# Daylight & Sunlight Assessments of a Proposed Residential Development at Croke Villas, Sackville Avenue, Dublin 3

**Applicant:** Dublin City Council
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## Contents:

# 1. Introduction

The proposed development for the construction of 52 no. apartments at a site c.0.88 ha at Croke Villas, Sackville Avenue, bounded by Ballybough Road, Sackville Gardens, Sackville Avenue, Ardilaun Square and Ardilaun Road, GAA National Handball Centre, Dublin 3, which will consist of the following:

Clearance works at the site will comprise the removal of walls and perimeter fencing and an allotment garden at the Croke Villas site bounded by Ballybough Road, Sackville Gardens, Sackville Avenue, Ardilaun Square and Ardilaun Road. A wall along the boundary of the site and Irish Rail lands and railway line (to the south) will also be removed and replaced with a new boundary wall.

• Demolition of 1 no. remaining Croke Villas Flat building at the site will be demolished in accordance with PA. Reg. Ref. 2946/16
• Construction of two apartment blocks between 4 to 5 storeys, consisting of a total of 52 no. residential units:
  - Block A consists of 35 no. residential units (1 no. 1 bed and 34 no. 2 bed apartments); and
  - Block B consists of 17 no. residential units (4 no. 1 bed and 13 no. 2 bed apartments) and 152 sqm of internal community, arts and cultural space at ground floor.
• 4 no. car parking spaces and 129 no. cycle spaces.
• Sackville Gardens street will be extended to join with Ardilaun Square to form a new perimeter street to the southern edge of Block A, which will function as a new pedestrian and cycle link also serve as an emergency vehicle access.
• Removal of undesignated car parking spaces along Sackville Avenue and construction of a new Boulevard on Sackville Avenue from the Ballybough Road junction to Ardilaun Road, which will also facilitate vehicular access.
• Provision of c. 961 sqm public open space, c.500 sqm communal open space, c.367 sqm private open space and 68 sqm of outdoor community, arts and cultural space (55 sqm facing Sackville Avenue and 13 sqm in internal courtyard).
• Boundary treatments, public lighting, site drainage works, road surfacing and footpaths, ESB substation, ESB meter rooms, plant rooms, stores, bin and bicycle storage, landscaping; and
• All ancillary site services and development works above and below ground.

## 1.1 Executive Summary

This report assesses the impact of the proposed development for Daylight and Sunlight on the neighbouring buildings and the quality of daylight and sunlight within the proposed development. This analysis is carried out based on the drawings of Coady Architects.

## 1.2 Assessment of Potential Impact to Daylight and Sunlight Availability on Adjacent Properties

### 1.2.1 Daylight to Adjacent Properties

The impact on the VSC levels is in-line with developments in urban locations and the Sustainable and Compact Settlements: Guidelines for Planning Authorities (2024) recommends flexibility when interpreting results.

Whilst it is acknowledged that the proposed development will have a perceptible level of impact to the daylight of many of the windows in this study, the level of impact to the vast majority of the affected windows is in line with the planning approved scheme for the site and windows which fall below >27% VSC or <27% but >80% existing value will experience a similar level of impact from the extant permission under Reg Ref.: 3455/17. Therefore the proposed development will have no substantial change in impact from that of the permitted development.

It is important to recognise that the guideline targets published by the BRE are intended to be employed with a degree of discretion and flexibility. The flexibility available in the BRE guide is outlined in the introductory section as follows:

> *"The advice given here is not mandatory and this document should not be seen as an instrument of planning policy. Its aim is to help rather than constrain the designer. Although it gives numerical targets these should be interpreted flexibly because natural lighting is only one of many factors in site layout design."*

This approach is recognised within planning guidance which has been published by Government. On page 43 of the Urban Design Manual 2009 the following advice is provided:

> *"Where design standards are to be used (such as the UK document Site Layout Planning for Daylight and Sunlight, published by the BRE), it should be acknowledged that for higher density proposals in urban areas it may not be possible to achieve the specified criteria, and standards may need to be adjusted locally to recognise the need for appropriate heights or street widths."*

### 1.2.2 Sunlight to Adjacent Properties

There will be minimal reduction to the available sunlight to the neighbouring properties and any impact will be imperceptible.

There will be no reduction to sunlight to existing adjacent private amenity spaces and are any perceived reduction will be negligible.

