illuminance
A measure of the amount of light falling on a surface, usually measured in lux.

Target illuminance (E_T)
Illuminance from daylight that should be achieved for at least half of annual daylight hours across a specified fraction of the reference plane in a daylit space.

Minimum target illuminance (E_{TM})
Illuminance from daylight that should be achieved for at least half of annual daylight hours across 95% of the reference plane in spaces with vertical and/or inclined daylight apertures.

Daylight factor (D)
Ratio of total daylight illuminance at a reference point on the working plane within a space to outdoor illuminance on a horizontal plane due to an unobstructed CIE standard overcast sky. Thus a 1% DF would mean that the indoor illuminance at that point in the space would be one hundredth the outdoor unobstructed horizontal illuminance.

Daylight, natural light
Part of global solar radiation capable of causing a visual sensation. (CIE, 2020) (Combined skylight and sunlight.)

No skyline
The outline on the working plane of the area from which no sky can be seen.

Obstruction Angle
The angular altitude of the top of an obstruction above the horizontal, measured from a reference point in a vertical plane in a section perpendicular to the vertical plane.

Skylight
Part of *diffuse* sky radiation capable of causing a visual sensation. (CIE, 2020)

Sunlight
Part of direct solar radiation capable of causing a visual sensation. (CIE, 2020)

Winter Probable Sunlight Hours (WPSH)
The long-term average of the total number of hours between the 21st of September and the 21st of March in which direct sunlight reaches the unobstructed ground (when clouds are considered).

Vertical Sky Component (VSC)
Ratio of that part of illuminance, at a point on a given vertical plane, that is received directly from a sky of assumed or known luminance distribution (usually CIE standard overcast sky), to illuminance on a horizontal plane due to an unobstructed hemisphere of this sky. Usually the 'given vertical plane' is the outside of a window wall. The VSC does not include reflected light, either from the ground or from other buildings.

Reference plane or working plane
Horizontal, vertical or inclined plane in which a visual task lies. Normally the working plane may be taken to be horizontal, 0.85 m above the floor in houses and factories, 0.7 m above the floor in offices.

Spatial Daylight Autonomy (sDA)
Spatial Daylight Autonomy (sDA) is a metric describing annual sufficiency of ambient daylight levels in interior environments. It is defined as the percent of an analysis area that meets a minimum daylight illuminance level for a specified fraction of the operating/daylight hours per year. The sDA value is expressed as a percentage of area.

1 Executive Summary

This report provides information on the daylight and sunlight analysis undertaken for the proposed Railpark West LRD, in the townland of Railpark, Maynooth, Co. Kildare.

The analysis and assessments in this report have been carried out in line with the recommendations of BRE's Site Layout Planning for Daylight and Sunlight, A Guide to Good Practice (BRE Building Technology Group, 2022) and BS EN 17037. These documents set out recognised best-practice approaches for evaluating daylight, sunlight and overshadowing.

In addition, the methodology has been prepared with regard to relevant national policy, including the Compact Settlement Guidelines 2024 and the Sustainable Urban Housing: Design Standards for New Apartments 2025 ("Apartment Guidelines 2025"). Both policy documents reaffirm the need for well-designed, higher-density residential development that achieves good environmental quality, including adequate daylight and sunlight access for future occupants, while recognising the different performance expectations in compact, urban locations.

The BRE Guide provides useful recommendations to ensure adequate levels of daylight and sunlight in the proposed development. However, it also has relevance to the potential impact of the proposed development on existing neighbouring dwellings. The Guidelines make it clear that levels of daylight and sunlight cannot be expected to be as high in dense urban or consolidated settlement locations as would be the case in suburban or rural ones. It should be noted that whilst widely used, these are guidelines and do not have a statutory or mandatory basis.

The impact analysis of the proposed development on existing surrounding buildings was completed, but the proposed development will not adversely affect:

- access to skylight,
- access to sunlight, and
- sunlight to gardens/open spaces.

In terms of internal daylight levels within the proposed development, the results show that 95% of all rooms meet or exceed the BRE's minimum recommendations for internal daylight provision in dwellings. For the small number of rooms that are slightly below the BRE recommendations, the design team has incorporated mitigation and compensatory measures, including enhanced private amenity space and the provision of high-quality communal open space for all residents. Therefore, the proposed development performs at a high level for a scheme of this scale and aligns with national policy objectives for high-quality and sustainable compact growth, as supported by the Compact Settlement Guidelines 2024 and Apartment Guidelines 2025.

To maximise available light, glazing to all habitable rooms is provided in excess of 20%. The design team have developed the proposed building using the principles of the BRE's Site Layout Planning for Daylight and Sunlight, A Guide to Good Practice.

In terms of the amenity spaces provided, the results show that the open spaces receive greater than two hours of sunlight on 21 March. The cumulative area of these spaces exceeds the recommended criteria for sunlight, and it should be noted that the total amenity area is in excess of the required area for a scheme of this nature.

Overall, the development has been designed with due consideration for sunlight and daylight and meets the recommendations set out in the BRE Guide – BR 209 (2022), while also aligning with the national planning policy direction outlined in the Compact Settlement Guidelines 2024 and the Apartment Guidelines 2025.

2 Introduction

Site layout planning to achieve good daylighting and sun lighting, within buildings and in the open spaces around them is an important aspect in designing new buildings or developments. Daylight animates an interior and makes it attractive and interesting, as well as providing light to work or read by. Good daylight and sunlight can contribute to making a building energy-efficient; they can reduce the need for electric lighting, while winter solar gain can reduce heating requirements.

This report provides information on the daylight and sunlight analysis undertaken for the proposed development.

Maynooth Montane Developments intend to apply for planning permission for Railpark West LRD, in the townland of Railpark, Maynooth, Co. Kildare.

The proposed development is for 139 no. units comprising 36 no. houses (ranging in heights up to 3 storeys), 95 no. apartments (5 no. blocks ranging in heights up to 5 storeys partially over podium parking) and 08 no. duplexes (1 no. 3/4 storey Block).

The proposal includes for a new vehicular/pedestrian/cyclist access from the permitted Maynooth Eastern Ring Road (MERR) to the east and the adjoining development to the South, and pedestrian/cyclist access (and vehicular access for one of the proposed houses) to Parklands Grove/Old Rail Park to the north of the site.

The development also includes all car and bicycle parking at surface and podium underdeck level, new streets and footpaths, bin stores, residential private open spaces, public & communal open spaces, boundary treatments, waste management areas, landscaping and all associated site development works.

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The analysis and assessments in this report have been carried in line with the recommendations of BRE's "Site Layout Planning for daylight and sunlight, a Guide to good practice" (BRE Building Technology Group, 2022) and BS EN 17037. The a forementioned BRE guide is also known as BRE Guide BR 209 and may be referenced as such or simply as the "BRE Guide" hereafter in this document.

This report will assess the proposed development's impact on daylight and sunlight to the existing buildings by the following means:

- Obstruction Angle Check (25-degree Line test)
- Vertical Sky Component (VSC)
- Sunlight to Gardens/Open Spaces

The report also assesses access to sunlight for the proposed development by means of sunlight to gardens/open spaces

Additionally, Appendix A provides shadow images for the proposed development.

3 Site Description

3.1 Location & Context

The site located to The Rail Park, Maynooth, Co. Kildare.

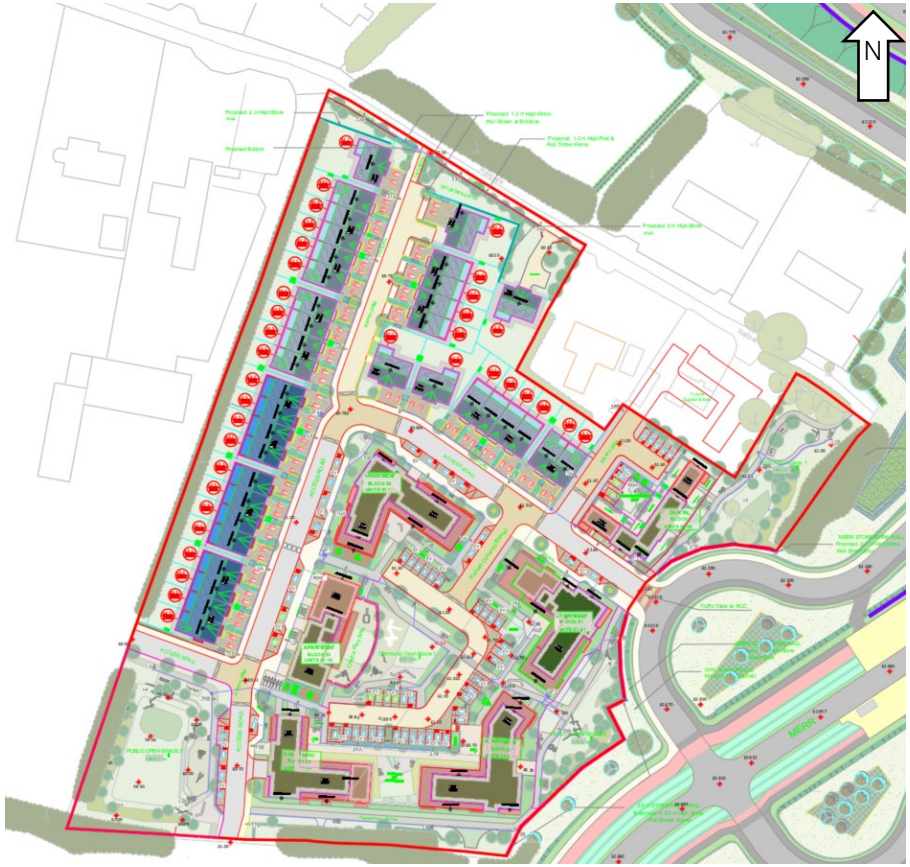


Figure 1: Site Plan of Railpark West LRD

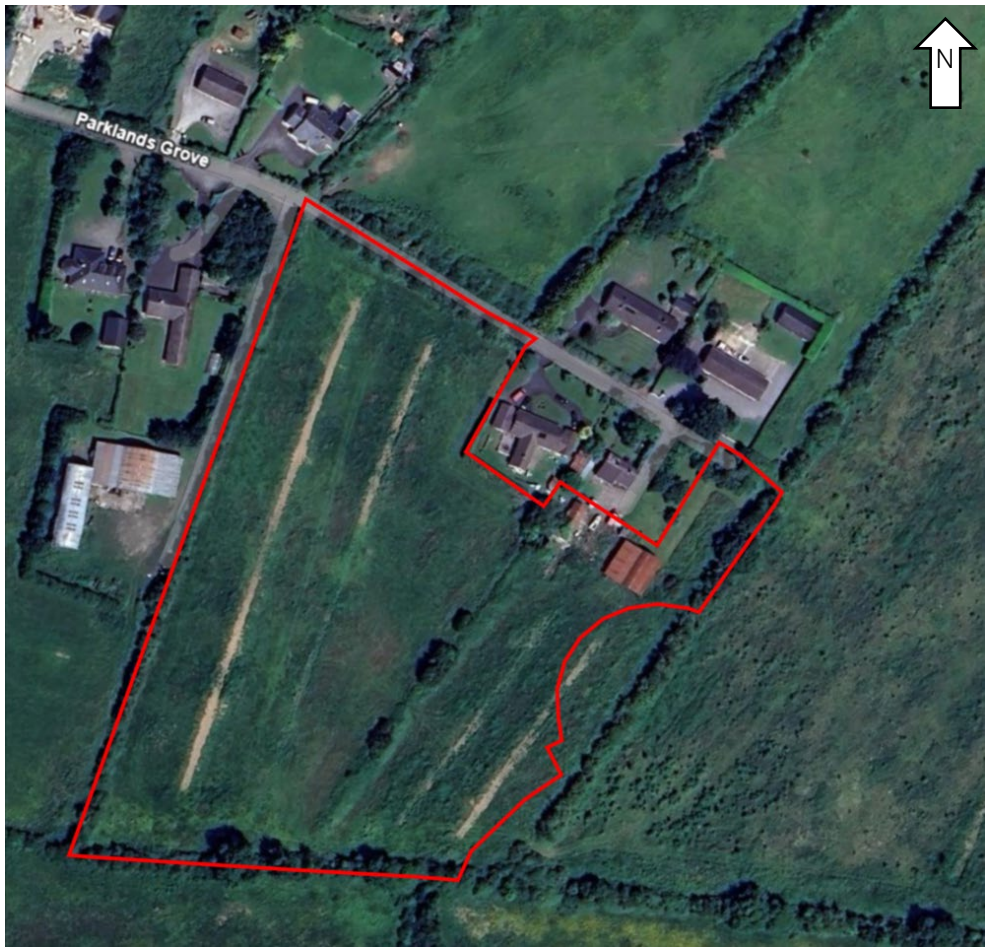


Figure 2: Aerial View of Site (Courtesy Google Maps) [Site boundary is only indicative. Refer to architectural drawings for accurate site boundary details.]

3.2 Proposed Development

The following images provide details of the proposed apartment and duplex blocks within the development.

Apartment Block 01 - North East Elevation
Scale 1:200

Apartment Block 01 - South West Elevation
Scale 1:200

Figure 3: Block-1 Elevation

Apartment Block 01 - South West Sectional Elevation
Scale 1:200

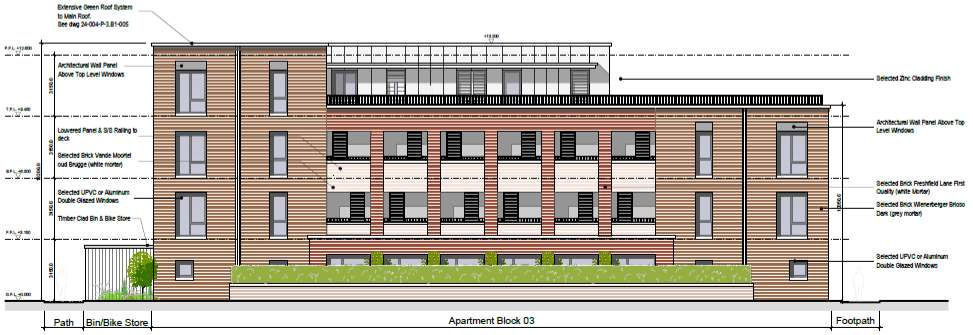
Apartment Block 01 - North West Sectional Elevation
Scale 1:200

Figure 4: Block-1 Section Elevation

Figure 5: Block-2 Elevation

Figure 6: Block-2 Section Elevation

Apartment Block 03 - West Elevation
Scale 1:200



Apartment Block 03 - East Elevation
Scale 1:200

Figure 7: Block-3 Elevation

Apartment Block 02 - South East Sectional Elevation

Apartment Block 02 - South West Sectional Elevation
Scale 1:200

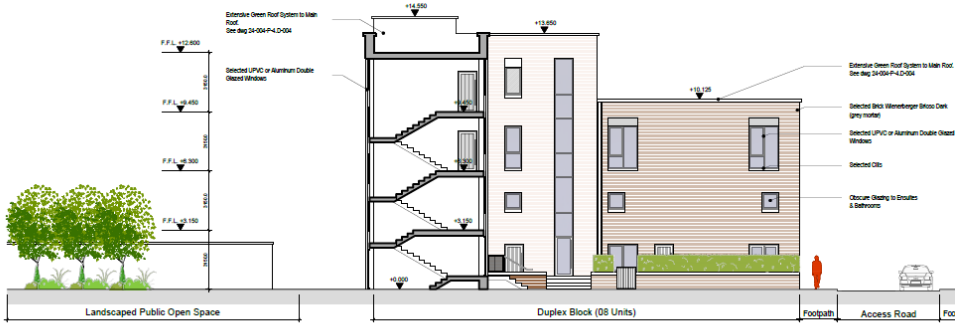
Figure 8: Block-3 Section Elevation

Figure 9: Block-4-5 Elevation

Figure 10: Block-4-5 Section Elevation

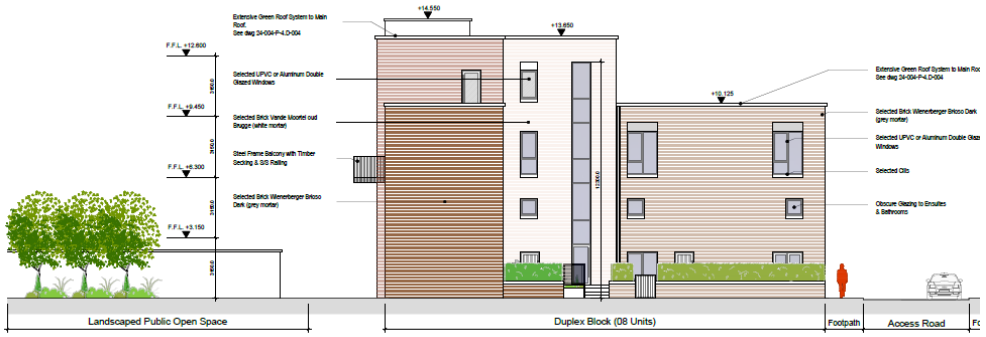
Duplex Block - West Sectional Elevation
Scale 1:200

Duplex Block - South Elevation
Scale 1:200



Duplex Block - North Sectional Elevation
Scale 1:200

Figure 11: Duplex Section Elevation



Duplex Block - North Elevation
Scale 1:200

Figure 12: Duplex Elevation

3.3 Sensitive Receptors

The BRE guide states that when assessing the potential effects of a proposed development on existing buildings, only those windows and rooms that have a 'reasonable expectation' of daylight and sunlight need to be considered. Windows and rooms which meet these criteria are considered to be 'sensitive receptors. Paragraph 2.2.2 of the BRE guide clarifies what are considered sensitive receptors with respect to sunlight and daylight as follows:

"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."

Outdoor amenity spaces which have a reasonable expectation of sunlight, whether they are private gardens, communal open spaces or outdoor public amenity areas, are also considered sensitive receptors.

Sensitive receptors that may be affected by the proposed development are highlighted in Table 1 below.

Table 1: Sensitive Receptors

Sensitive Receptors Image/Map	Legend
 (Background Image/Map credit: https://www.eircode.ie/)	Site Boundary Potential Sensitive Receptors Notes: 1. Properties highlighted in blue will not definitely be impacted by the proposed development.

4 Methodology & Assessment Criteria

The analyses and assessments are based on the guidelines set out in the BRE guide (BR 209) "Site Layout Planning for Daylight and Sunlight, A Guide to Good Practice" (BRE Building Technology Group, 2022). This guide is intended to be used in conjunction with interior lighting recommendations in BS EN 17037 Daylight in buildings, and in the CIBSE publication LG 10 Daylighting – a guide for designers.

It should also be noted that although the BRE guide gives numerical guidelines, "*these should be interpreted flexibly since natural lighting is only one of many factors in site layout design.*" (BRE Building Technology Group, 2022)

Advanced lighting simulation software is used to perform the analysis. The software combines 3D modelling capabilities with a suite of programs which employ advanced raytracing. The software fully meets all relevant guidelines set out in the BRE Guide BR209. The software has the ability to perform annual simulations based on hourly climatic data. This type of simulation is used for the assessment of internal daylight provision in new buildings (discussed in section 4.2.)

Throughout this report an effort will be made to differentiate between metrics used to assess skylight only, sunlight only or a combination of both - daylight. As defined in the glossary of the BRE Guide, "Daylight" is an umbrella term that includes both skylight and sunlight—the diffuse and direct components of light from the sky respectively. Unfortunately, the terms daylight and skylight are often used interchangeably but this report will aim to specify when daylight specifically refers to skylight or when it also encompasses sunlight.

The following sub-sections outline the methodology and assessment criteria used.

4.1 Existing Buildings

The impact of the proposed development on the existing buildings (sensitive receptors only) with respect to daylight is assessed using the following methodologies. The methodologies are grouped into sub-sections based on whether they are "Light from the sky" analysis or "Sun lighting" analysis.

4.1.1 Light from the Sky

4.1.1.1 Obstruction Angle Check

The BRE guide states that:

"Loss of light to existing windows need not be analysed if the distance of each part of the proposed development from the existing window is three or more times its height above the centre of the existing window. In these cases, the loss of light will be small." (BRE Building Technology Group, 2022)

Therefore, in Figure , if the distance s1 was at least 3 times greater than h1, loss of light to the existing windows would not need to be analysed.

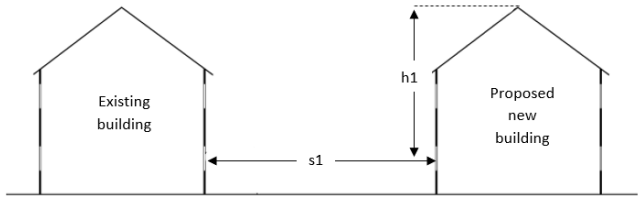


Figure 13: Spacing-to-Height Ratio

If the development is taller or closer than this, then the obstruction angle of the new development can be checked, where the obstruction angle is the angle subtended by the new development at the level of the centre of the lowest window in the existing building.

"If this angle is less than 25° for the whole of the development then it is unlikely to have a substantial effect on the diffuse skylight enjoyed by the existing building." (BRE Building Technology Group, 2022)

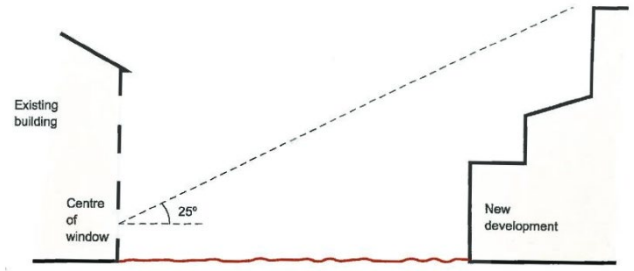


Figure 14: Obstruction Angle Check (25 Degree Line Test)

The obstruction angle is measured from the 3D CAD model. This check is suitable for existing windows where the proposed development is directly opposite an existing window, i.e. proposed development is cut by a vertical section drawn perpendicular to the window.

If, for any part of the new development, this angle is more than 25°, a more detailed check is needed to find the loss of skylight to the existing building. This may also be required in cases where the existing windows are not opposite the proposed development.

4.1.1.2 Vertical Sky Component (VSC)

Any reduction in the total amount of skylight for the existing properties can be calculated by finding the VSC at the centre of each main window. The Vertical Sky Component (VSC) is the ratio of the direct sky illuminance at the vertical reference point, to the simultaneous illuminance on an unobstructed horizontal plane. Reflected light is not included.

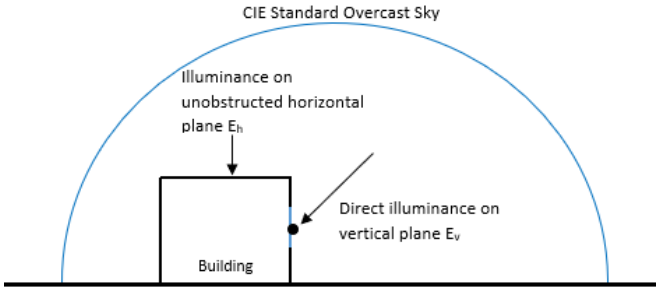


Figure 15: Vertical Sky Component

In the case of a floor-to-ceiling window such as a patio door, a point 1.6 m above ground (or balcony level for an upper storey) on the centre line of the window is used. The reference point is in the external plane of the window wall. Windows to bathrooms, toilets, storerooms, circulation areas and garages are not analysed.

Note that because the CIE standard overcast sky model is used, VSC is independent of orientation and location. (It is a *skylight* metric.)

The diffuse daylighting of any existing building may be adversely affected if:

"the VSC measured at the centre of an existing main window [or 1.6m above bottom of glazed door] is less than 27%, and less than 0.8 times its former value." (BRE Building Technology Group, 2022)

4.1.1.3 No Skyline

While VSC provides an indication of skylight availability, it does provide any information on the distribution of light within a space. In addition to external obstructions, the distribution of daylight within a space is dependent on window sizes and positioning, and room layouts. The no skyline divides points on the working plane which can and cannot see the sky.

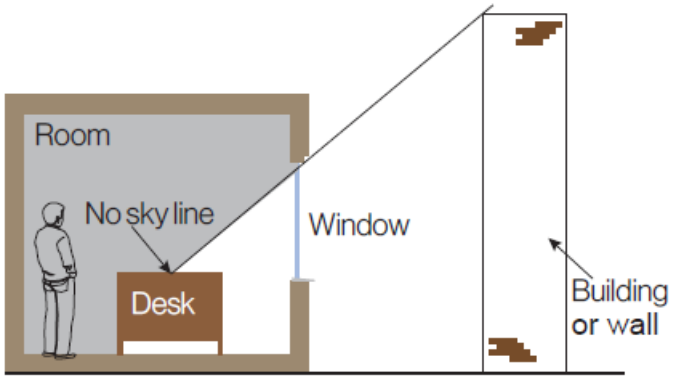


Figure 16: No Skyline [courtesy (BRE Building Technology Group, 2022)]

Areas beyond the no skyline, since they receive no direct daylight, usually look dark and gloomy compared with the rest of the room.

Where room layouts are known, the impact on the daylighting distribution in the existing building should be found by plotting the no skyline in each of the main rooms.

The diffuse daylighting of an existing building may be adversely affected if:

"the area of the working plane in a room which can receive direct skylight is reduced to less than 0.80 times its former value." (BRE Building Technology Group, 2022)

(Room layouts for neighbouring buildings are often not readily available, hence VSC is often the only analysis performed.)

4.1.2 Sun lighting

"In designing a new development or extension to a building, care should be taken to safeguard the access to sunlight both for existing dwellings, and for any nearby non-domestic buildings where there is a particular requirement for sunlight." (BRE Building Technology Group, 2022)

Obstruction to sunlight may become an issue if:

- Some part of a new development is situated within 90° of due south of a main window wall of an existing building.
- In the section drawn perpendicular to this existing window wall, the new development subtends an angle greater than 25° to the horizontal measured from the centre of the lowest window to a main living room.

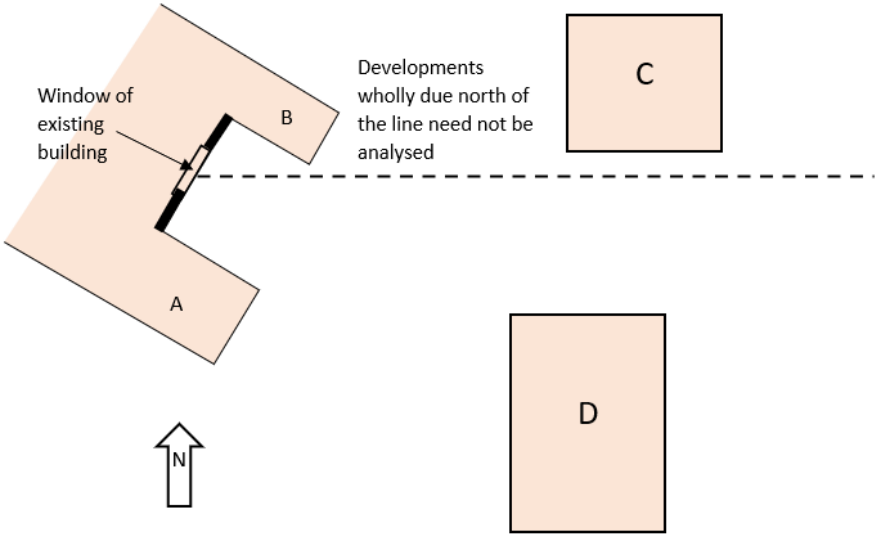


Figure 17: Sunlight Analysis Scenarios for Existing Buildings

No sunlight check is required on the existing window for proposed extension B and new building C, as they lie within 90° of due north of the window. The impact on sunlight to the existing window should be checked for proposed extension A, and new building D if it subtends more than 25° to the horizontal, measured in section from the centre of the window.

To assess loss of sunlight to an existing building, it is suggested that all main living rooms of dwellings, and conservatories, should be checked if they have a window facing within 90° of due south.

4.1.2.1 Probable Sunlight Hours

To calculate the loss of sunlight to an existing building over the year, the annual probable sunlight hours (APSH) metric can be used. "*Here 'probable sunlight hours' 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 (based on sunshine probability data). The sunlight reaching a window is quantified as a percentage of this unobstructed annual total.*" (BRE Building Technology Group, 2022)

Sunlight to an existing dwelling may be adversely affected if the centre of a main living room window (which faces within 90° of due south):

- receives less than 25% of annual probable sunlight hours (APSH) and less than 0.80 times its former annual value.
- or less than 5% of annual probable sunlight hours between 21 September and 21 March (often referred to as winter probable sunlight hours - WPSH) and less than 0.80 times its former value during that period.
- and has a reduction in sunlight received over the whole year greater than 4% of annual probable sunlight hours.

4.1.2.2 Basic Assessment

It is not always necessary to do a full calculation using Annual Probable Sunlight Hours APSH (section 4.1.2.1). The same "spacing-to-height ratio" and "obstruction angle" checks discussed in section 4.1.1.1 can be used to determine if a more detailed calculation is necessary or not. Additionally, depending on the VSC and orientation of the existing windows an APSH assessment may not be required. The recommendation for safeguarding sunlight to existing neighbouring buildings will be met if:

- *"the distance of each part of the new development from the existing window is three or more times its height above the centre of the existing window [see Figure] (note: obstructions within 90° of due north of the existing window need not count here).*
- *The window wall faces within 90° of due south and no obstruction, measured in the section perpendicular to the window wall, subtends an angle of more than 25° to the horizontal [Figure]. Again, obstructions within 90° of due north of the existing window need not be counted.*
- *The window wall faces within 20° of due south and the reference point has a VSC of 27% or more."* (BRE Building Technology Group, 2022)

4.1.3 Sunlight to Existing Gardens & Open Spaces

Good site layout planning for daylight and sunlight should not limit itself to providing natural lighting inside buildings. Sunlight in the spaces between buildings has an important impact on the overall appearance and ambience of a development.

"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." (BRE Building Technology Group, 2022)

4.1.3.1 Shadow Plots

The BRE guide states:

"Where a large building is proposed which may affect a number of gardens or open spaces it is often illustrative to plot a shadow plan showing the location of shadows at different times of day and year."

4.1.4 Impact Classification

Appendix H of the BRE Guide – "Environmental Impact Assessment" states that the impact of a new building on its surroundings can be classified as negligible, minor, moderate or major adverse. Where the loss of skylight or sunlight fully meets the guidelines in the BRE guide, the impact is assessed as negligible or minor adverse. Where the loss of skylight or sunlight does not meet the BRE guidelines, the impact is assessed as minor, moderate or major adverse.

Table 2 provides a more detailed description of the impact classification.

Table 2: Environmental Impact Assessment: Impact Classification

Negligible impact	• *Loss of light well within guidelines,* ***or*** • *only a small number of windows losing light (within the guidelines)* ***or*** • *limited area of open space losing light (within the guidelines)*

Minor adverse impact (a)	• *Loss of light only just within guidelines* ***and***
	  ○ *a larger number of windows are affected* ***or***
	  ○ *larger area of open space is affected (within the guidelines)*

Minor adverse impact (b)	• *only a small number of windows or limited open space areas are affected* • *the loss of light is only marginally outside the guidelines* • *an affected room has other sources of skylight or sunlight* • *the affected building or open space only has a low-level requirement for skylight or sunlight* • *there are particular reasons why an alternative, less stringent, guideline should be applied*
Major adverse impact	• *large number of windows or large open space areas are affected* • *the loss of light is substantially outside the guidelines* • *all the windows in a particular property are affected* • *the affected indoor or outdoor spaces have a particularly strong requirement for skylight or sunlight (living rooms / playground)*

A moderate adverse impact falls somewhere between the criteria for *"Minor Adverse Impact (b)"* and *"Major Adverse Impact"*.

4.2 New Buildings

The daylight provision was also checked for the proposed development.

4.2.1 Light from the Sky

Section 2.1.8 of the BRE Guide states that:

"Daylight provision in new rooms may be checked using either of the methods in BS EN 17037 Daylight in Buildings: direct prediction of illuminance levels using hourly climate data, or the use of the daylight factor (D)".

Both methods are measures of the overall amount of daylight in a space.

The daylight factor (D) method addresses daylight provision as a ratio of unobstructed external illuminance under overcast sky conditions. This method involves calculating the daylight factor (D) that would be exceeded over half of the room, i.e. the median daylight factor (this is not the same as the average daylight factor used in the previous standard, BS8206-2). The recommended daylight factor values are location specific. This method will not be discussed in any more detail in this report as the illuminance method is the preferred option.

4.2.1.1 Illuminance Method (Target Illuminance E_T)

The illuminance method "*involves using climatic data for the location of the site (via the use of an appropriate, typical or average year, weather file within the software) to calculate the illuminance from daylight at each point on an assessment grid on the reference plane at an at least hourly interval for a typical year."* (BRE Building Technology Group, 2022)

"A target illuminance (E_T) should be achieved across at least half of the reference plane in a daylit space for at least half of the daylight hours. Another target illuminance (E_{TM}) should also be achieved across 95% of the reference plane for at least half of the daylight hours; this is the minimum target illuminance to be achieved towards the back of the room." (BRE Building Technology Group, 2022)

(Note that since hourly climatic data is used based on the location of the site, location and orientation are accounted for. The target illuminance can therefore be considered a *daylight* metric, i.e. incorporating both skylight and sunlight.)

BS EN 17037 gives three levels of recommendation for daylight provision in interior spaces: minimum, medium and high. For compliance with the standard, a daylit space should achieve the minimum level of recommendation.

Table 3 gives the target illuminances for side lit rooms. Different targets, given in Table A2 of BS EN 17037, apply in spaces with horizontal rooflights.

Table 3: EN 17037 Target Illuminances

Level of recommendation	Target illuminance E_T (lx) for half of assessment grid	Target illuminance E_{TM} (lx) for 95% of assessment grid
Minimum	300	100
Medium	500	300
High	750	500

The guidance contained in BR 209 is intended to be used with BS EN 17037 and its UK National Annex. The UK National Annex gives specific minimum recommendations for habitable rooms in dwellings in the UK. Although Ireland adopted EN17037 directly as IS EN EN17037, it is expected that all councils in Ireland will adopt the UK National Annex recommendations. The Dubin City Council Development Plan 2022-2028 states:

"Is important to note that no amendments were made to [the IS EN 17037] document and unlike BS EN 17037, it does not contain a national annex. It offers only a single target for new buildings (there are no space-by-space targets – e.g. a kitchen would have the same target as a warehouse or office). […] These limitations make it unsuitable for use in planning policy or during planning applications. BR 209 must still be used for this purpose."

Even if a predominantly daylit appearance is not achievable for a room in a dwelling, the National Annex NA recommends that the target illuminance values given in Table 4 are exceeded over 50% of the points on a reference plane 0.85 m above the floor, for at least half of the daylight hours.

Table 4: BS EN 17037 NA Target Illuminances for dwellings

Room type	Target illuminance E_T (lx)
Bedroom	100
Living Room	150
Kitchen	200

Where one room in a dwelling serves more than a single purpose, it is recommended that the target illuminance is that for the room type with the highest value – for example, in a space that combines a living room and a kitchen the target illuminance is recommended to be 200 lx.

However, it is recommended that local authorities 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."* (BRE Building Technology Group, 2022). This may be appropriate in instances where small internal kitchens are unavoidable in apartment developments.

The minimum target illuminance level to be achieved across 95% of the reference plane within a space need not be applied to rooms in dwellings.

To avoid any confusion, the targets in Table 4 are those used for the purposes of this analysis.

The illuminance method is detailed and calculation intensive. It can take some time to process depending on the software, detail of the calculation model and the available computing power hence why the daylight factor (D) method may be preferred by some. However, it can provide additional information beyond the limits of the Daylight Factor method due to the use of hourly climate data.

There are a few ways the results of this type of analysis can be presented. One method is to report the % *area* of the reference plane exceeding the target illuminance E_T (for half of the daylight hours.) (This area should be greater than 50% to meet the BS EN 17037 recommendations.) This is equivalent to Spatial Daylight Autonomy (sDA). BR209 recommends reporting the median illuminance (exceeded over 50% of the reference plane) as this enables comparison with the different recommendations in BS EN 17037. It says that *"As an optional extra, the proportional area of the reference plane exceeding a particular target value may be presented".* It should be noted that the calculation methodology and results are the same in both instances. It is only the *presented* result that differs. For completeness, the results will be presented in both ways, i.e. both of the below metrics will be presented:

- The ***median illuminance*** (the illuminance exceeded over 50% of the reference plane).
- The ***% area*** of the reference plane exceeding a particular target illuminance (lux).

The settings used in the computational model for the illuminance calculations are outlined below:

- The reference/working plane is taken to be 0.85m above the floor.

The settings used in the computational model for the illuminance calculations are outlined below:

- The reference/working plane is taken to be 0.85m above the floor.
- The grid spacing is 0.1m.
- A band of 0.3m from the walls is excluded from the grid.

- Window frame factor is set to 20% (This is based on the size of the window openings and the area of the window which is framing.)
- The glazing transmittance (normal) was set to 0.70.
- The glazing maintenance factor is set to 96% (This accounts for the reduction in glazing transmittance due to dirt; 4% loss of daylight compared with clean glazing.)
- The illuminance calculations take account of light which has been reflected from both external and internal surfaces. In the absence of detailed information on surface reflectances the recommended default reflectances from BR209 2022 have been used. These are detailed in Table 5 below.

Table 5: Surface Reflectances

Surface Type	Reflectance
Interior walls	0.50
Floors	0.20
Ceilings	0.70
Exterior walls and obstructions	0.20
Exterior Ground	0.20

Table 6: Balcony Glazing Properties

Surface Type	Properties
Balcony Glazing	Transmittance: 0.80 Refractive Index: 1.52

4.2.2 Sun lighting

For interiors, access to sunlight can be quantified based on the methodology set out in BS EN 17037.

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

- *at least one main window wall faces within 90° 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.*

Where groups of dwellings are planned, site layout design should aim to maximise the number of dwellings with a main living room that meets the above recommendations." (BRE Building Technology Group, 2022)

There are 3 levels of recommendation provided in EN 17037 relating to sunlight to a room:

- 1.5 hours is the minimum level,
- 3 hours is the medium level, and
- 4 hours is the high level

For dwellings, as outlined above, at least one habitable room, preferably a main living room, should meet at least the minimum criterion.

4.2.3 Sunlight to Proposed Open Spaces

The BRE Guide recommends:

"*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.*"

The communal open spaces and amenity space are analysed and assessed against the above criterion.

5 Analysis

5.1 Overview of Computational Models

3D models of the existing the proposed scenarios were created. The site plans and 2D drawings provided by the architect were used to correctly position the surrounding buildings relative to the existing and proposed buildings.

3D models of the existing the proposed schemes were created. The existing and analysed (surrounding) models are based on 2D drawings provided by the architect supplemented by Google Street Maps and OS maps. The proposed model is based on the 2D CAD drawings provided by the architect:

In the following figures the building colours correspond to the following:

- Beige/buff elements represent the existing surrounding buildings that are analysed
- The blue elements are the buildings in the proposed development.

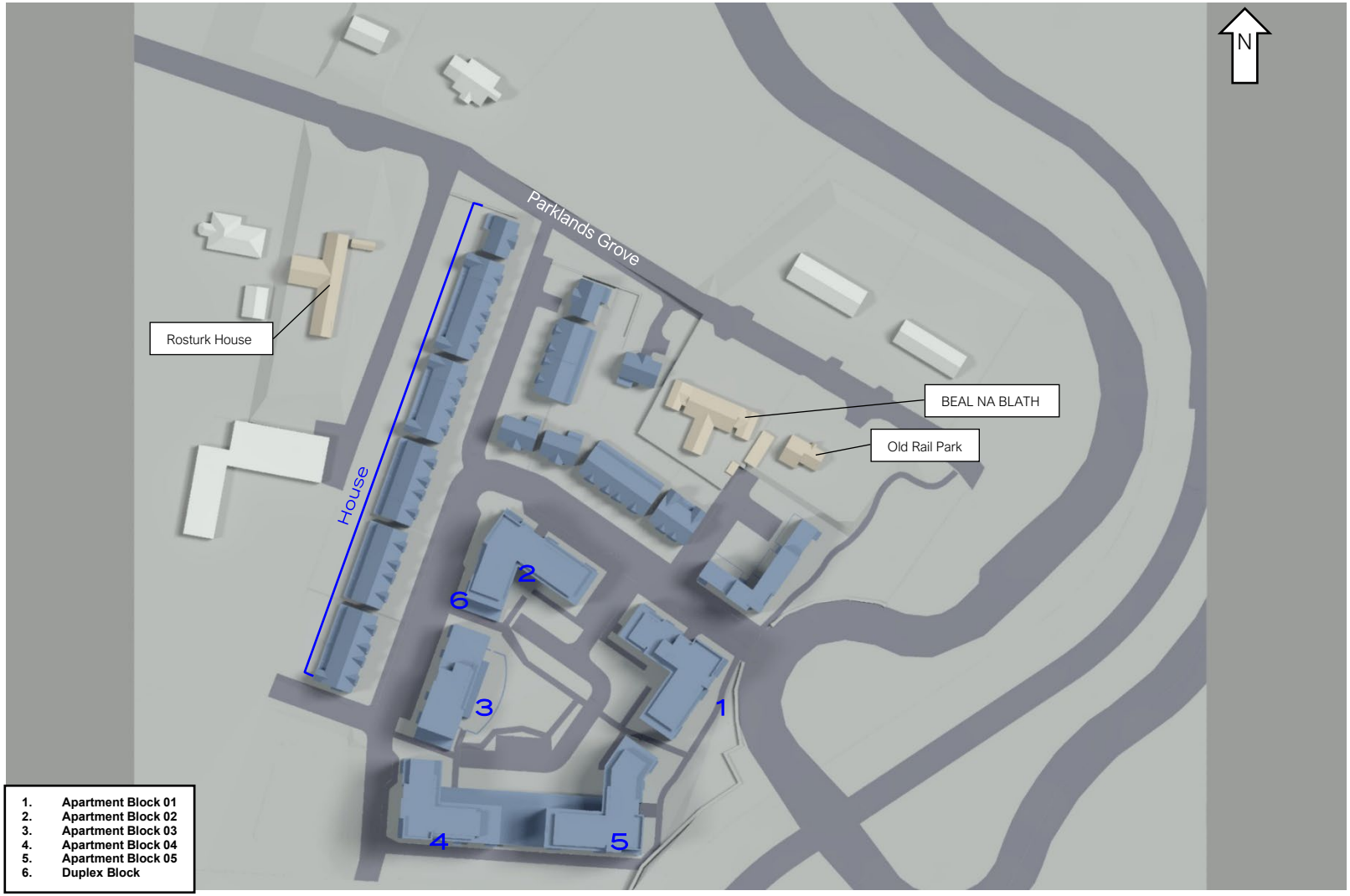


Figure 18: Proposed Model (Plan View)