### 1.3 Assessment of the Quality of Daylight and Sunlight within the Proposed Development

The apartments were designed in line with the recommendations of the BRE guidelines. Numerous rounds of design iterations were conducted to improve the daylight and sunlight within in the proposed development. The guidelines clearly state that the they are recommendations only and flexibility is required when setting and interpreting the targets.

BR209:2022 recommends assessment methods set out in BS EN 17037 for daylight provision. BS EN 17037 contains a National Annex (NA1) which sets out minimum daylight levels to be achieved in the UK and channel Islands. Ireland has a similar latitude and climate to the UK. The National Annex in BS EN 17037 states that the target values set out in Table A1 may be hard to achieve in the UK and as a result sets alternative minimum values for rooms to dwellings. The minimum illuminance levels set out in BS EN17037:2018+A1:2021 are: Kitchens and living spaces containing a kitchen 200lux (1.3%DF). Living rooms 150lux (1%DF) and bedrooms 100lux (DF0.7%).

There are existing mature trees to the rear of no.6 Sackville Gardens within the vicinity of the proposed development. All daylight assessments are undertaken with the retained existing trees in place.

#### 1.3.1 Assessment of Daylight in Accordance with BR209:2022 and BS EN 17037:2018+A1:2021

100% of the Living, Dining, Kitchen and Bedroom spaces within the proposed development achieve the target values set out in BS EN 17037:2018+A1:2021 section NA1. These are the minimum values, per specified use, to be achieved in habitable rooms and meets the recommendations of the BRE guidelines.

#### 1.3.2 Sunlight within the Proposed Development

This scheme is well designed for sunlight, with 71.2% of units meeting the minimum recommended 1.5 direct sunlight hours. This is in line with the BRE guideline example for an apartment layout where 4 in 5 achieves the target sunlight hours.

All of the proposed communal and public amenity spaces achieve sunlight levels that exceed 2 hours sunlight over 50% of the amenity space on the 21st March.

### 1.4 Supplementary Information - Assessment of Daylight in Accordance with IS EN 17037:2018

EN 17037:2018 sets out values for target illuminance, minimum target illuminance and fractions of reference plane to be achieved. The target and minimum target levels set out in EN17037:2018 are for any type of building; they do not take into account room use or make allowance for rooms that have a lesser requirement for daylight. The results of this assessment indicate a high level of daylight provision, with 96.0% of rooms achieving Minimum Illuminance and 88.1% achieving Target Illuminance. Appendix B identifies any rooms which do not achieve target illuminance levels.

To date there is no guidance from governmental bodies on the use or interpretation of IS EN 17038:2018. Apartment guidelines and local authorities guidelines refer to BR209 2022: “Site layout planning for daylight and sunlight” (Third edition) which in turn references BS EN 17037. BS EN17037:2018+A1:2021 is the same as IS EN 17037:2018 with the addition of a National Annex (NA1) and the annex specifically refers to and sets room specific values for dwellings in the UK and Channel Islands.

Appendix 16- Sunlight and Daylight of the Dublin City Development Plan 2022-2028 gives guidance on the two daylight provision metrics as follows:
Section 3.3 BS EN 17037:2018 – Daylight in Buildings states that:*“The minimum daylight provision targets given within the national annex have relevance.”*
Section 3.4 IS EN 17037:2018 – Daylight in Buildings states that due to the lack of localisation and provision for specific guidance on individual room use that: *“These limitations make it unsuitable for use in planning policy or during planning applications. BR 209 must still be used for this purpose.“*

### 1.5 Conclusions

Overall the design team worked in response to the context to ensure the proposed development performed with regards to achieving the best possible daylight and sunlight quality. All apartments meet the minimum standard for daylight provision as per BS EN 17037:2018+A1:2021 as referred to in the BRE guidelines BR209:2022 (third edition). The majority of the apartment units achieve daylight provision as set out in IS EN 17038:2018.