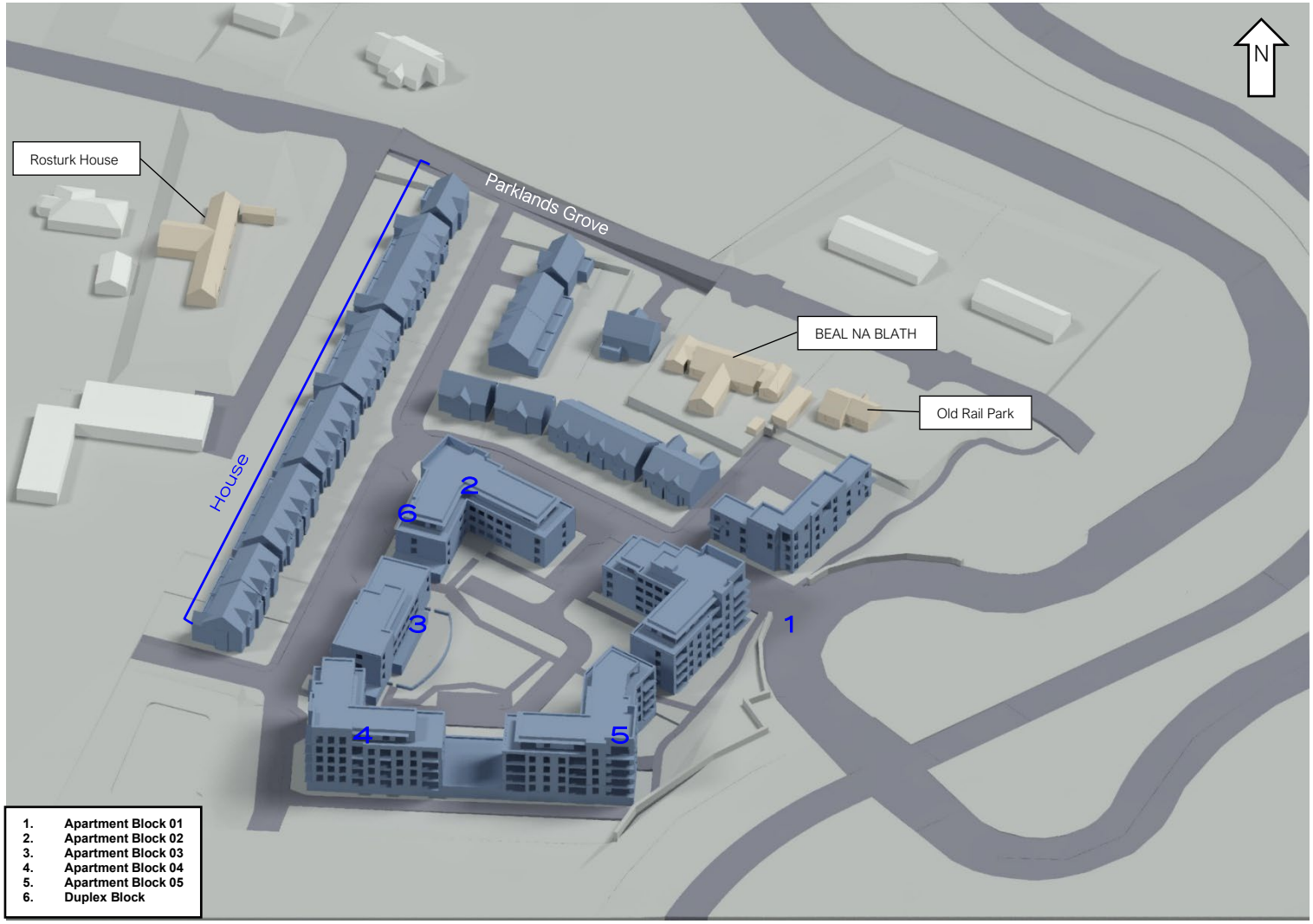


Figure 19: Proposed Model (Perspective view looking North)

5.2 Existing Buildings

5.2.1 25 Degree Line Test

The obstruction angle was checked for the closest properties to the site that have windows directly opposite the proposed development.

25-degree planes were drawn from the centre of the closest windows of the neighbouring properties. As these windows are the closest to the proposed development, if they are not adversely impacted, then it follows that the other adjacent neighbouring properties will not be adversely impacted.

The results for the "25-degree line test" are shown in the following figures. The 25-degree planes are shown in red.

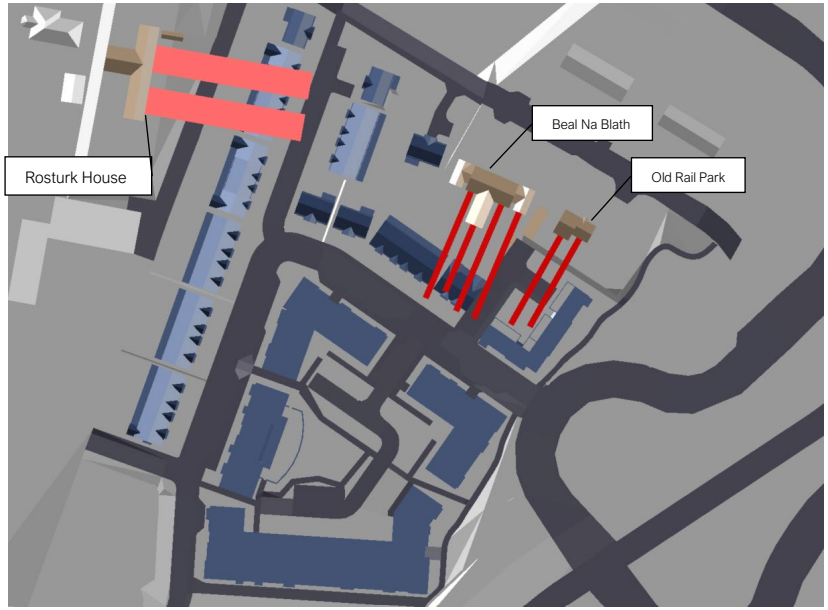


Figure 20: 25 Degree Planes Plan View

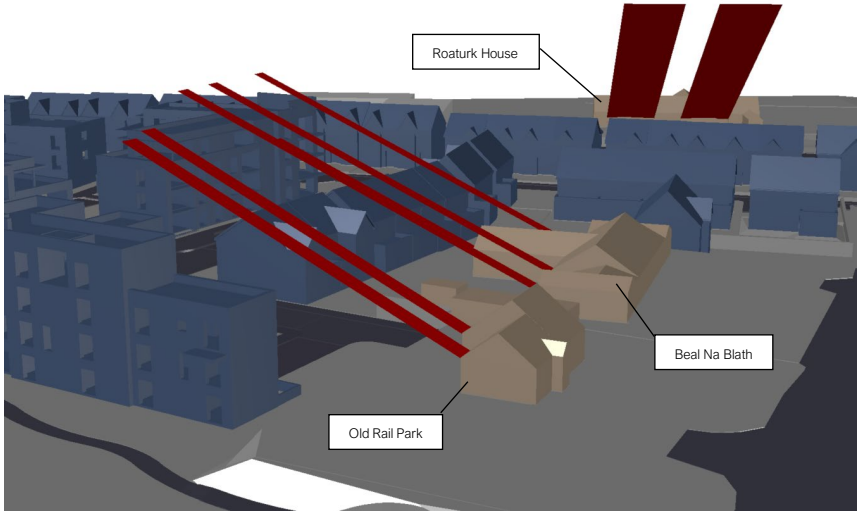


Figure 21: 25 Degree Planes Perspective View (looking from East)

The analysis shows that none of the 25-degree planes cut the proposed development. That is to say, the obstruction angle is less than 25 degrees for all of the properties/windows tested. Therefore, the proposed development will have a negligible impact on the skylight enjoyed by the existing neighbouring dwellings (See Table 1: Sensitive Receptors for building labels).

5.2.2 VSC Analysis

The 25-degree plane test shows that the development will have a negligible impact on the existing neighbouring houses. However, not all neighbouring properties are directly opposite the proposed development, so VSC analysis has been performed for the remaining neighbouring properties. These are labelled in Table 1: Sensitive Receptors as:

1. Rosturk House
2. Beal Na Blath House
3. Old Rail Park House

Some assumptions had to be made for window positions at the rear of these properties where information could not be gleaned from Google Street View or otherwise. Where assumptions must be made, multiple VSC points are spaced evenly across each facade facing the proposed development. The VSC points for each property are shown in the following figures.

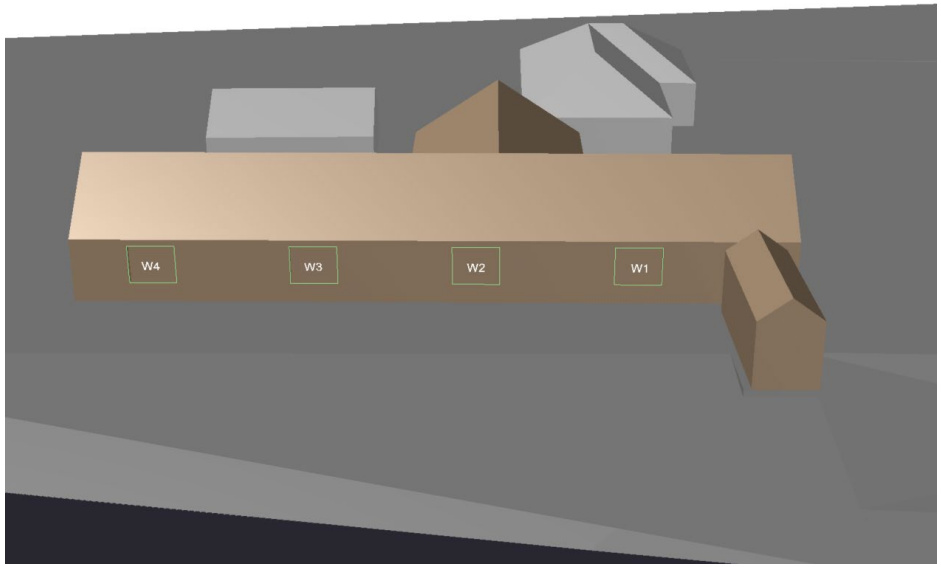


Figure 22: Rosturk House East view Old Rail Park

Figure 23: Beal Na Blath & Old Rail Park House Southwest view Old Rail Park

Table 7: VSC Results

Floor Ref.	Window Ref.		VSC	Pr/Ex	Meets BRE Criteria
OLD RAILPARK HOUSE					
Ground	W1	Existing	39.35	0.86	YES
		Proposed	33.86		
	W2	Existing	37.44	0.87	YES
		Proposed	32.59		
BEAL NA BLATH HOUSE					
Ground	W1	Existing	34.82	0.92	YES
		Proposed	32.14		
	W2	Existing	39.61	0.84	YES
		Proposed	33.12		
	W3	Existing	35.39	0.91	YES
		Proposed	32.14		
	W4	Existing	37.51	0.90	YES
		Proposed	33.91		
ROSTURK HOUSE					
Ground	W1	Existing	36.62	0.94	YES
		Proposed	34.36		
	W2	Existing	38.96	0.94	YES
		Proposed	36.45		
	W3	Existing	39.28	0.93	YES
		Proposed	36.58		
	W4	Existing	39.34	0.93	YES
		Proposed	36.43		

Table 8: VSC Summary Results

Property	Number of Windows Tested	Windows that meet BRE Guidelines	
		No.	%
OLD RAILPARK House	2	2	100%
BEAL NA BLATH House	4	4	100%
ROSTURK HOUSE	4	4	100%
Total	**10**	**10**	**100%**

All windows tested have VSC values greater than 27% with the proposed development in place. Therefore, these windows will still receive adequate amounts of skylight after the proposed development is built and the impact to all windows will be negligible.

The results meet the recommendations of the BRE Guide and show that the proposed development will have a negligible impact on skylight to the neighbouring dwelling

5.3 Proposed Development

5.3.1 Daylight Analysis for Proposed Development

The daylight provision in the apartments and duplex units in the proposed development was checked using the target illuminance (E_T) method. The results are presented in the following tables.

Floor Ref	Room Ref	Room Use	Median Lux	% of Area Meeting Req Lux	Req Lux	Req % of Effective Area	Req % of Daylight Hours	Daylight Hours	Meets Criteria
APT Block 1									
Ground	R1	LKD	283	70%	200	50%	50%	4380	YES
	R2	Bedroom	189	99%	100	50%	50%	4380	YES
	R3	LKD	115	24%	200	50%	50%	4380	NO
	R4	Bedroom	112	54%	100	50%	50%	4380	YES
	R5	Bedroom	150	72%	100	50%	50%	4380	YES
	R6	LKD	349	88%	200	50%	50%	4380	YES
	R7	Bedroom	243	100%	100	50%	50%	4380	YES
	R8	LKD	201	50%	200	50%	50%	4380	YES
	R9	Bedroom	309	100%	100	50%	50%	4380	YES
	R10	Bedroom	321	100%	100	50%	50%	4380	YES
	R11	Bedroom	300	100%	100	50%	50%	4380	YES
	R12	LKD	347	88%	200	50%	50%	4380	YES
	R13	Bedroom	251	100%	100	50%	50%	4380	YES
	R14	Bedroom	310	100%	100	50%	50%	4380	YES
First	R1	LKD	339	81%	200	50%	50%	4380	YES
	R2	Bedroom	213	100%	100	50%	50%	4380	YES
	R3	LKD	146	33%	200	50%	50%	4380	NO
	R4	Bedroom	151	67%	100	50%	50%	4380	YES
	R5	Bedroom	196	92%	100	50%	50%	4380	YES
	R6	LKD	451	100%	200	50%	50%	4380	YES
	R7	Bedroom	283	100%	100	50%	50%	4380	YES
	R8	LKD	234	59%	200	50%	50%	4380	YES
	R9	Bedroom	340	100%	100	50%	50%	4380	YES
	R10	Bedroom	348	100%	100	50%	50%	4380	YES
	R11	Bedroom	322	100%	100	50%	50%	4380	YES
	R12	LKD	382	97%	200	50%	50%	4380	YES
	R13	Bedroom	273	100%	100	50%	50%	4380	YES
	R14	Bedroom	338	100%	100	50%	50%	4380	YES

Table 9: Illuminance Results – Apartment Block 1 Ground & First Floor

Floor Ref	Room Ref	Room Use	Median Lux	% of Area Meeting Req Lux	Req Lux	Req % of Effective Area	Req % of Daylight Hours	Daylight Hours	Meets Criteria
APT Block 1									
Second	R1	LKD	404	92%	200	50%	50%	4380	YES
	R2	Bedroom	233	100%	100	50%	50%	4380	YES
	R3	LKD	177	44%	200	50%	50%	4380	NO
	R4	Bedroom	184	83%	100	50%	50%	4380	YES
	R5	Bedroom	237	100%	100	50%	50%	4380	YES
	R6	LKD	486	100%	200	50%	50%	4380	YES
	R7	Bedroom	268	100%	100	50%	50%	4380	YES
	R8	LKD	242	61%	200	50%	50%	4380	YES
	R9	Bedroom	348	100%	100	50%	50%	4380	YES
	R10	Bedroom	355	100%	100	50%	50%	4380	YES
	R11	Bedroom	328	100%	100	50%	50%	4380	YES
	R12	LKD	398	99%	200	50%	50%	4380	YES
	R13	Bedroom	288	100%	100	50%	50%	4380	YES
	R14	Bedroom	367	100%	100	50%	50%	4380	YES
Third	R1	LKD	787	100%	200	50%	50%	4380	YES
	R2	Bedroom	297	100%	100	50%	50%	4380	YES
	R3	Bedroom	346	100%	100	50%	50%	4380	YES
	R4	Bedroom	268	100%	100	50%	50%	4380	YES
	R5	LKD	509	100%	200	50%	50%	4380	YES
	R6	Bedroom	298	100%	100	50%	50%	4380	YES
	R7	LKD	295	68%	200	50%	50%	4380	YES
	R8	Bedroom	353	100%	100	50%	50%	4380	YES
	R9	Bedroom	360	100%	100	50%	50%	4380	YES
	R10	Bedroom	335	100%	100	50%	50%	4380	YES
	R11	LKD	461	100%	200	50%	50%	4380	YES
	R12	Bedroom	301	100%	100	50%	50%	4380	YES

Table 10: Illuminance Results – Apartment Block 1Second &Third Floor

Floor Ref	Room Ref	Room Use	Median Lux	% of Area Meeting Req Lux	Req Lux	Req % of Effective Area	Req % of Daylight Hours	Daylight Hours	Meets Criteria
APT Block 1									
Fourth	R1	Bedroom	341	100%	100	50%	50%	4380	YES
	R2	LKD	707	100%	200	50%	50%	4380	YES
	R3	Bedroom	369	100%	100	50%	50%	4380	YES
	R4	Bedroom	392	100%	100	50%	50%	4380	YES
	R5	Bedroom	215	100%	100	50%	50%	4380	YES
	R6	Bedroom	361	100%	100	50%	50%	4380	YES
	R7	LKD	961	100%	200	50%	50%	4380	YES

Table 11: Illuminance Results – Apartment Block 1 Fourth

Floor Ref	Room Ref	Room Use	Median Lux	% of Area Meeting Req Lux	Req Lux	Req % of Effective Area	Req % of Daylight Hours	Daylight Hours	Meets Criteria
APT Block 2									
Ground	R1	LKD	187	45%	200	50%	50%	4380	NO
	R2	Bedroom	214	100%	100	50%	50%	4380	YES
	R3	Bedroom	161	70%	100	50%	50%	4380	YES
	R4	LKD	198	48%	200	50%	50%	4380	NO
	R5	Bedroom	228	98%	100	50%	50%	4380	YES
	R6	LKD	343	84%	200	50%	50%	4380	YES
	R7	Bedroom	189	97%	100	50%	50%	4380	YES
	R8	LKD	150	36%	200	50%	50%	4380	NO
	R9	Bedroom	227	100%	100	50%	50%	4380	YES
	R10	Bedroom	158	70%	100	50%	50%	4380	YES
	R11	Bedroom	210	100%	100	50%	50%	4380	YES
	R12	LKD	283	69%	200	50%	50%	4380	YES
	R13	Bedroom	314	100%	100	50%	50%	4380	YES
	R14	Bedroom	270	100%	100	50%	50%	4380	YES
First	R1	LKD	385	90%	200	50%	50%	4380	YES
	R2	Bedroom	249	100%	100	50%	50%	4380	YES
	R3	Bedroom	191	85%	100	50%	50%	4380	YES
	R4	LKD	239	60%	200	50%	50%	4380	YES
	R5	Bedroom	256	100%	100	50%	50%	4380	YES
	R6	LKD	413	99%	200	50%	50%	4380	YES
	R7	Bedroom	217	100%	100	50%	50%	4380	YES
	R8	LKD	187	45%	200	50%	50%	4380	NO
	R9	Bedroom	261	100%	100	50%	50%	4380	YES
	R10	Bedroom	187	78%	100	50%	50%	4380	YES
	R11	Bedroom	240	100%	100	50%	50%	4380	YES
	R12	LKD	343	84%	200	50%	50%	4380	YES
	R13	Bedroom	345	100%	100	50%	50%	4380	YES
	R14	Bedroom	306	100%	100	50%	50%	4380	YES

Table 12: Illuminance Results – Apartment Block 2 Ground & First Floor

Floor Ref	Room Ref	Room Use	Median Lux	% of Area Meeting Req Lux	Req Lux	Req % of Effective Area	Req % of Daylight Hours	Daylight Hours	Meets Criteria
APT Block 2									
Second	R1	LKD	557	99%	200	50%	50%	4380	YES
	R2	Bedroom	269	100%	100	50%	50%	4380	YES
	R3	Bedroom	210	98%	100	50%	50%	4380	YES
	R4	LKD	273	73%	200	50%	50%	4380	YES
	R5	Bedroom	274	100%	100	50%	50%	4380	YES
	R6	LKD	462	100%	200	50%	50%	4380	YES
	R7	Bedroom	236	100%	100	50%	50%	4380	YES
	R8	LKD	243	65%	200	50%	50%	4380	YES
	R9	Bedroom	282	100%	100	50%	50%	4380	YES
	R10	Bedroom	209	86%	100	50%	50%	4380	YES
	R11	Bedroom	261	100%	100	50%	50%	4380	YES
	R12	LKD	439	98%	200	50%	50%	4380	YES
	R13	Bedroom	373	100%	100	50%	50%	4380	YES
	R14	Bedroom	331	100%	100	50%	50%	4380	YES
Third	R1	LKD	1091	100%	200	50%	50%	4380	YES
	R2	Bedroom	315	100%	100	50%	50%	4380	YES
	R3	Bedroom	431	100%	100	50%	50%	4380	YES
	R4	Bedroom	257	100%	100	50%	50%	4380	YES
	R5	Bedroom	348	100%	100	50%	50%	4380	YES
	R6	LKD	646	100%	200	50%	50%	4380	YES
	R7	Bedroom	302	100%	100	50%	50%	4380	YES
	R8	Bedroom	368	100%	100	50%	50%	4380	YES
	R9	Bedroom	258	100%	100	50%	50%	4380	YES
	R10	LKD	942	100%	200	50%	50%	4380	YES

Table 13: Illuminance Results – Apartment Block 2 Second &Third Floor

Floor Ref	Room Ref	Room Use	Median Lux	% of Area Meeting Req Lux	Req Lux	Req % of Effective Area	Req % of Daylight Hours	Daylight Hours	Meets Criteria
APT Block 3									
First	R1	LKD	265	78%	200	50%	50%	4380	YES
	R2	Bedroom	365	100%	100	50%	50%	4380	YES
	R3	LKD	160	37%	200	50%	50%	4380	NO
	R4	Bedroom	231	99%	100	50%	50%	4380	YES
	R5	Bedroom	231	100%	100	50%	50%	4380	YES
	R6	LKD	160	36%	200	50%	50%	4380	NO
	R7	Bedroom	349	100%	100	50%	50%	4380	YES
	R8	LKD	288	83%	200	50%	50%	4380	YES
	R9	Bedroom	314	100%	100	50%	50%	4380	YES
	R10	Bedroom	288	100%	100	50%	50%	4380	YES
Second	R1	LKD	296	84%	200	50%	50%	4380	YES
	R2	Bedroom	386	100%	100	50%	50%	4380	YES
	R3	LKD	183	44%	200	50%	50%	4380	NO
	R4	Bedroom	251	100%	100	50%	50%	4380	YES
	R5	Bedroom	253	100%	100	50%	50%	4380	YES
	R6	LKD	222	56%	200	50%	50%	4380	YES
	R7	Bedroom	381	100%	100	50%	50%	4380	YES
	R8	LKD	405	100%	200	50%	50%	4380	YES
	R9	Bedroom	338	100%	100	50%	50%	4380	YES
	R10	Bedroom	314	100%	100	50%	50%	4380	YES
Third	R1	LKD	332	89%	200	50%	50%	4380	YES
	R2	Bedroom	400	100%	100	50%	50%	4380	YES
	R3	LKD	244	67%	200	50%	50%	4380	YES
	R4	Bedroom	265	100%	100	50%	50%	4380	YES
	R5	Bedroom	334	100%	100	50%	50%	4380	YES

Table 14: Illuminance Results – Apartment Block 3 First, Second & Third Floor

Floor Ref	Room Ref	Room Use	Median Lux	% of Area Meeting Req Lux	Req Lux	Req % of Effective Area	Req % of Daylight Hours	Daylight Hours	Meets Criteria
APT Block 4									
First	R1	LKD	398	100%	200	50%	50%	4380	YES
	R2	Bedroom	509	100%	100	50%	50%	4380	YES
	R3	Bedroom	330	100%	100	50%	50%	4380	YES
	R4	LKD	206	51%	200	50%	50%	4380	YES
	R5	Bedroom	328	100%	100	50%	50%	4380	YES
	R6	LKD	194	49%	200	50%	50%	4380	NO
	R7	Bedroom	326	100%	100	50%	50%	4380	YES
	R8	LKD	717	100%	200	50%	50%	4380	YES
	R9	Bedroom	178	100%	100	50%	50%	4380	YES
	R10	Bedroom	407	100%	100	50%	50%	4380	YES
	R11	Bedroom	380	100%	100	50%	50%	4380	YES
	R12	LKD	304	88%	200	50%	50%	4380	YES
	R13	Bedroom	290	100%	100	50%	50%	4380	YES
	R14	Bedroom	308	100%	100	50%	50%	4380	YES
Second	R1	LKD	416	100%	200	50%	50%	4380	YES
	R2	Bedroom	513	100%	100	50%	50%	4380	YES
	R3	Bedroom	333	100%	100	50%	50%	4380	YES
	R4	LKD	210	53%	200	50%	50%	4380	YES
	R5	Bedroom	332	100%	100	50%	50%	4380	YES
	R6	LKD	194	50%	200	50%	50%	4380	YES
	R7	Bedroom	327	100%	100	50%	50%	4380	YES
	R8	LKD	722	100%	200	50%	50%	4380	YES
	R9	Bedroom	181	100%	100	50%	50%	4380	YES
	R10	Bedroom	416	100%	100	50%	50%	4380	YES
	R11	Bedroom	390	100%	100	50%	50%	4380	YES
	R12	LKD	322	89%	200	50%	50%	4380	YES
	R13	Bedroom	308	100%	100	50%	50%	4380	YES
	R14	Bedroom	306	100%	100	50%	50%	4380	YES

Table 15: Illuminance Results – Apartment Block 4 First & Second Floor

Floor Ref	Room Ref	Room Use	Median Lux	% of Area Meeting Req Lux	Req Lux	Req % of Effective Area	Req % of Daylight Hours	Daylight Hours	Meets Criteria
APT Block 4									
Third	R1	LKD	430	100%	200	50%	50%	4380	YES
	R2	Bedroom	515	100%	100	50%	50%	4380	YES
	R3	Bedroom	335	100%	100	50%	50%	4380	YES
	R4	LKD	215	54%	200	50%	50%	4380	YES
	R5	Bedroom	335	100%	100	50%	50%	4380	YES
	R6	LKD	196	50%	200	50%	50%	4380	YES
	R7	Bedroom	329	100%	100	50%	50%	4380	YES
	R8	LKD	727	100%	200	50%	50%	4380	YES
	R9	Bedroom	183	100%	100	50%	50%	4380	YES
	R10	Bedroom	419	100%	100	50%	50%	4380	YES
	R11	Bedroom	395	100%	100	50%	50%	4380	YES
	R12	LKD	348	99%	200	50%	50%	4380	YES
	R13	Bedroom	329	100%	100	50%	50%	4380	YES
	R14	Bedroom	321	100%	100	50%	50%	4380	YES
Fourth	R1	LKD	457	100%	200	50%	50%	4380	YES
	R2	Bedroom	522	100%	100	50%	50%	4380	YES
	R3	Bedroom	340	100%	100	50%	50%	4380	YES
	R4	LKD	219	56%	200	50%	50%	4380	YES
	R5	Bedroom	339	100%	100	50%	50%	4380	YES
	R6	LKD	228	56%	200	50%	50%	4380	YES
	R7	Bedroom	331	100%	100	50%	50%	4380	YES
	R8	LKD	729	100%	200	50%	50%	4380	YES
	R9	Bedroom	184	100%	100	50%	50%	4380	YES
	R10	Bedroom	423	100%	100	50%	50%	4380	YES
	R11	Bedroom	401	100%	100	50%	50%	4380	YES
	R12	LKD	371	100%	200	50%	50%	4380	YES
	R13	Bedroom	362	100%	100	50%	50%	4380	YES
	R14	Bedroom	331	100%	100	50%	50%	4380	YES

Table 16: Illuminance Results – Apartment Block 4 Third & Fourth Floor

Floor Ref	Room Ref	Room Use	Median Lux	% of Area Meeting Req Lux	Req Lux	Req % of Effective Area	Req % of Daylight Hours	Daylight Hours	Meets Criteria
APT Block 4									
Fifth	R1	LKD	369	99%	200	50%	50%	4380	YES
	R2	Bedroom	329	100%	100	50%	50%	4380	YES
	R3	Bedroom	324	100%	100	50%	50%	4380	YES
	R4	Bedroom	408	100%	100	50%	50%	4380	YES
	R5	LKD	1007	100%	200	50%	50%	4380	YES
	R6	Bedroom	226	100%	100	50%	50%	4380	YES
	R7	Bedroom	518	100%	100	50%	50%	4380	YES
	R8	Bedroom	284	100%	100	50%	50%	4380	YES
	R9	LKD	501	100%	200	50%	50%	4380	YES

Table 17: Illuminance Results – Apartment Block 4 Fifth Floor

Floor Ref	Room Ref	Room Use	Median Lux	% of Area Meeting Req Lux	Req Lux	Req % of Effective Area	Req % of Daylight Hours	Daylight Hours	Meets Criteria
APT Block 5									
First	R1	LKD	414	99%	200	50%	50%	4380	YES
	R2	Bedroom	364	100%	100	50%	50%	4380	YES
	R3	Bedroom	286	99%	100	50%	50%	4380	YES
	R4	Bedroom	413	100%	100	50%	50%	4380	YES
	R5	LKD	236	57%	200	50%	50%	4380	YES
	R6	Bedroom	323	100%	100	50%	50%	4380	YES
	R7	LKD	615	100%	200	50%	50%	4380	YES
	R8	Bedroom	285	100%	100	50%	50%	4380	YES
	R9	Bedroom	208	98%	100	50%	50%	4380	YES
	R10	LKD	184	45%	200	50%	50%	4380	NO
	R11	Bedroom	205	97%	100	50%	50%	4380	YES
	R12	LKD	284	69%	200	50%	50%	4380	YES
	R13	Bedroom	225	99%	100	50%	50%	4380	YES
	R14	Bedroom	153	87%	100	50%	50%	4380	YES
	R15	Bedroom	261	100%	100	50%	50%	4380	YES
Second	R1	LKD	423	100%	200	50%	50%	4380	YES
	R2	Bedroom	367	100%	100	50%	50%	4380	YES
	R3	Bedroom	289	99%	100	50%	50%	4380	YES
	R4	Bedroom	415	100%	100	50%	50%	4380	YES
	R5	LKD	240	58%	200	50%	50%	4380	YES
	R6	Bedroom	326	100%	100	50%	50%	4380	YES
	R7	LKD	641	100%	200	50%	50%	4380	YES
	R8	Bedroom	297	100%	100	50%	50%	4380	YES
	R9	Bedroom	214	99%	100	50%	50%	4380	YES
	R10	LKD	194	47%	200	50%	50%	4380	NO
	R11	Bedroom	213	99%	100	50%	50%	4380	YES
	R12	LKD	296	73%	200	50%	50%	4380	YES
	R13	Bedroom	240	99%	100	50%	50%	4380	YES
	R14	Bedroom	161	92%	100	50%	50%	4380	YES
	R15	Bedroom	261	100%	100	50%	50%	4380	YES

Table 18: Illuminance Results – Apartment Block 5 First & Second Floor

Floor Ref	Room Ref	Room Use	Median Lux	% of Area Meeting Req Lux	Req Lux	Req % of Effective Area	Req % of Daylight Hours	Daylight Hours	Meets Criteria
APT Block 5									
Third	R1	LKD	429	100%	200	50%	50%	4380	YES
	R2	Bedroom	369	100%	100	50%	50%	4380	YES
	R3	Bedroom	290	99%	100	50%	50%	4380	YES
	R4	Bedroom	418	100%	100	50%	50%	4380	YES
	R5	LKD	242	59%	200	50%	50%	4380	YES
	R6	Bedroom	330	100%	100	50%	50%	4380	YES
	R7	LKD	650	100%	200	50%	50%	4380	YES
	R8	Bedroom	306	100%	100	50%	50%	4380	YES
	R9	Bedroom	221	99%	100	50%	50%	4380	YES
	R10	LKD	204	52%	200	50%	50%	4380	YES
	R11	Bedroom	217	100%	100	50%	50%	4380	YES
	R12	LKD	308	77%	200	50%	50%	4380	YES
	R13	Bedroom	250	100%	100	50%	50%	4380	YES
	R14	Bedroom	171	94%	100	50%	50%	4380	YES
	R15	Bedroom	267	100%	100	50%	50%	4380	YES
Fourth	R1	LKD	476	100%	200	50%	50%	4380	YES
	R2	Bedroom	371	100%	100	50%	50%	4380	YES
	R3	Bedroom	292	100%	100	50%	50%	4380	YES
	R4	Bedroom	421	100%	100	50%	50%	4380	YES
	R5	LKD	273	64%	200	50%	50%	4380	YES
	R6	Bedroom	333	100%	100	50%	50%	4380	YES
	R7	LKD	654	100%	200	50%	50%	4380	YES
	R8	Bedroom	312	100%	100	50%	50%	4380	YES
	R9	Bedroom	225	100%	100	50%	50%	4380	YES
	R10	LKD	227	60%	200	50%	50%	4380	YES
	R11	Bedroom	223	100%	100	50%	50%	4380	YES
	R12	LKD	378	87%	200	50%	50%	4380	YES
	R13	Bedroom	258	100%	100	50%	50%	4380	YES
	R14	Bedroom	175	96%	100	50%	50%	4380	YES
	R15	Bedroom	277	100%	100	50%	50%	4380	YES

Table 19: Illuminance Results – Apartment Block 5 Third & Fourth Floor

Floor Ref	Room Ref	Room Use	Median Lux	% of Area Meeting Req Lux	Req Lux	Req % of Effective Area	Req % of Daylight Hours	Daylight Hours	Meets Criteria
APT Block 5									
Fifth	R1	LKD	926	100%	200	50%	50%	4380	YES
	R2	Bedroom	340	100%	100	50%	50%	4380	YES
	R3	Bedroom	465	100%	100	50%	50%	4380	YES
	R4	Bedroom	409	100%	100	50%	50%	4380	YES
	R5	LKD	890	100%	200	50%	50%	4380	YES
	R6	Bedroom	385	100%	100	50%	50%	4380	YES
	R7	Bedroom	241	100%	100	50%	50%	4380	YES
	R8	Bedroom	533	95%	100	50%	50%	4380	YES
	R9	LKD	828	100%	200	50%	50%	4380	YES

Table 20: Illuminance Results – Apartment Block 5 Fifth Floor

Floor Ref	Room Ref	Room Use	Median Lux	% of Area Meeting Req Lux	Req Lux	Req % of Effective Area	Req % of Daylight Hours	Daylight Hours	Meets Criteria
Duplex Block									
Ground	R1	Living Room	512	100%	150	50%	50%	4380	YES
	R2	KD	531	100%	200	50%	50%	4380	YES
	R3	KD	477	100%	200	50%	50%	4380	YES
	R4	Living Room	365	99%	150	50%	50%	4380	YES
	R5	LKD	461	99%	200	50%	50%	4380	YES
	R6	KD	299	96%	200	50%	50%	4380	YES
	R7	Living Room	281	97%	150	50%	50%	4380	YES
First	R1	Bedroom	280	100%	100	50%	50%	4380	YES
	R2	Bedroom	217	88%	100	50%	50%	4380	YES
	R3	Bedroom	417	100%	100	50%	50%	4380	YES
	R4	Bedroom	393	100%	100	50%	50%	4380	YES
	R5	Bedroom	211	89%	100	50%	50%	4380	YES
	R6	Bedroom	323	100%	100	50%	50%	4380	YES
	R7	Bedroom	404	100%	100	50%	50%	4380	YES
	R8	Bedroom	776	100%	100	50%	50%	4380	YES
	R9	Bedroom	254	100%	100	50%	50%	4380	YES
	R10	Bedroom	143	69%	100	50%	50%	4380	YES
	R11	Bedroom	139	65%	100	50%	50%	4380	YES
	R12	Bedroom	64	22%	100	50%	50%	4380	NO

Table 21: Illuminance Results – Duplex Ground & First Floor

Floor Ref	Room Ref	Room Use	Median Lux	% of Area Meeting Req Lux	Req Lux	Req % of Effective Area	Req % of Daylight Hours	Daylight Hours	Meets Criteria
Duplex Block									
Second	R1	LKD	542	100%	200	50%	50%	4380	YES
	R2	Bedroom	411	100%	100	50%	50%	4380	YES
	R3	Bedroom	473	100%	100	50%	50%	4380	YES
	R4	Bedroom	297	100%	100	50%	50%	4380	YES
	R5	Bedroom	544	100%	100	50%	50%	4380	YES
	R6	Bedroom	199	94%	100	50%	50%	4380	YES
	R7	Bedroom	330	100%	100	50%	50%	4380	YES
	R8	LKD	409	99%	200	50%	50%	4380	YES
Third	R1	LKD	600	99%	200	50%	50%	4380	YES
	R2	LKD	449	97%	200	50%	50%	4380	YES

Table 22: Illuminance Results – Duplex Second & Third Floor

Table 23: Illuminance Results Summary

Property	Number of Rooms Tested	Rooms satisfying Criteria		Rooms not satisfying Criteria
		No.	%	
APT Block 1	61	58	95%	3
APT Block 2	52	48	92%	4
APT Block 3	25	22	88%	3
APT Block 5	69	67	97%	2
APT Block 4	65	64	98%	1
Duplex Block	29	28	97%	1
Total	**301**	**287**	**95%**	**14**

A summary of the results is provided above for the residential units. The results show that 95% of all rooms meet or exceed the BRE's minimum recommendations for internal daylight provision in dwellings. Therefore, the proposed development performs at a high level for a scheme of this scale and aligns with national policy to ensure high-quality, sustainable development. For the 14 rooms that are slightly below the BRE recommendations, the design team has incorporated mitigation and compensatory measures, including enhanced private amenity space and the provision of high-quality communal open space for all residents.

5.3.2 Sunlight to Proposed Amenity Spaces

The BRE guide recommends:

"*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.*"

The main communal open spaces and the open space was analysed. These areas are identified in the following figures and labelled for reference in the results Table 24

Figure 24: Proposed Amenity Spaces, 2hr Sunlight Test

Table 24: Open Spaces 2hr Sunlight Test Results

Open Space	Area (m^2)	2hr Sun Area (m^2)	% Area	Meets Criteria
Communal Open Space 1	597.41	550.13	92.09%	YES
Public Open Space 1	967.16	885.66	91.57%	YES
Public Open Space 2	508.07	440.54	86.71%	YES
Public Open Space 3	1724.71	1665.07	96.54%	YES
Total	3797.5	3541.41	93.26%	YES

The results show the open spaces that receive greater than 2 hours of sunlight on March 21st. The cumulative area of the spaces exceeds the recommended criteria for sunlight. It should be noted that the amenity area is in excess of the required area for such a scheme.

6 Conclusion

The analysis and assessments in this report have been carried ouy in line with the recommendations of BRE's "Site Layout Planning for daylight and sunlight, a Guide to good practice" (BRE Building Technology Group, 2022) and BS EN 17037.

The impact analysis of the proposed development on existing surrounding buildings has been completed and the proposed development will not affect:

- access to skylight,
- access to sunlight, and
- sunlight to gardens/open spaces.

In terms of internal daylight levels within the proposed development, the results show that 95% of all rooms meet or exceed the BRE's minimum recommendations for internal daylight provision in dwellings. Therefore, we believe the proposed development performs at a high level for a scheme of this scale and aligns to national policy to ensure high quality sustainable development.

In order to maximise available light, glazing to all habitable rooms is in excess of 20%. The design team have developed the proposed building using the principles of the BREs "Site Layout Planning for Daylight and Sunlight, A guide to good practice".

In terms of the amenity spaces provided the results show the open spaces that receive greater than 2 hours of sunlight on March 21st. The cumulative area of the spaces exceeds the recommended criteria for sunlight. It should be noted that the amenity area is in excess of the required area for such a scheme.

Overall, the development has been designed with due consideration for sunlight and daylight and meets the recommendations as set out in the BRE Guide – BR 209 "Site Layout Planning for Daylight and Sunlight, A guide to good practice (2022)."

Appendix A Proposed Illuminance Contours (with Room & Window Legends)