Also of note with regards to internal daylighting section 6.7 of the Sustainable Urban Housing: Design Standards for New Apartments July 2023 states the following:

> *“Where an applicant cannot fully meet all of the requirements of the daylight provisions above, this must be clearly identified and a rationale for any alternative, compensatory design solutions must be set out, which planning authorities should apply their discretion in accepting taking account of its assessment of specific (sic). This may arise due to design constraints associated with the site or location and the balancing of that assessment against the desirability of*

*achieving wider planning objectives. Such objectives might include securing comprehensive urban regeneration and or an effective urban design and streetscape solution."*

Furthermore Section 3.2 of the Urban Development and Building Heights: Guidelines for Planning Authorities (2018) states the following:

*"Where a proposal may not be able to fully meet all the requirements of the daylight provisions above, this must be clearly identified and a rationale for any alternative, compensatory design solutions must be set out, in respect of which the planning authority or An Bord Pleanála should apply their discretion, having regard to local factors including specific site constraints and the balancing of that assessment against the desirability of achieving wider planning objectives. Such objectives might include securing comprehensive urban regeneration and or an effective urban design and streetscape solution."*

It is our opinion that all the rooms within the proposed development achieve the minimum target daylight levels set out in BS EN 17037:2018+A1:2021 as referred to in The BRE guidelines BR209:2022 (third edition) and no compensatory measures are required.

# 2. Methodology

## 2.1 Standards and Guidelines

Ministerial guidance is provided in Sustainable and Compact Settlements: Guidelines for Planning Authorities (2024) Section 5.3.7(b).

> *"In cases where a technical assessment of daylight performance is considered by the planning authority to be necessary regard should be had to quantitative performance approaches to daylight provision outlined in guides like A New European Standard for Daylighting in Buildings IS EN17037:2018, UK National Annex BS EN17037:2019 and the associated BRE Guide 209 2022 Edition (June 2022), or any relevant future standards or guidance specific to the Irish context."*

This is accordance with Section 6.6 of the Sustainable Urban Housing: Design Standards for New Apartments (2023), and Section 3.2 of the Urban Development and Building Heights Guidelines for Planning Authorities (2018).

The Daylight and Sunlight assessments included in this report demonstrates the level of compliance with these three documents:

- BR209:2022 Site Layout Planning for Daylight and Sunlight (3rd edition), also referred to as the BRE guidelines.
- BS EN 17037:2018+A1:2021 Daylight in Buildings, also referred to as the UK Annex.
- IS EN 17037:2018 Daylight in Buildings.

As Appendix 16- Sunlight and Daylight of the Dublin City Development Plan 2022-28 references the BR209:2011 Site Layout Planning for Daylight and Sunlight (2nd edition), it is considered that the guidance in the Development Plan has been superseded by BR209:2022 and therefore it is not necessary to assess the scheme against the recommendations in Appendix 16 also.

## 2.2 BRE Guidance Document BR209:2022 - Site Layout Planning for Daylight and Sunlight (3rd edition).

The BRE guidelines (2022) state at the outset that "It is purely advisory and the numerical target values within it may be varied to meet the needs of the development and its location." The recommendations of the BRE guidelines (2022) are not suitable for rigid application to all developments in all contexts and this is of particular importance in the context of national and local policies for the consolidation and densification of urban areas.

BR209 2022 sets out the assessment metrics to be applied when assessing the potential impact of a development on the daylight and sunlight of neighbouring properties. The metrics for assessing impact to adjacent buildings in the areas of Daylight is the Vertical Sky Component (VSC) and Sunlight is the Annual Probable Sunlight Hours (APSH). Sunlight to adjacent amenity space is assessed through the measurement of sunlight availability on the 21st March and the plotting of shadow diagrams.

The BRE guidelines (2022) recommend the use of BS EN 17037:2018 for assessing the quality of interior spaces in proposed developments. BS EN 17037 sets out assessment methods for daylight provision and access to sunlight. It states that "The guidance here is intended for use in the United Kingdom and in the Republic of Ireland, though recommendations in the Irish Standard IS EN 17037 may vary from those in BS EN17037."

EN 17037 is a unified daylighting standard published by the European Committee for Standardization (CEN) in 2018. It is applicable across all countries within the EU including Ireland with the Irish edition IS EN17037:2018. The standard is enacted in Britain under BS EN 17037:2018+A1:2021 with a UK National Annex for regional assessments. The daylight and sunlight assessment methods for internal daylight and sunlight provision are common to both the Irish Standard Version and the UK version.

The UK National Annex (NA) provides further recommendations for daylight provision in the UK and Channel Islands. NA.1 states that the UK committee supports the recommendations for daylight in buildings given in BS EN17037:2018. The annex states that the daylight target levels in Clause A.2 may be hard to achieve in buildings in the UK and in particular dwellings in urban areas with significant obstructions or tall trees outside. NA.2 sets out minimum daylight provision to be achieved in UK dwellings.