A.1 Proposed Apartment Block 1

Figure 25: Apartment Block 1 Ground Floor sDA Contours

Figure 26: Apartment Block 1 First Floor sDA Contours

Figure 27: Apartment Block 1 Second Floor sDA Contours

Figure 28: Apartment Block 1 Third Floor sDA Contours

Figure 29: Apartment Block 1 Fourth Floor sDA Contours

A.2 Proposed Apartment Block 2

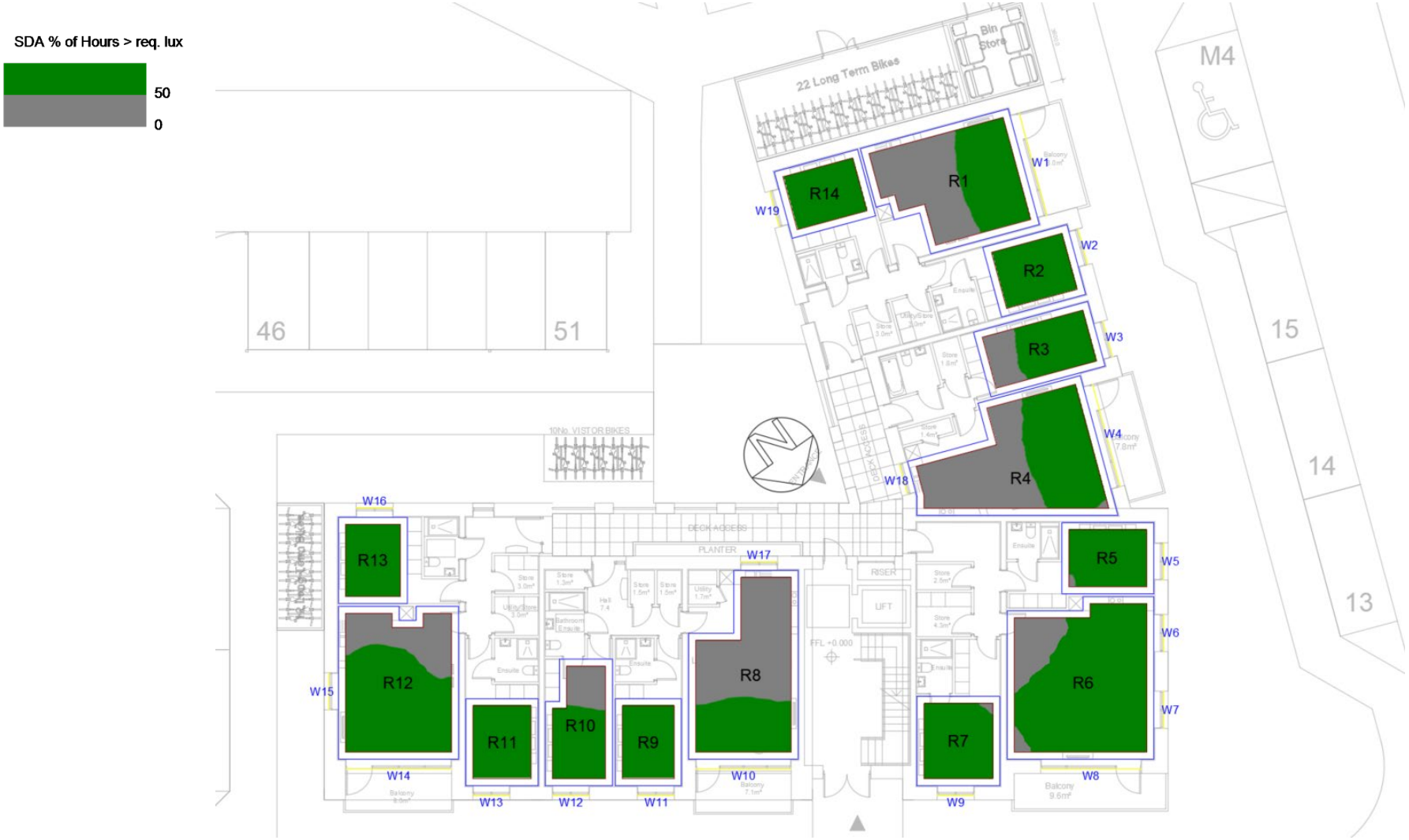


Figure 30: Apartment Block 2 Ground Floor sDA Contours

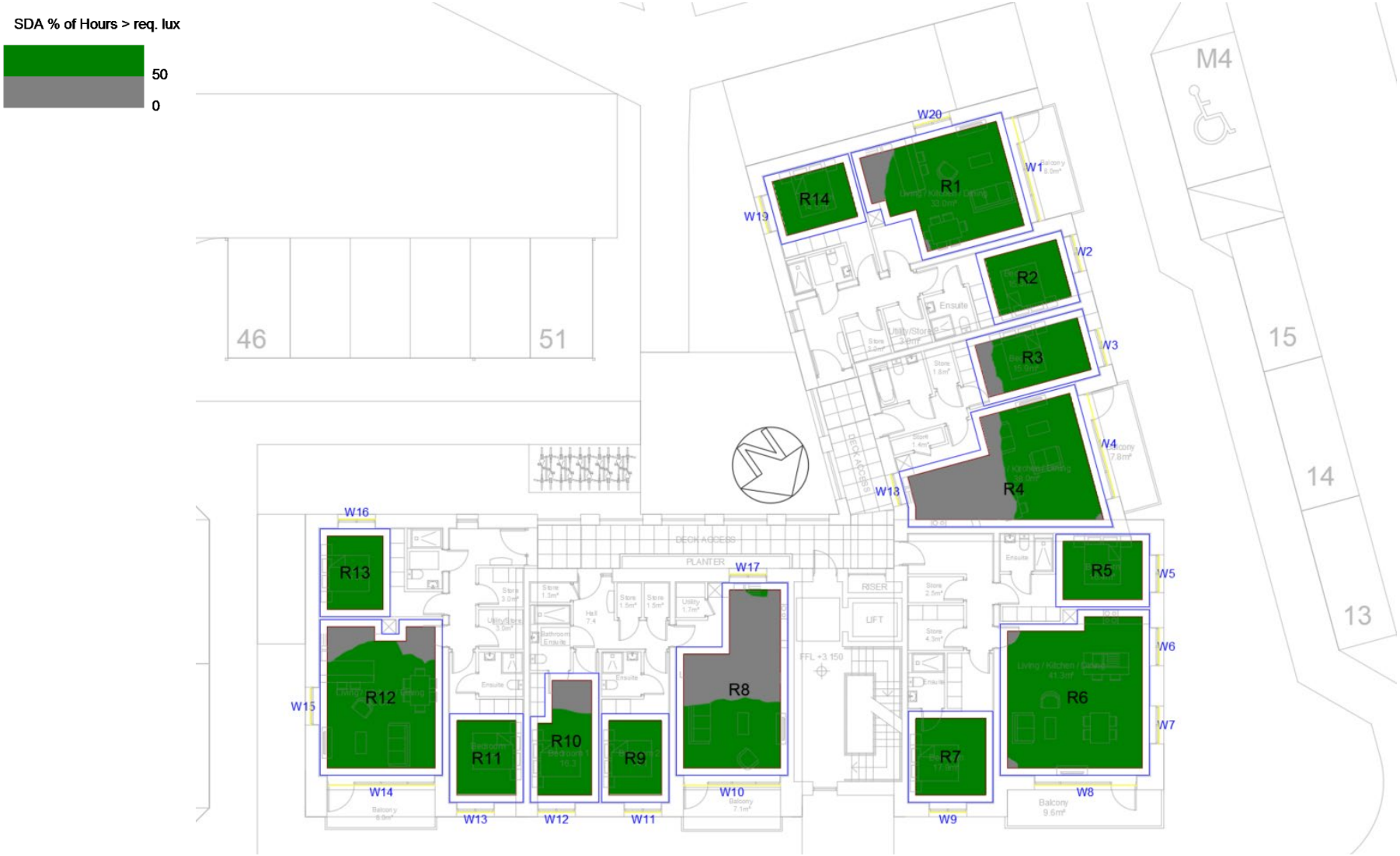


Figure 31: Apartment Block 2 First Floor sDA Contours

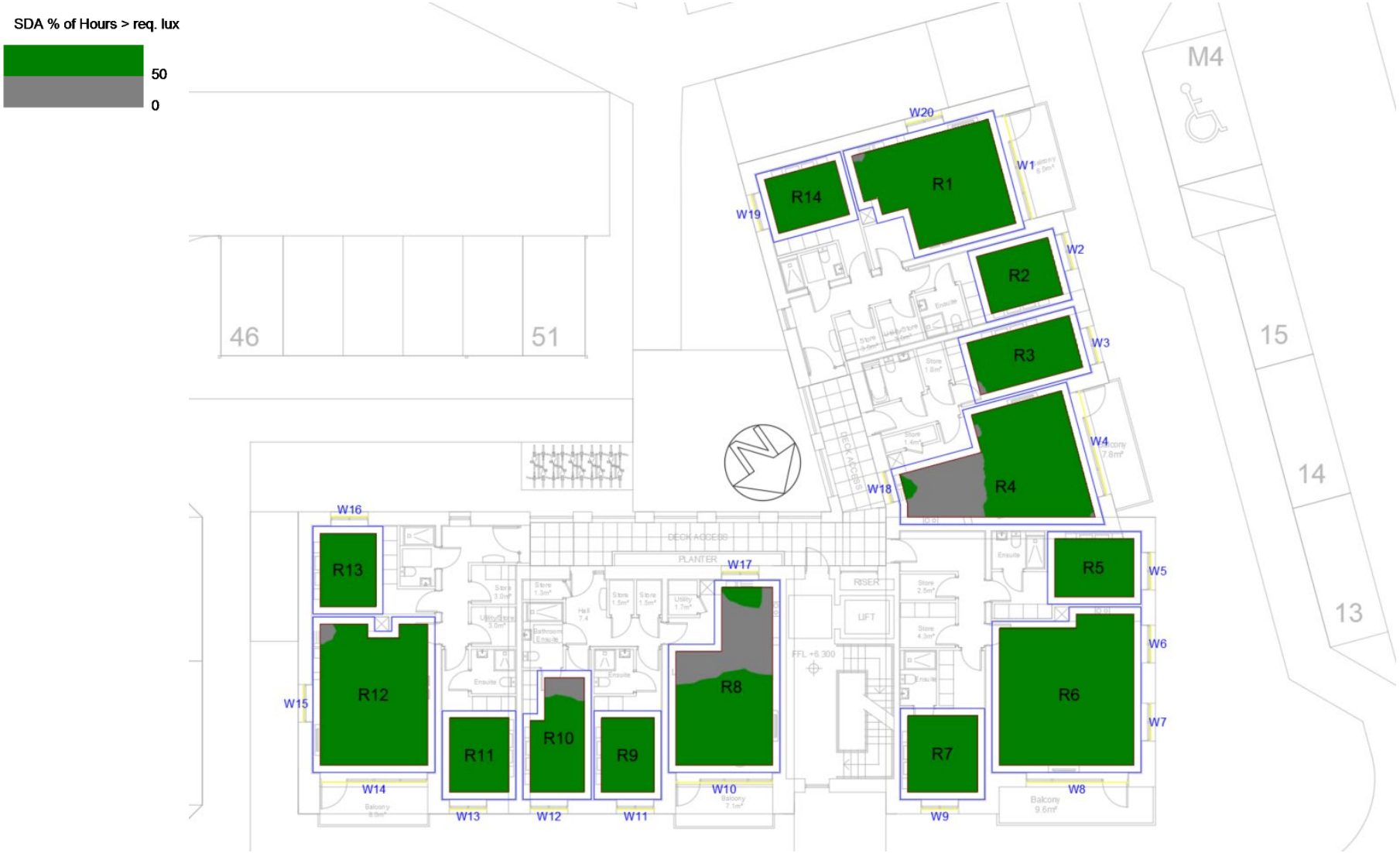


Figure 32: Apartment Block 2 Second Floor sDA Contours

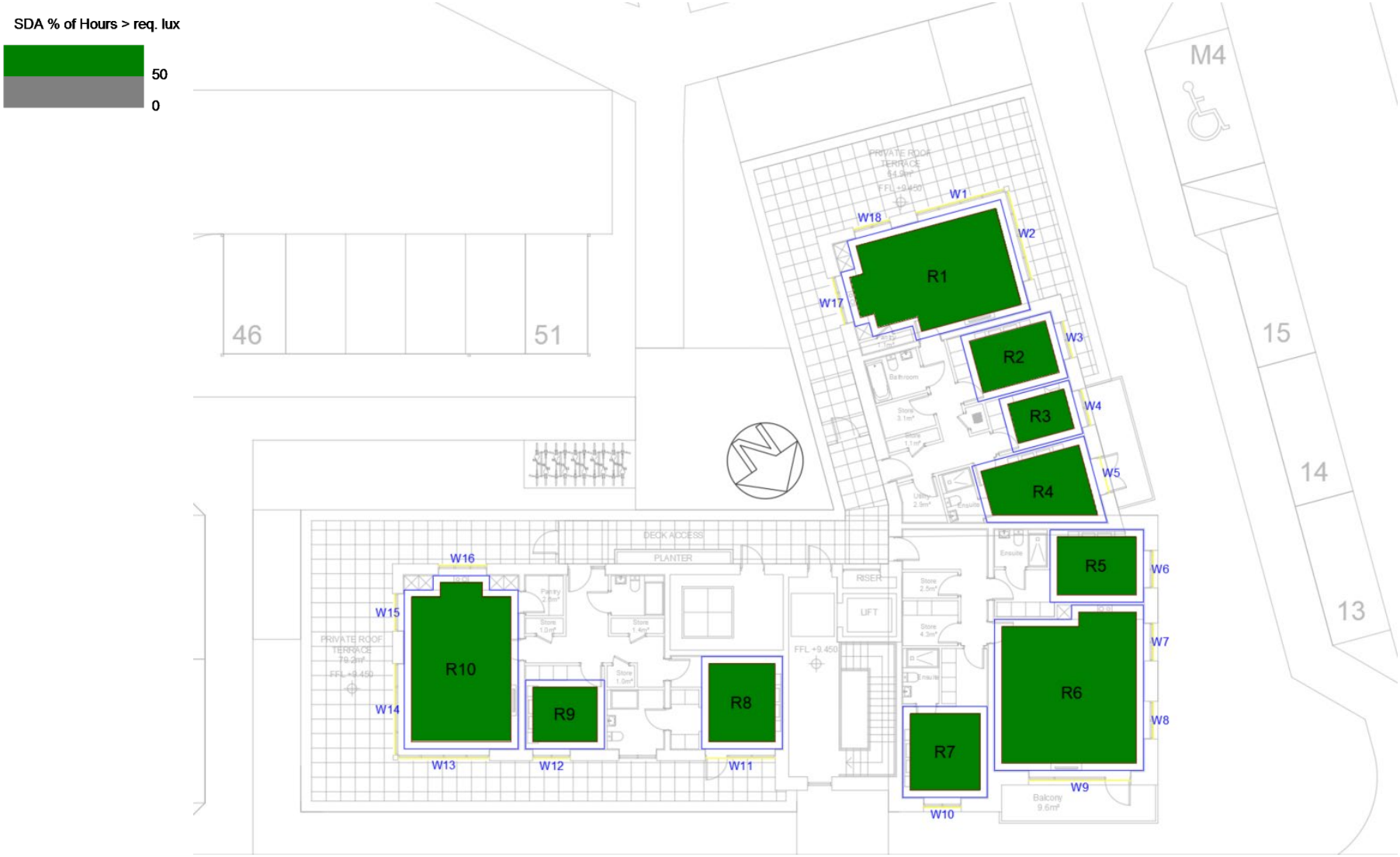


Figure 33: Apartment Block 2 Third Floor sDA Contours

A.3 Proposed Apartment Block 3

Figure 34: Apartment Block 3 First Floor sDA Contours

Figure 35: Apartment Block 3 Second Floor sDA Contours

Figure 36: Apartment Block 3 Third Floor sDA Contours

A.4 Proposed Apartment Block 4

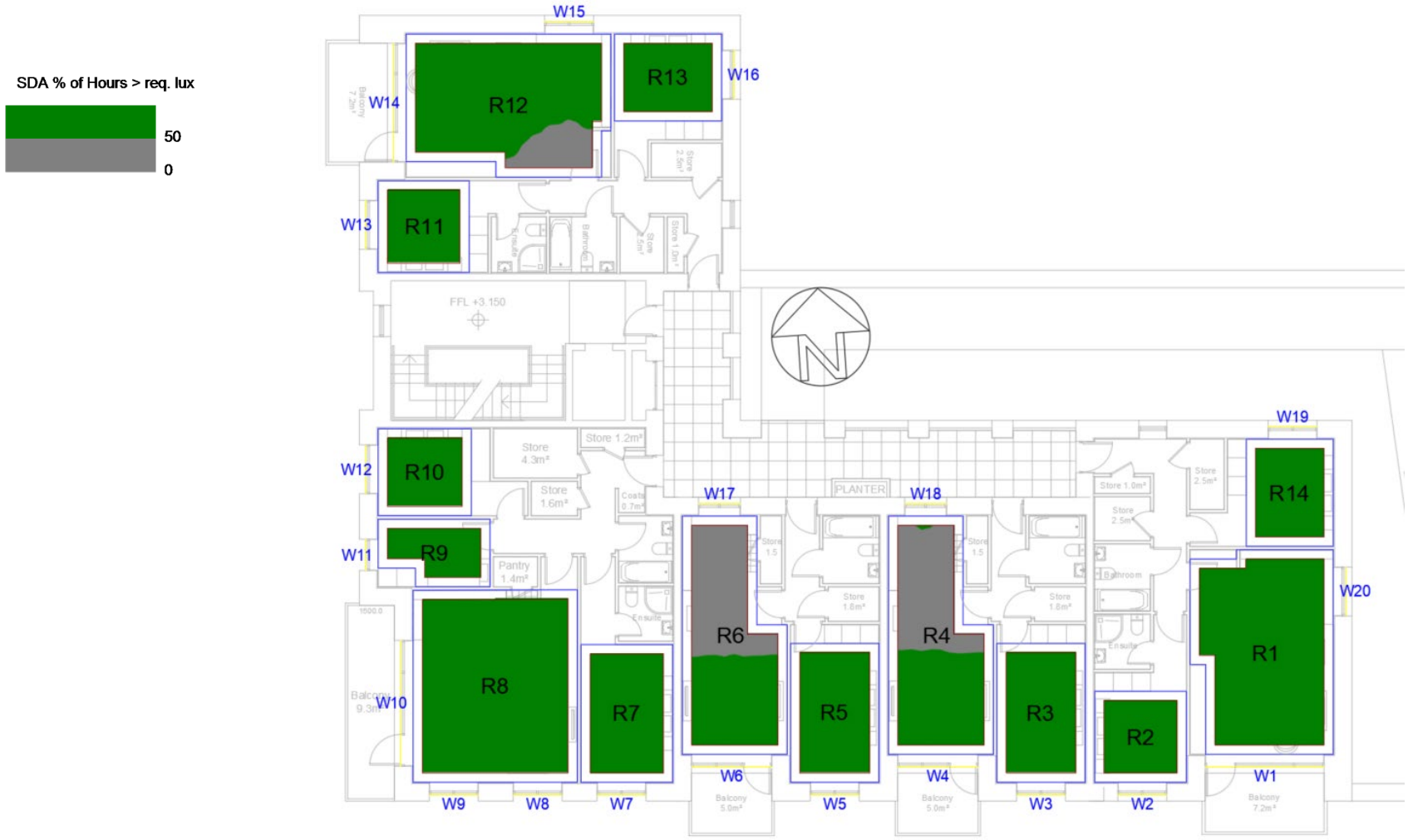


Figure 37: Apartment Block 4 First Floor sDA Contours

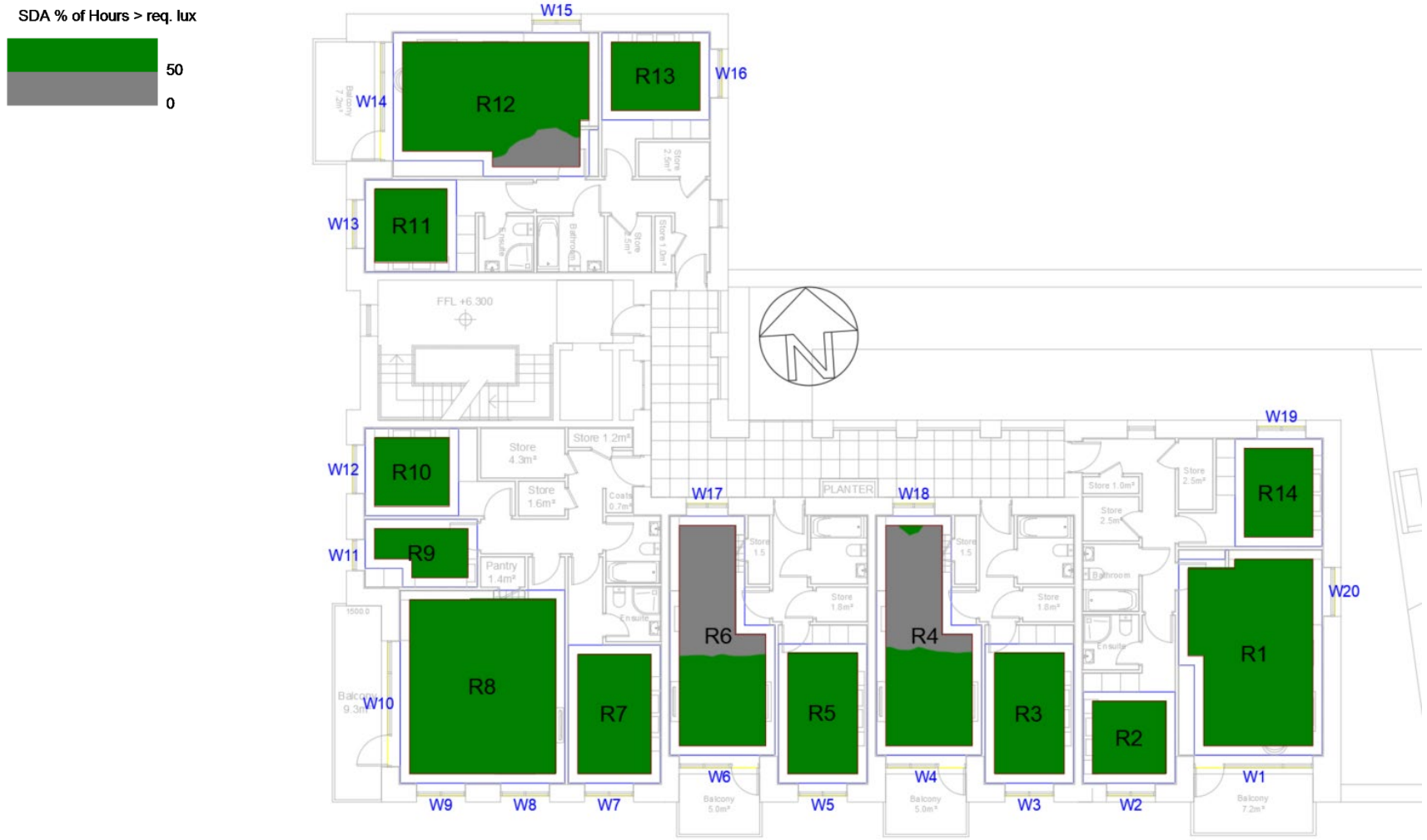


Figure 38: Apartment Block 4 Second Floor sDA Contours

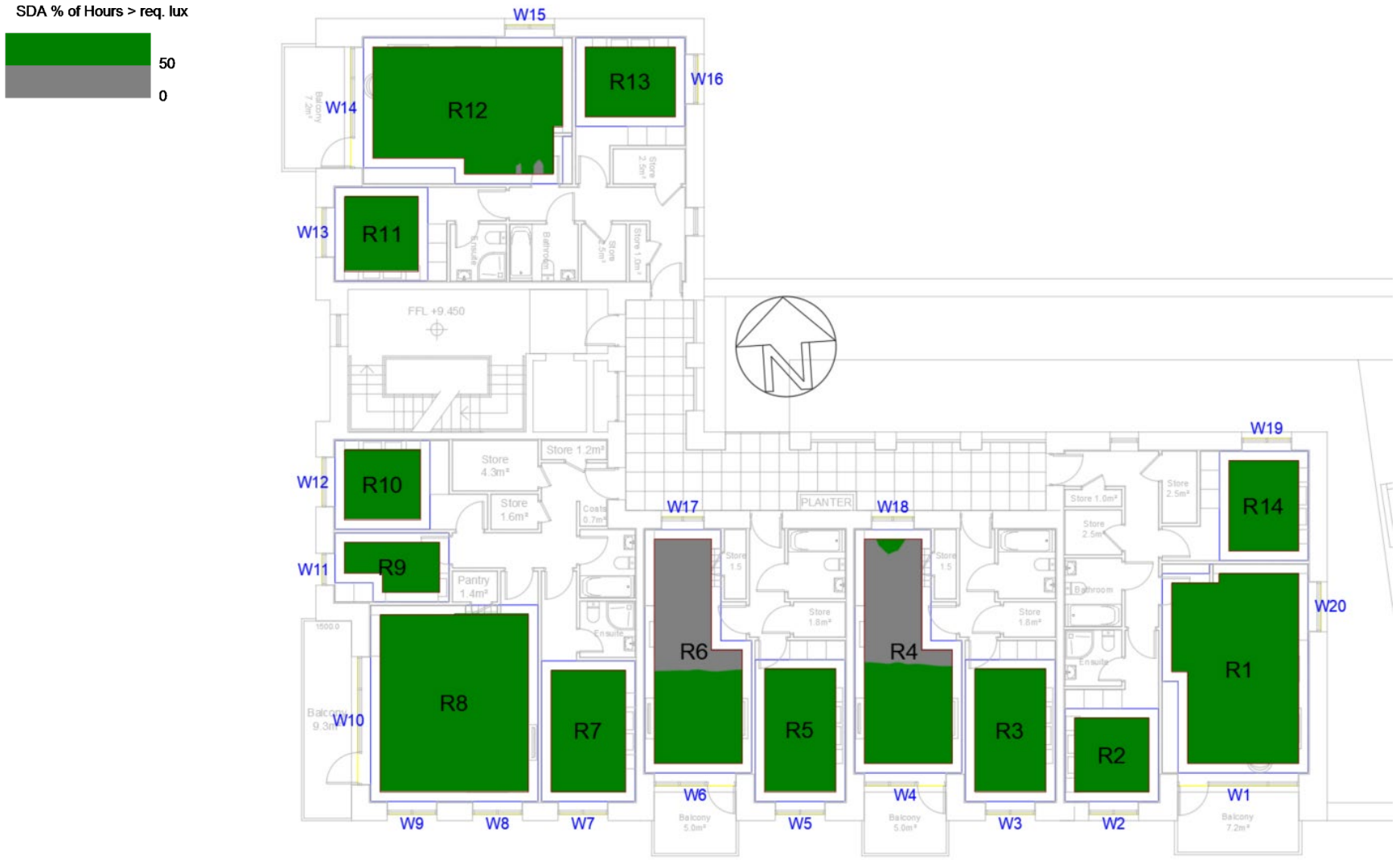


Figure 39: Apartment Block 4 Third Floor sDA Contours

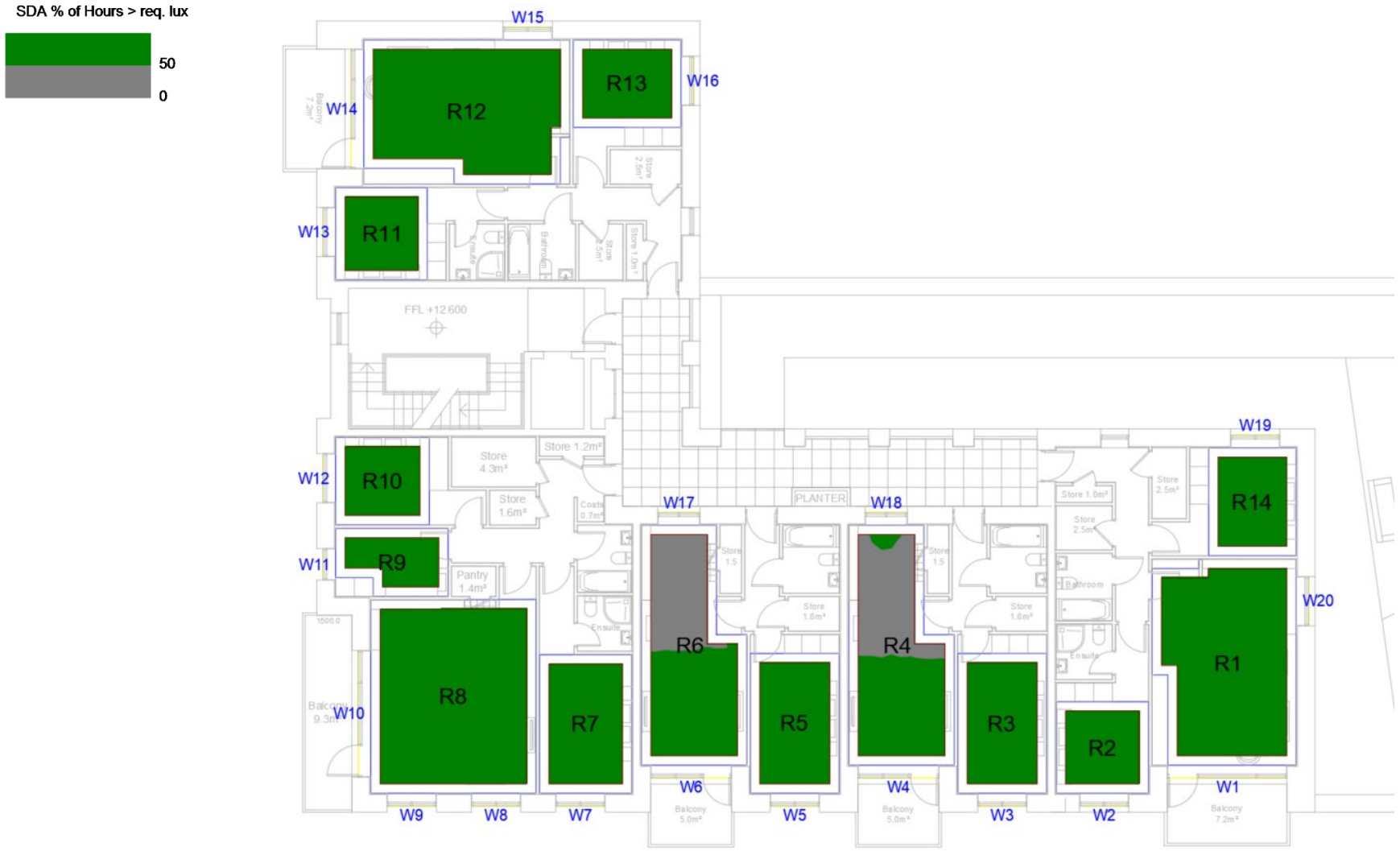


Figure 40: Apartment Block 4 Fourth Floor sDA Contours

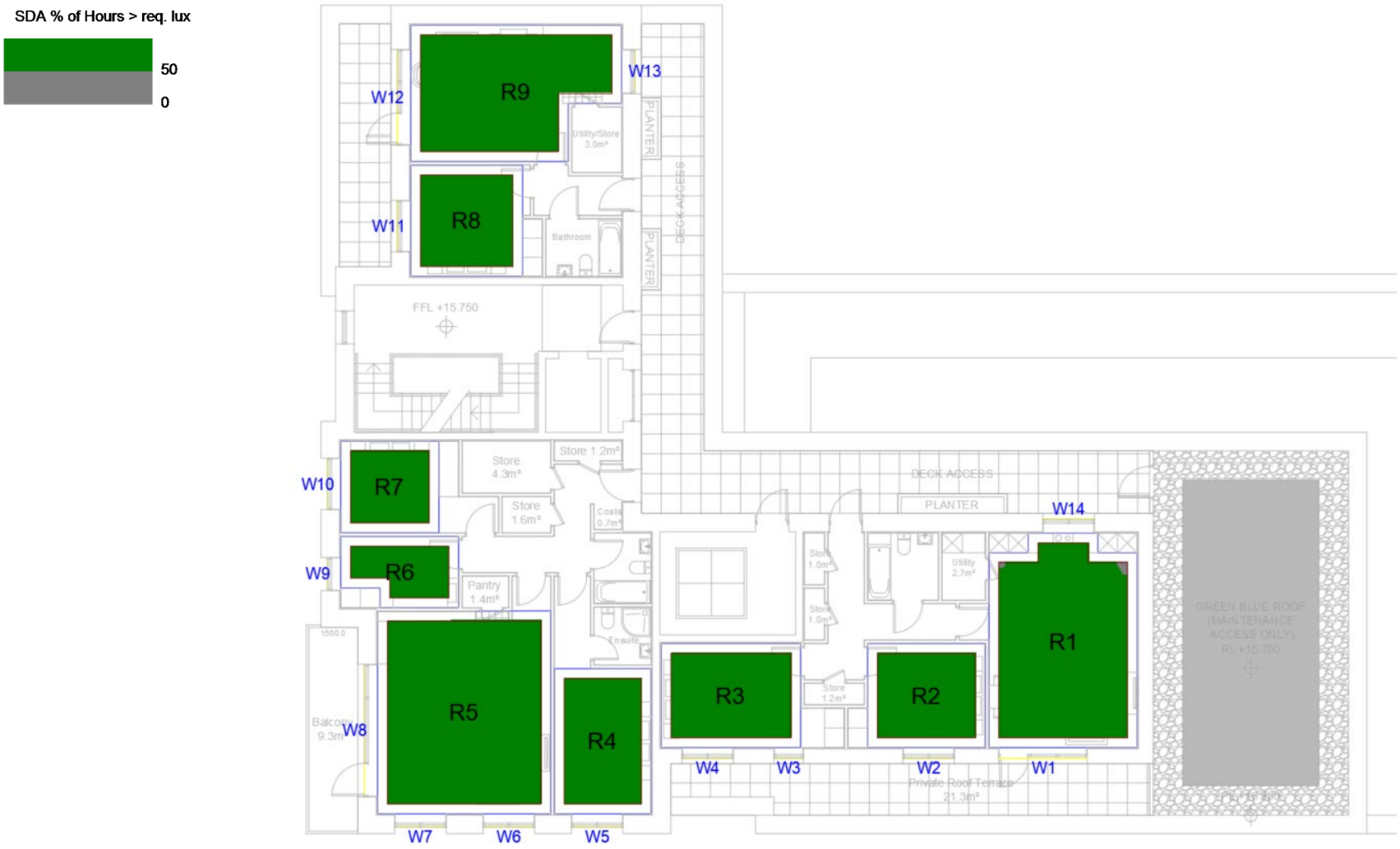


Figure 41: Apartment Block 4 Fifth Floor sDA Contours

A.5 Proposed Apartment Block 5

Figure 42: Apartment Block 5 First Floor sDA Contours

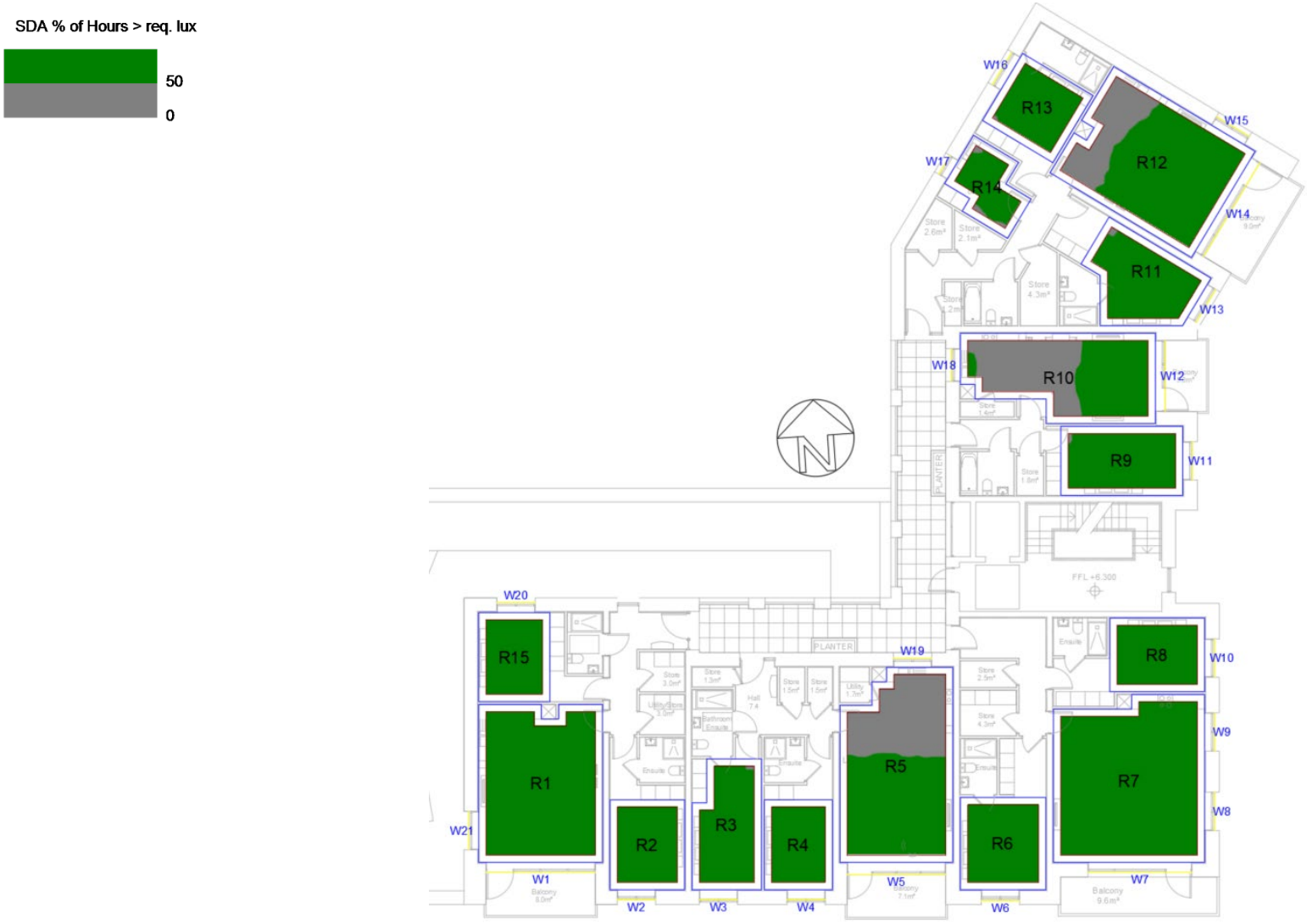


Figure 43: Apartment Block 5 Second Floor sDA Contours

Figure 44: Apartment Block 5 Third Floor sDA Contours

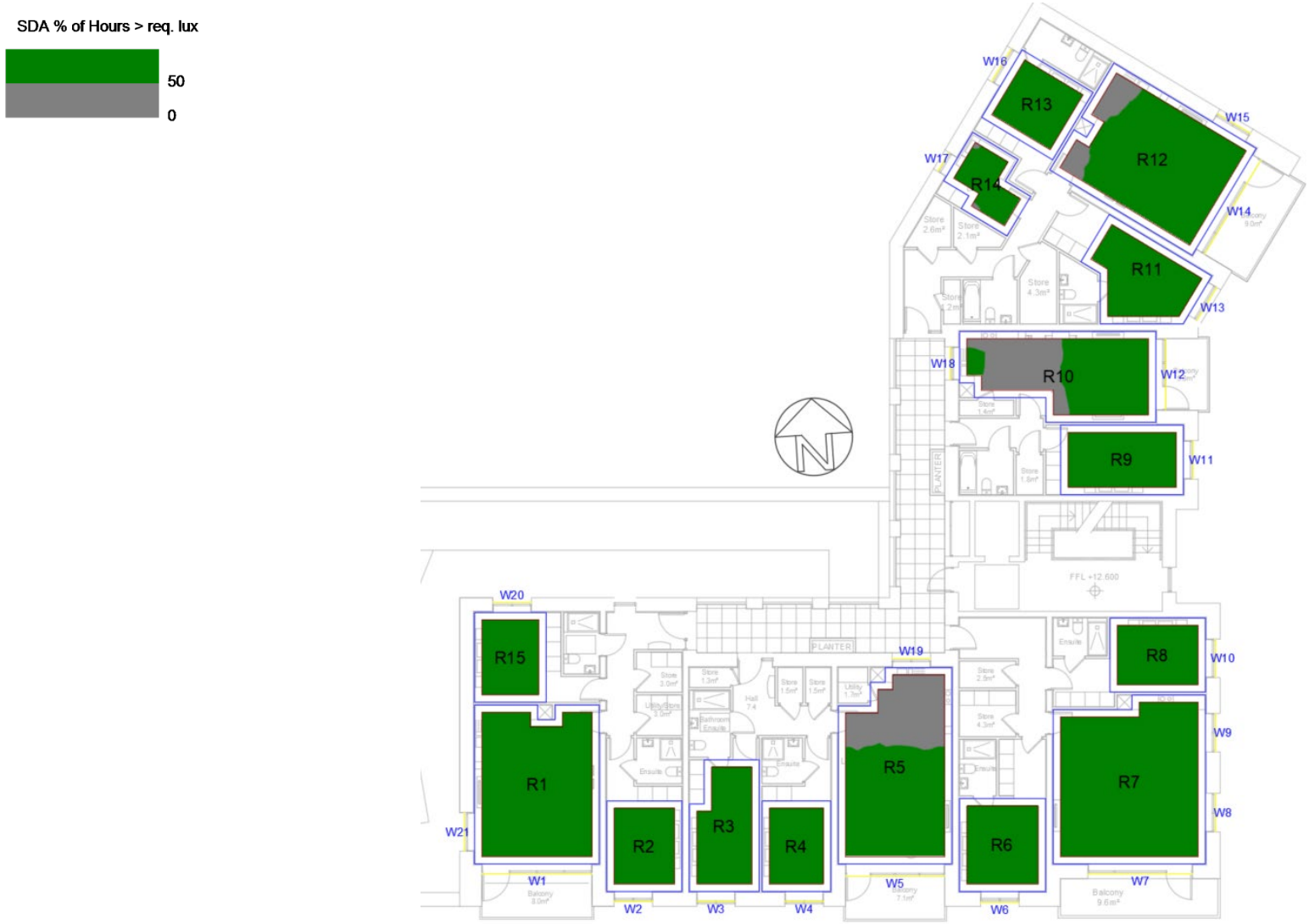


Figure 45: Apartment Block 5 Fourth Floor sDA Contours

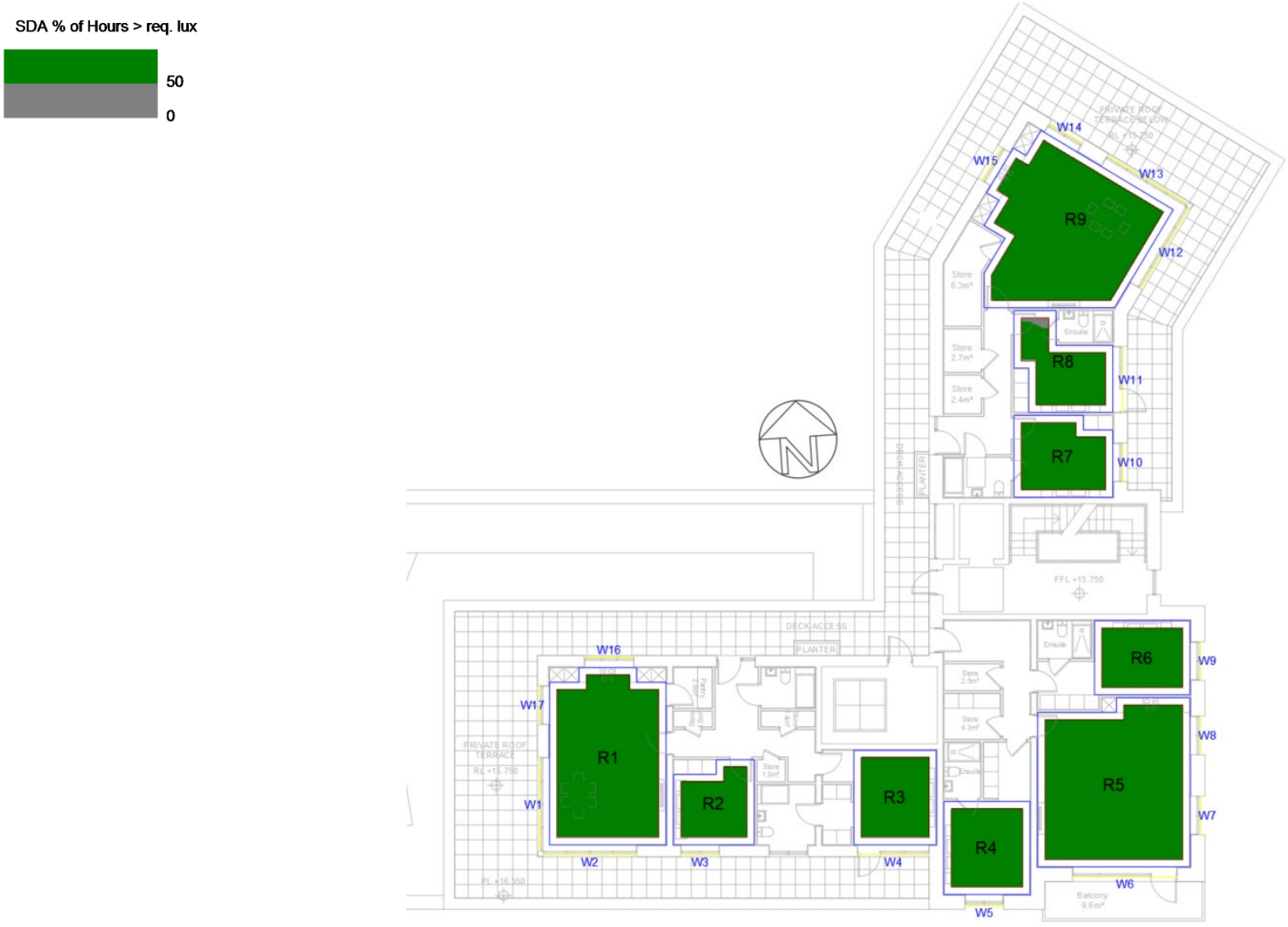


Figure 46: Apartment Block 5 Fifth Floor sDA Contours

A.6 Proposed Duplex Block

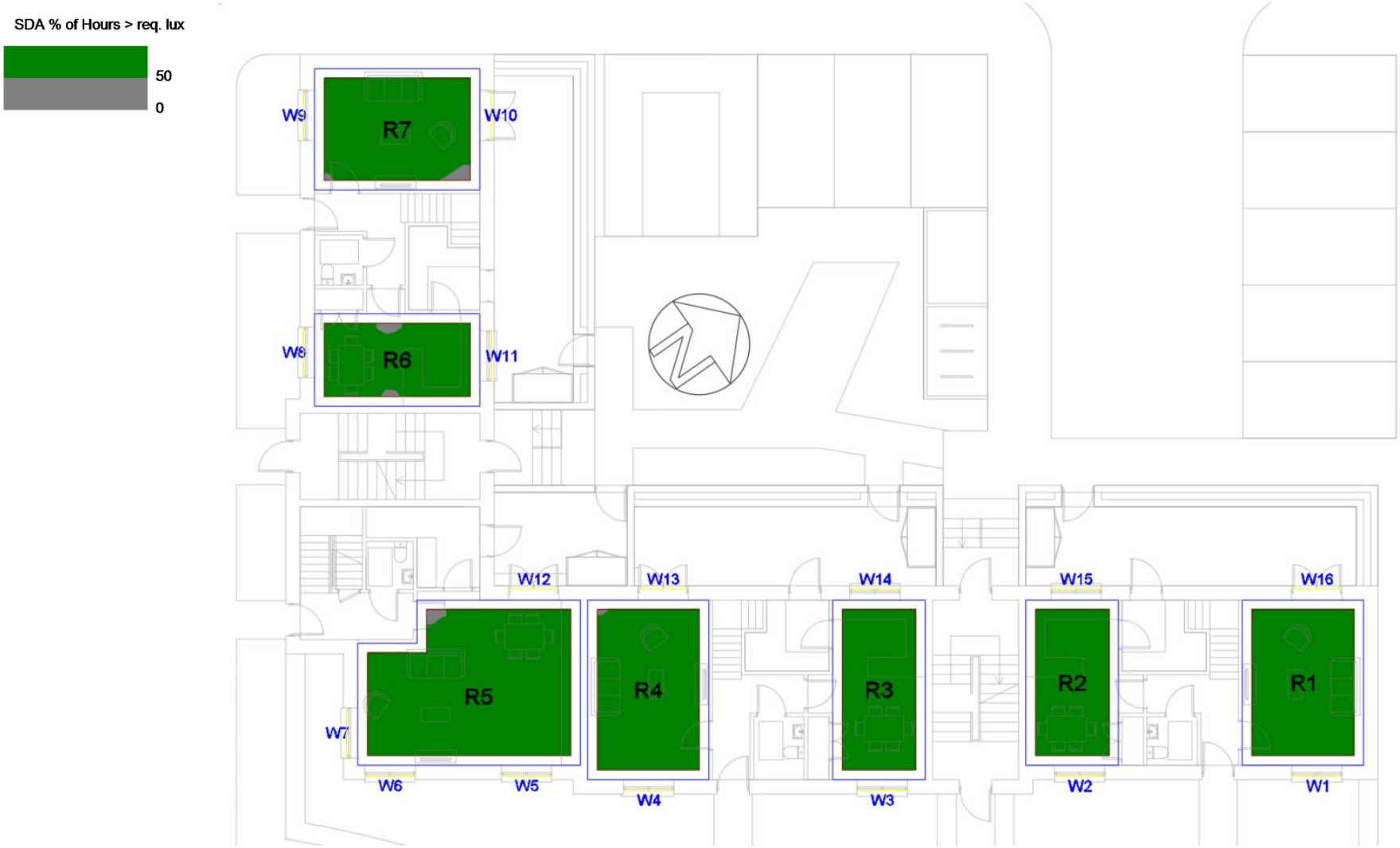


Figure 47: Duplex Block Ground Floor sDA Contours

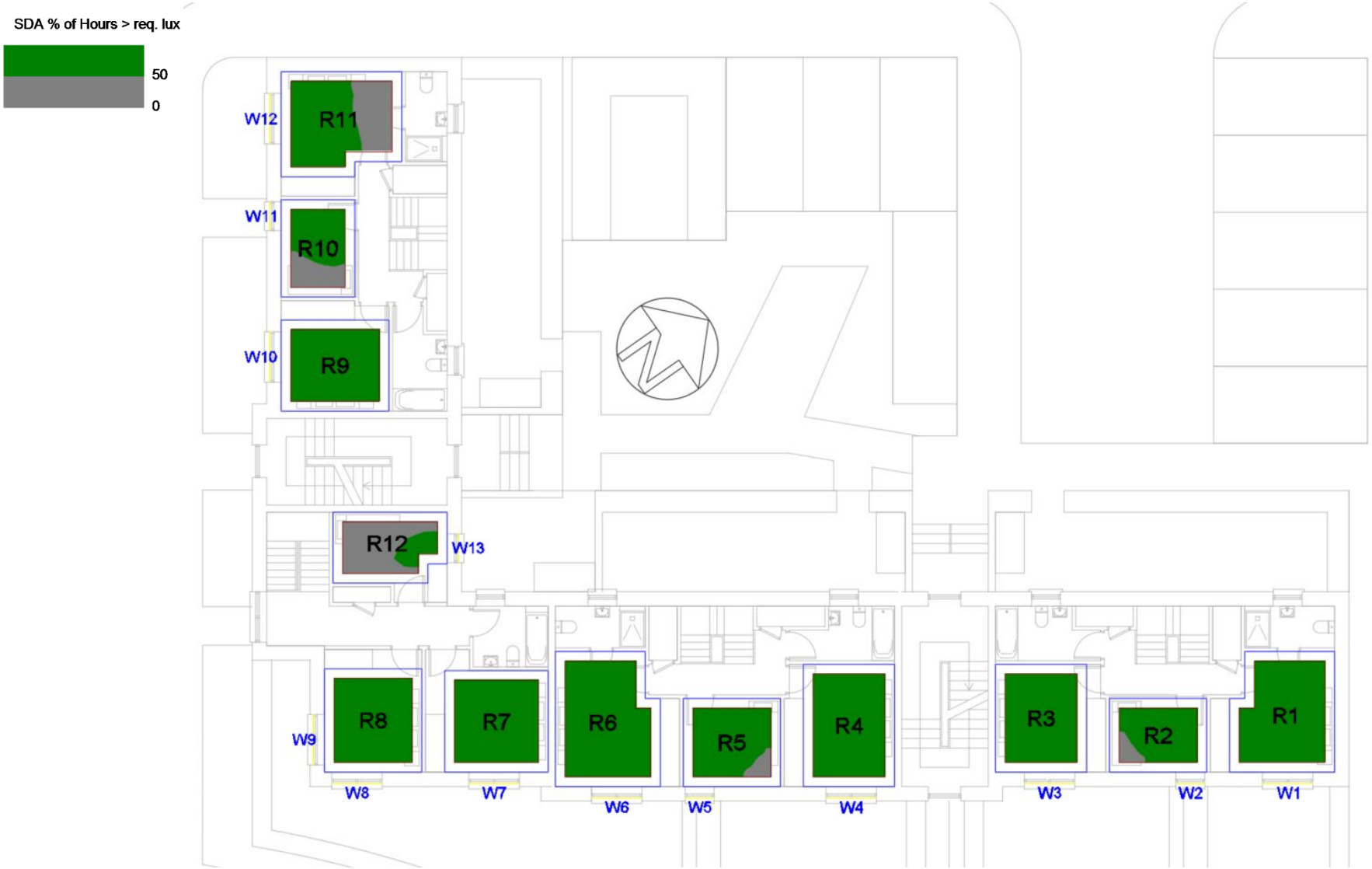


Figure 48: Duplex Block First Floor sDA Contours

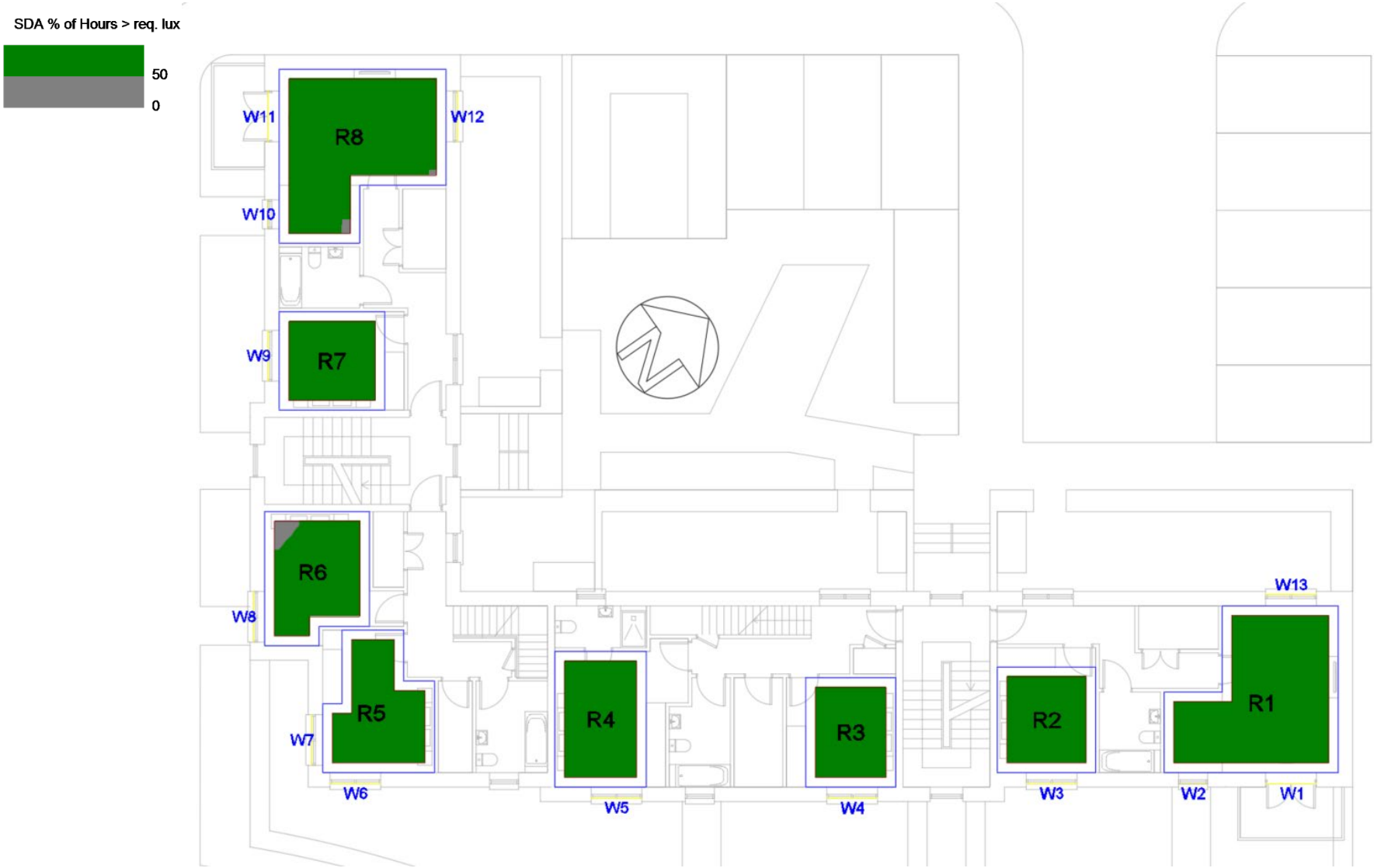


Figure 49: Duplex Block Second Floor sDA Contours

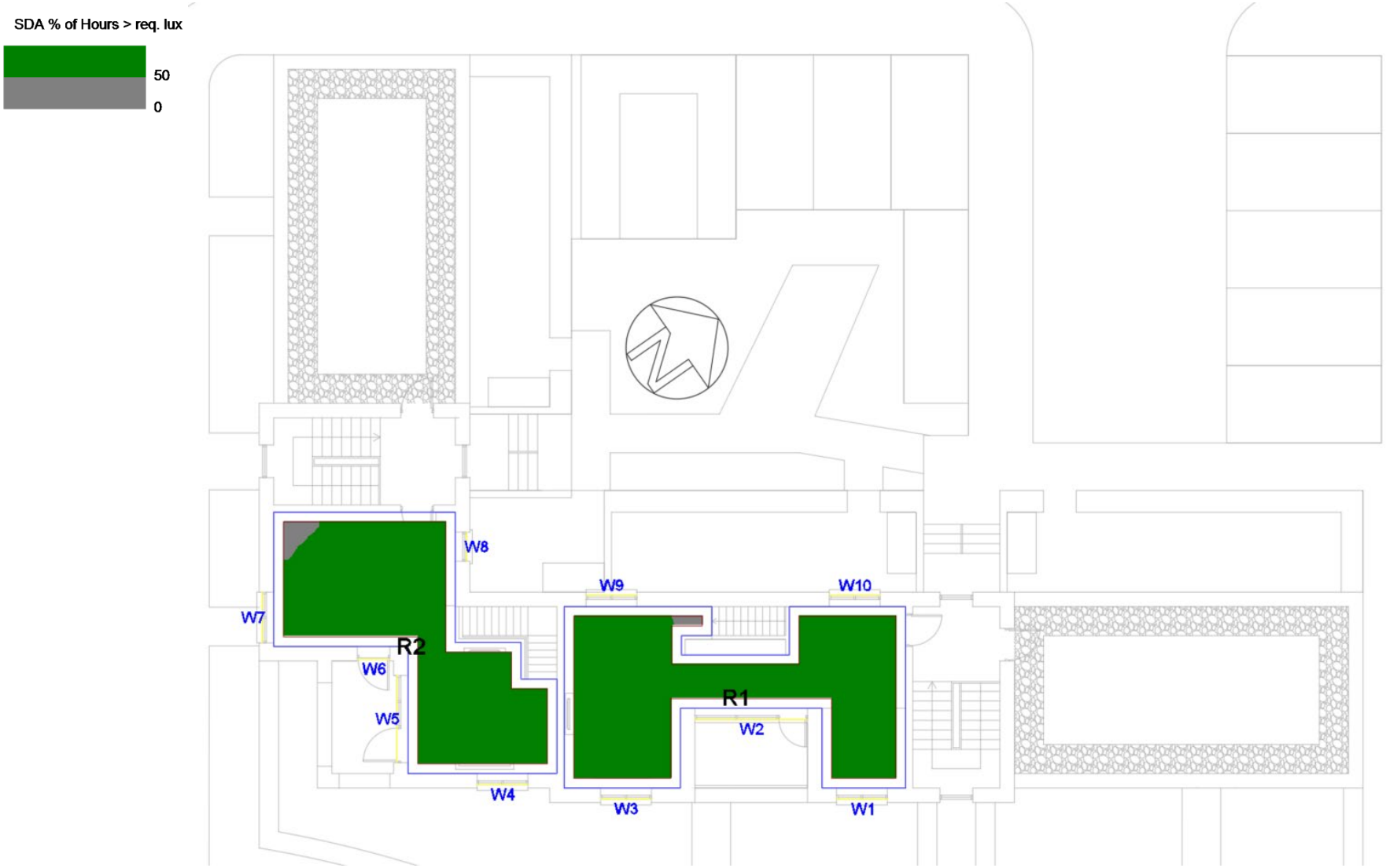


Figure 50: Duplex Block Third Floor sDA Contours

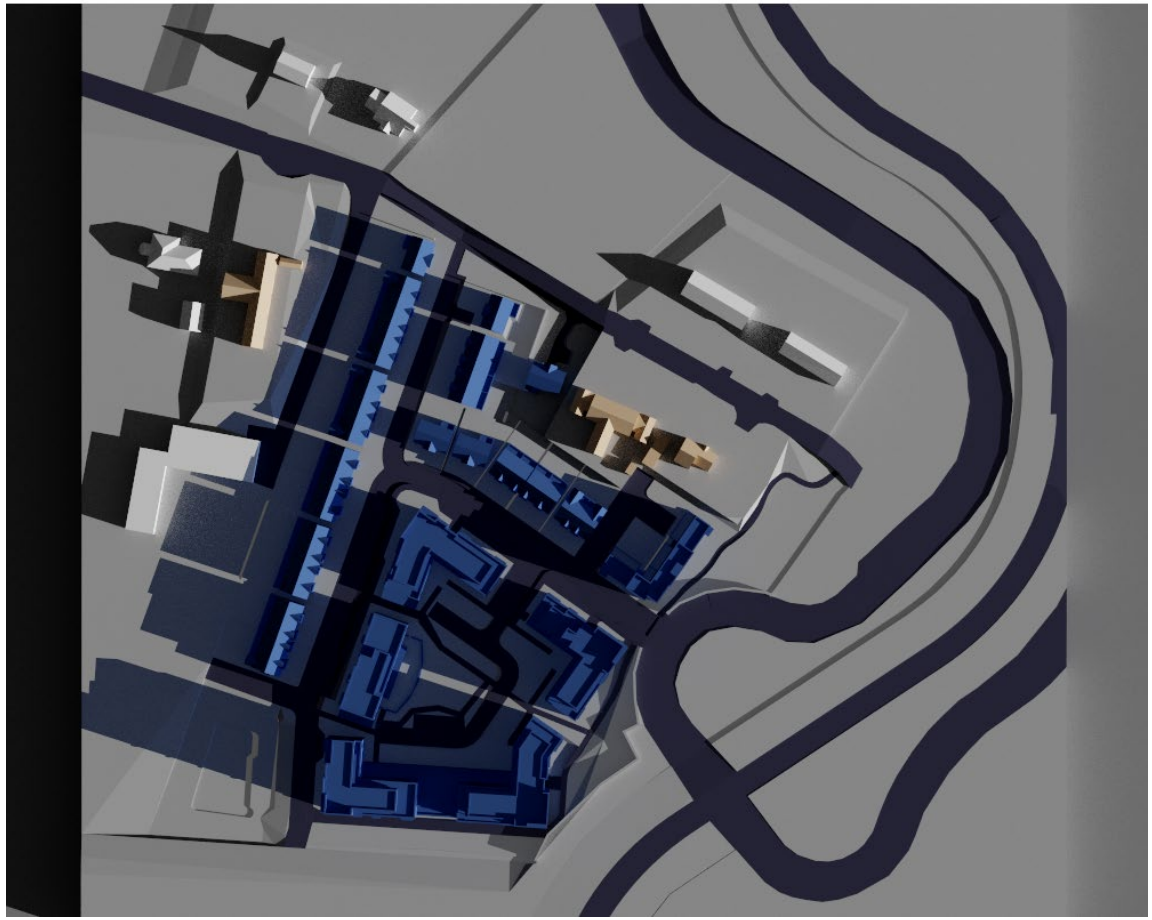
Appendix B Shadow Images

Shadow plots are used to show the shadows which the proposed building makes. "*In interpreting the impact of such differences, it must be borne in mind that nearly all structures will create areas of new shadow, and some degree of transient overshadowing of a space is to be expected.*" (BRE Building Technology Group, 2022)

Shadow plots were created for March 21st and June 21st. March 21st is the equinox and as such provides the average level of shadowing that can be expected. June 21st is a summertime plot and represents the best case for shadow. (December 21st has not been plotted as at this time of year even low buildings will cast long shadows. In a built-up area, it is common for large areas of the ground to be in shadow in December.)

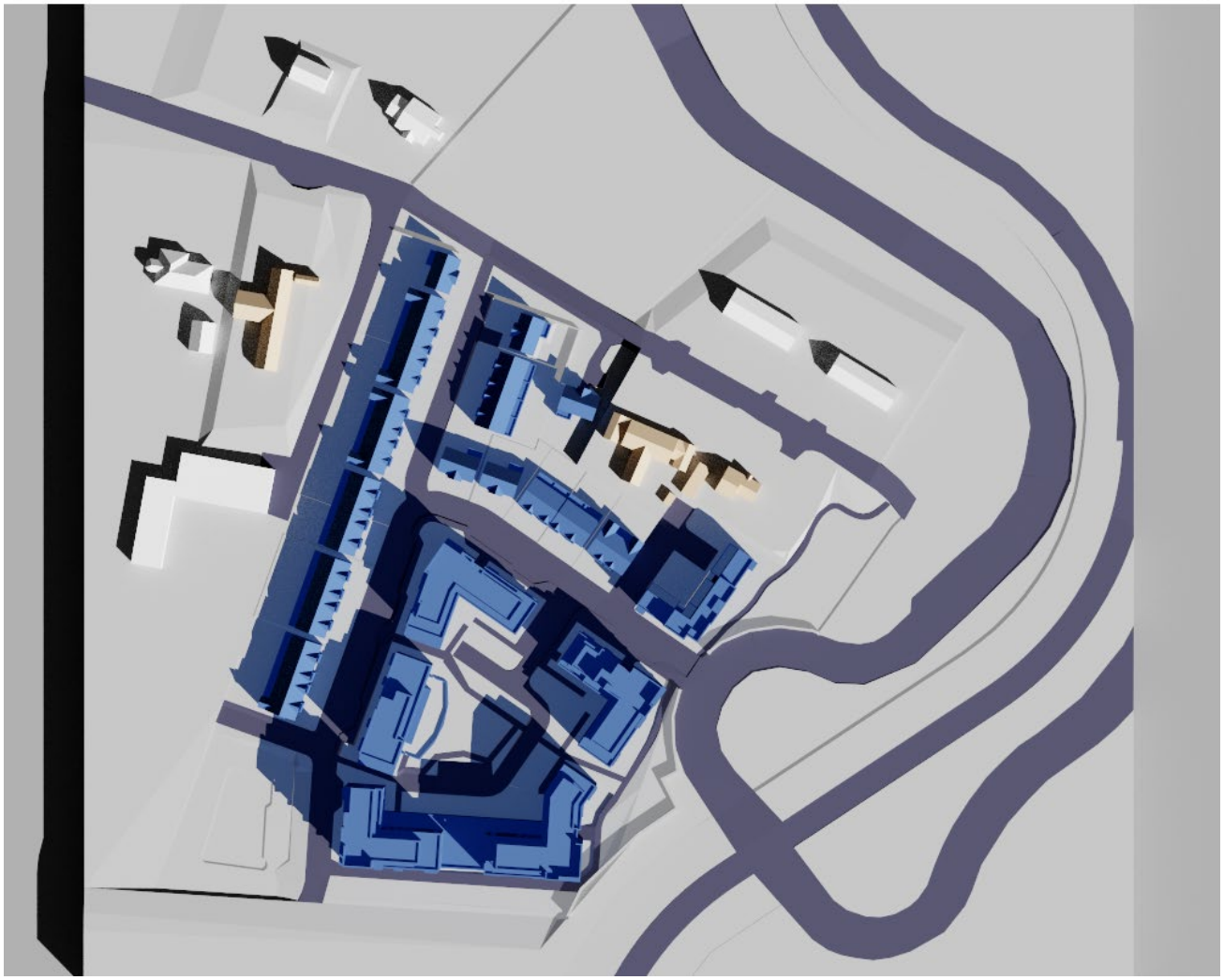
The shadow plots are purely illustrative (as opposed to other quantitative or quantitative metrics used in the analysis).

B.1 March 21st

	Proposed
March 21st - 08:00 (UTC)	20872-RPW-BPC-XX-ZZ-M3-P2-02 21-Mar 08-00-PROPOSED 

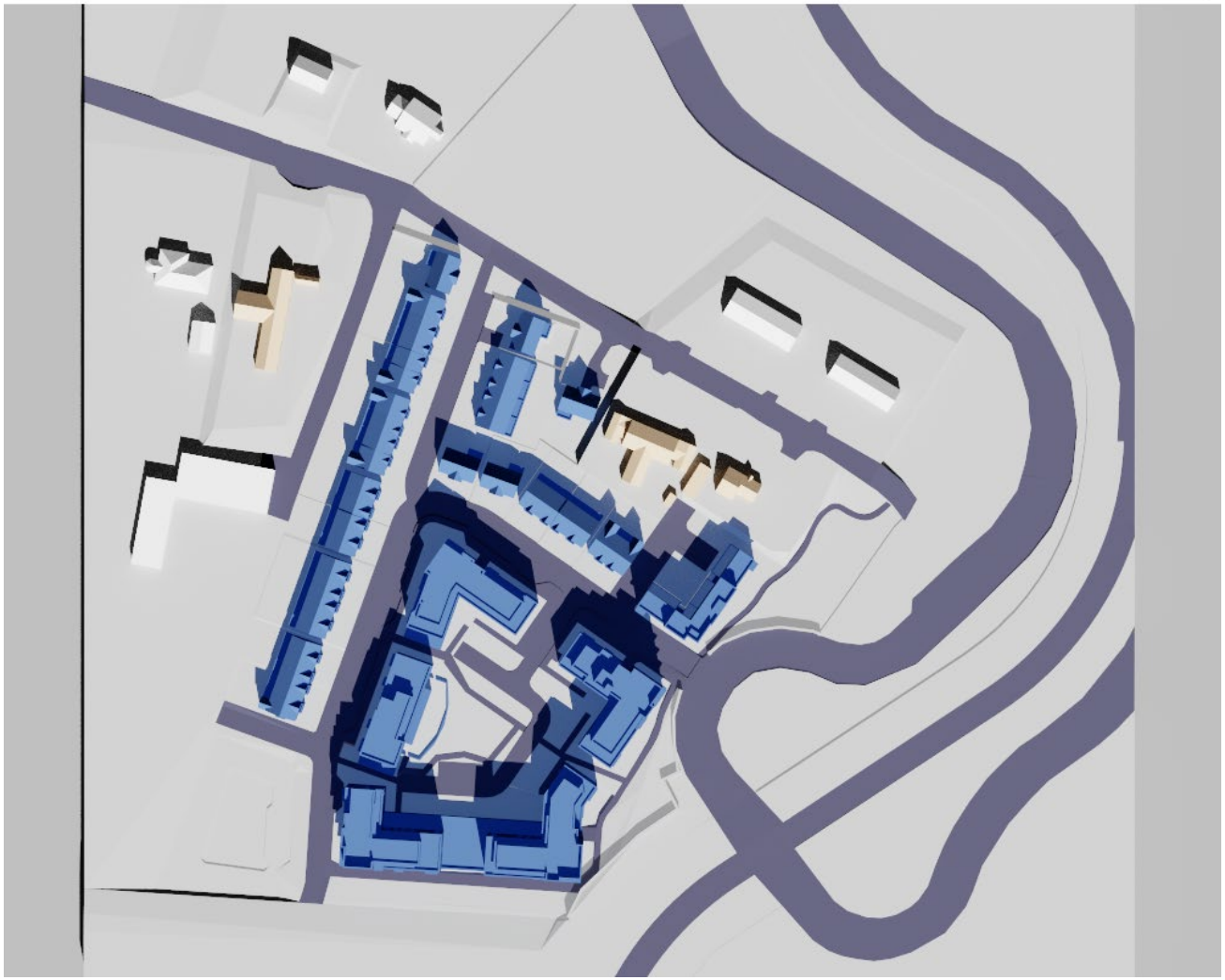
March 21st – 10:00 (UTC)

20872-RPW-BPC-XX-ZZ-M3-P2-02
21-Mar 10-00-PROPOSED



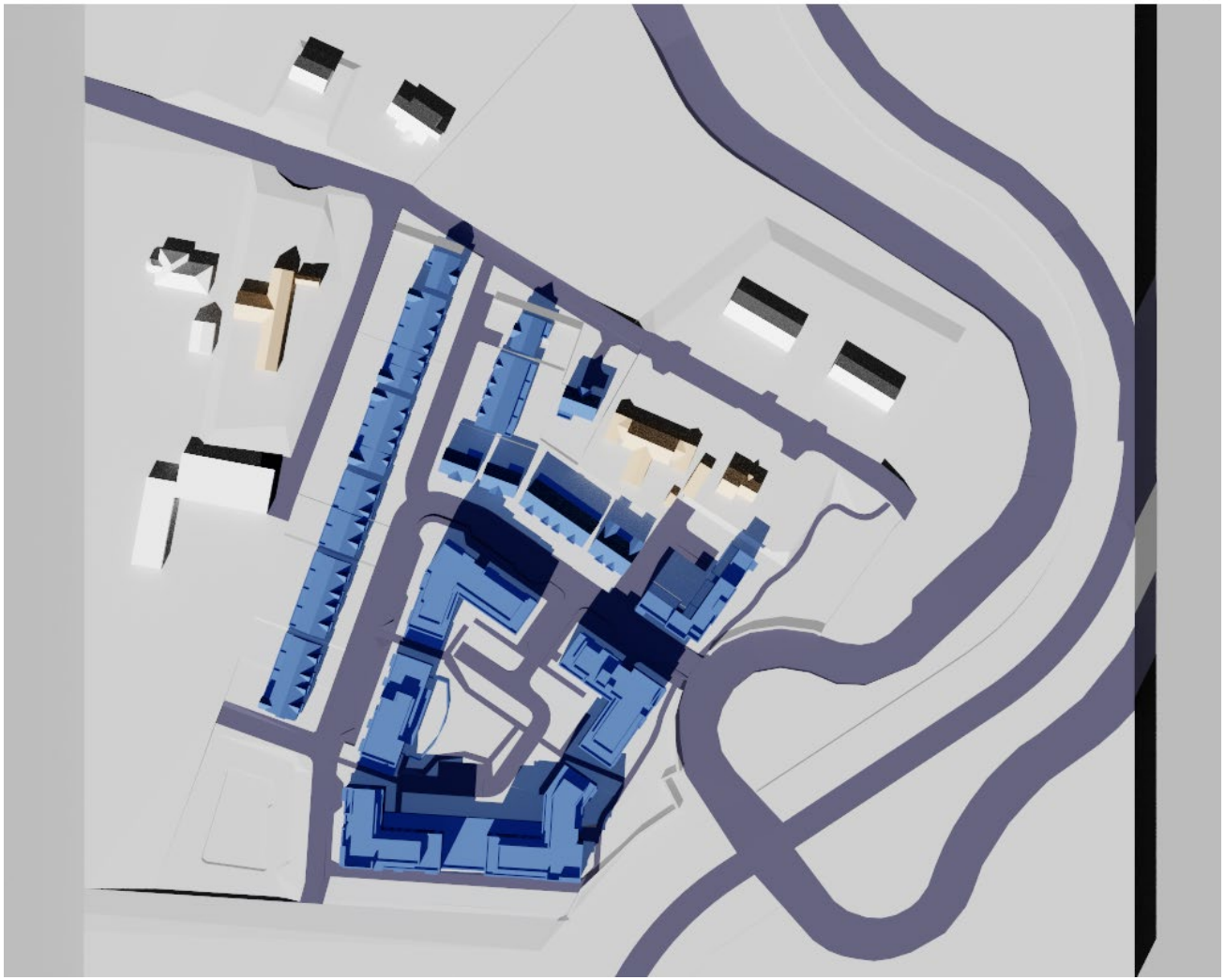
March 21st - 12:00 (UTC)

20872-RPW-BPC-XX-ZZ-M3-P2-02
21-Mar 12-00-PROPOSED



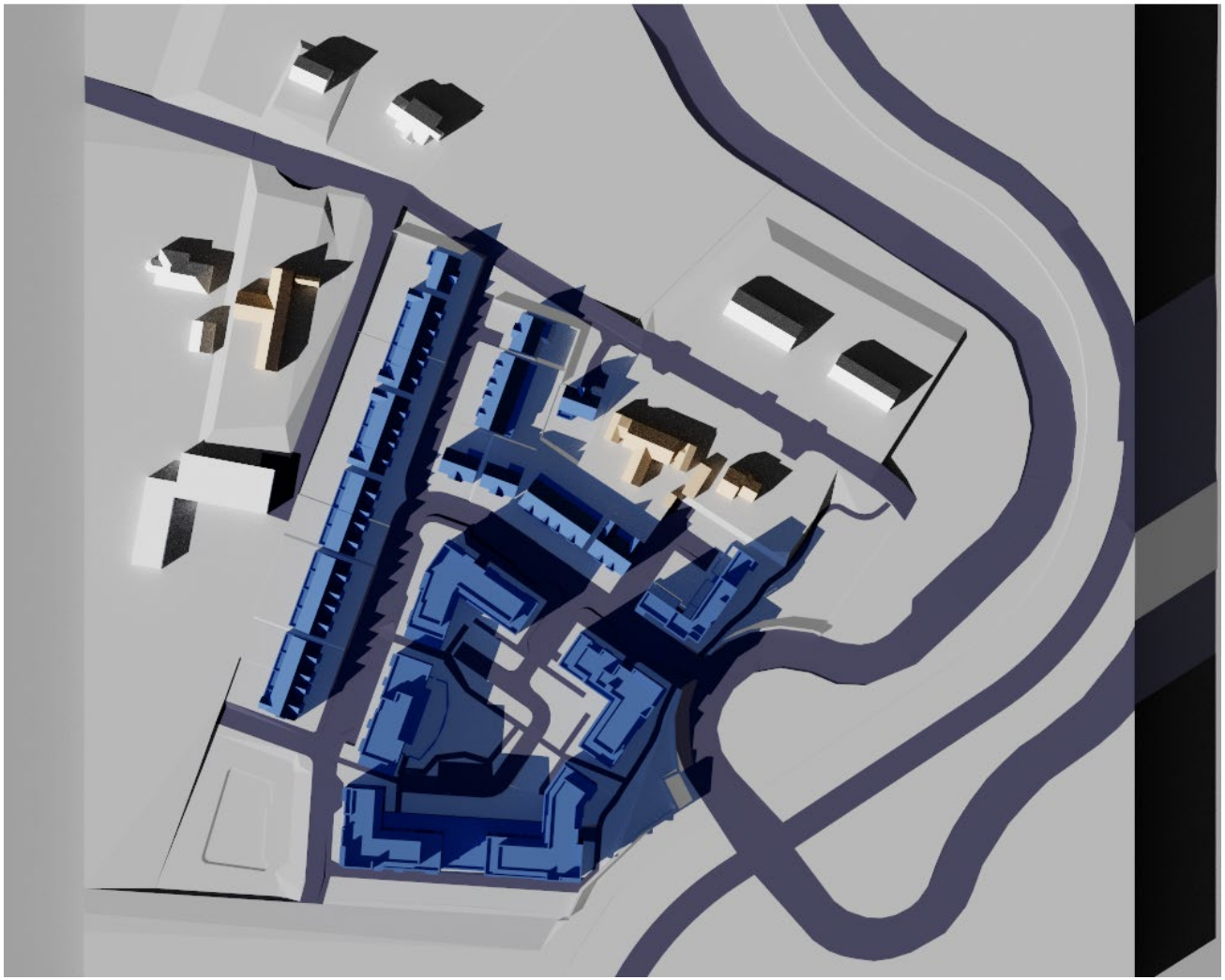
March 21st - 14:00 (UTC)

20872-RPW-BPC-XX-ZZ-M3-P2-02
21-Mar 14-00-PROPOSED

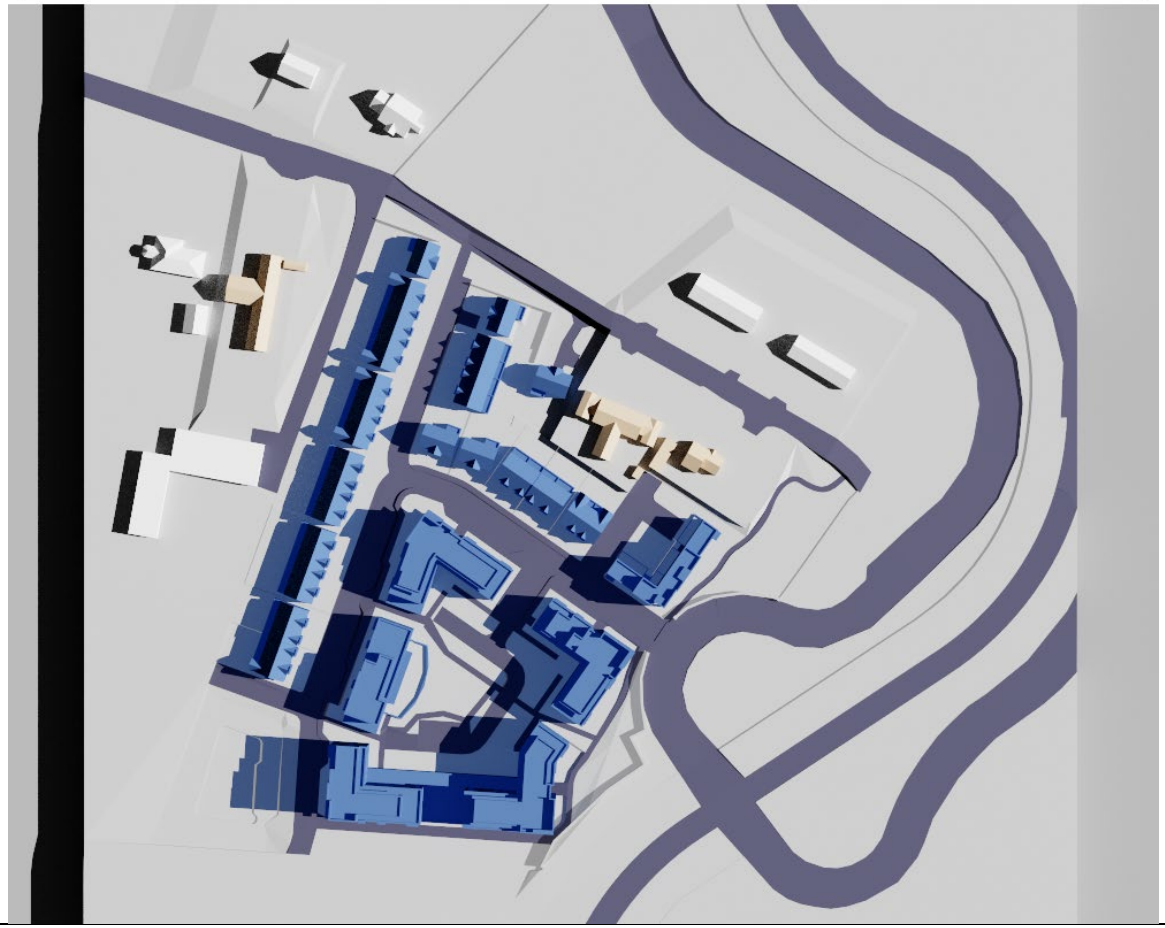


March 21st - 16:00 (UTC)

20872-RPW-BPC-XX-ZZ-M3-P2-02
21-Mar 16-00-PROPOSED



B.2 June 21st

	Proposed
June 21st - 8:00 (UTC+1)	20872-RPW-BPC-XX-ZZ-M3-P2-02 21-Jun 08-00-PROPOSED 

June 21st - 10:00 (UTC+1)

20872-RPW-BPC-XX-ZZ-M3-P2-02
21-Jun 10-00-PROPOSED

June 21st - 12:00 (UTC+1)

20872-RPW-BPC-XX-ZZ-M3-P2-02
21-Jun 12-00-PROPOSED

June 21st - 14:00 (UTC+1)

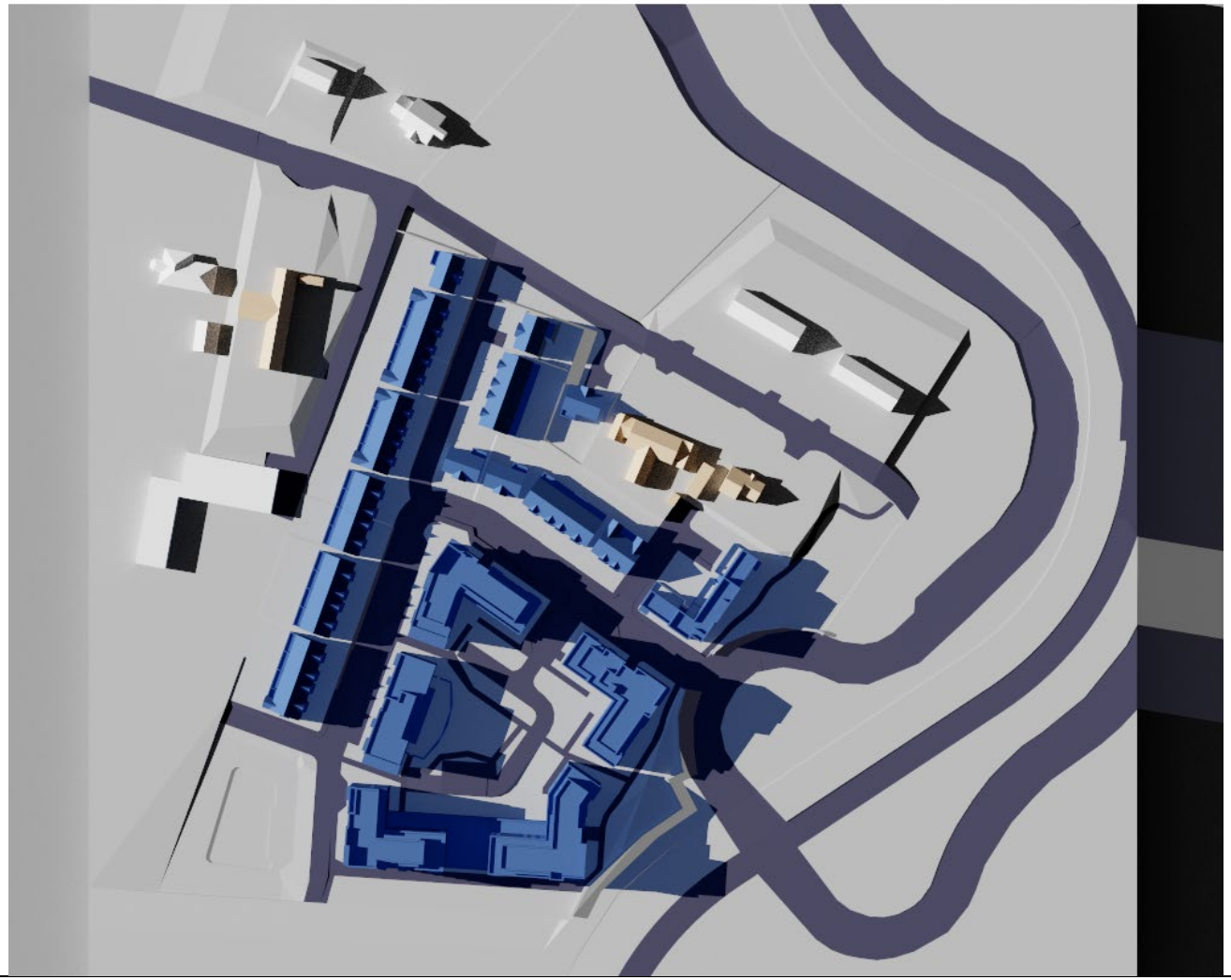
20872-RPW-BPC-XX-ZZ-M3-P2-02
21-Jun 14-00-PROPOSED

June 21st - 16:00 (UTC+1)

20872-RPW-BPC-XX-ZZ-M3-P2-02
21-Jun 16-00-PROPOSED

June 21st – 18:00 (UTC+1)

20872-RPW-BPC-XX-ZZ-M3-P2-02
21-Jun 18-00-PROPOSED



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