The UK National Annex A1 sets out room specific minimum values to be achieved in the UK and Channel Islands. All the rooms achieve the minimum DF factor levels set out in A1 for Bedrooms (DF0.7%), Living Rooms (1%DF) and Kitchens and Living Spaces containing a Kitchen(1.3%). The Daylight Factor percentage values are derived from minimum room specific illiminance levels set out in NA+1 and the Median External Diffuse Illuminance ($E_{v,d,med}$ ) for Dublin from Table A.3 EN17037:2018. The illuminance levels and corresponding DF% are given in Table 5 below.

## 2.3 Daylight to Existing Dwellings

BRE guidance document (2022) "Site layout planning for daylight and sunlight" relates to daylight and sunlight to potential impact in neighbouring buildings. As set out above, this is broadly in line with the previous version of the BRE guidelines (2011). The metrics are the same for assessing impact in the areas of Daylight (VSC) and Sunlight (APSH) to adjacent buildings. Sunlight to adjacent amenity space is assessed through the measurement of sunlight availability on the 21st March.

A proposed development could potentially have a negative effect on the level of daylight that a neighbouring property receives, if the obstructing building is large in relation to their distance from the existing dwelling. To ensure a neighbouring property is not adversely affected, the Vertical Sky Component (also referred to as VSC) is calculated and assessed. VSC can be defined as the amount of skylight that falls on a vertical wall or window.

BRE guidelines (2022) recommend that; *"Loss of light to existing windows need not be assessed 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."*

The diffuse light of the existing building may be adversely affected if part of a new building measured in a vertical section perpendicular to the main window wall of an existing building, from the centre of the lowest window, subtends an angle of more than 25º to the horizontal. If a window falls within a 45° angle both in plan and elevation with a new development in place then the window may be affected and should be assessed.

The guidelines sets out which rooms need to be assessed for daylight in Section 2.2;

> *"The guidelines 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";*

For loss of daylight the BRE guidelines (2022) recommends calculation of the Vertical Sky Component. This is the ratio of direct sky illuminance falling on the outside window, to the simultaneous horizontal illuminance under an unobstructed sky. The standard CIE Overcast Sky is used and the ratio is usually expressed as a percentage. The maximum value is just under 40% for a completely unobstructed vertical wall. The Vertical Sky Component on a window is a good measure of the amount of daylight entering it.

The BRE guidelines (2022) recommend one of two criteria is met when assessing for the Vertical Sky Component;

a) Where the Vertical Sky Component at the centre of the existing window exceeds 27% with the new development in place then enough sky light should still be reached by the existing window.

b) Where the Vertical Sky Component with the new development in place is both less than 27% and less than 0.8 times its former value, then the area lit by the window is likely to appear more gloomy, and electric light will be needed more of the time.

The BRE guidelines (2022) state that if the VSC is:

- At least 27%, then conventional window design will usually give reasonable results;
- Between 15% and 27%, then special measures (larger windows, changes to room layout) are usually needed to provide adequate daylight;
- Between 5% and 15%, then it is very difficult to prove adequate daylight unless very large windows are used;
- Less than 5%, then it is often impossible to achieve reasonable daylight, even if the whole window wall is glazed

This report assesses the percentage of direct sky illuminance that falls on the centre point of neighbouring windows that could be affected by the proposed development through the Vertical Sky Component (VSC) as per the methodologies contained in the BRE guidelines (2022).

## 2.4 Sunlight to Existing Buildings

The BRE guidelines (2022) recommend assessing the main living rooms and conservatories if they have a window wall facing within 90° of due south. Kitchens and bedrooms are less important but care should be taken not to block too much sun. If the proposed development is fully north of the existing window then sunlight need not be assessed.

The Annual Probable Sunlight Hours (APSH) is used to assess the quantity of sunlight for a given location. This is the total amount of sunshine for a given location on an unobstructed horizontal surface taking cloud cover into account. Statistical data from the Irish Meteorological Service is used to assess the APSH and the Winter Probable Sunlight Hours (taken to fall between the 21st of September and the 21st of March).
Table 1 below shows the average sunlight hours for each month and the maximum possible without any cloud cover. This gives the factor of possible sunlight hours for each month.

| Met Éireann Sunlight Hours Data Set 1991-2020 | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec | Total |
| Average Sunlight Hours/ Day | 1:54 | 2:54 | 3:42 | 5:24 | 6:24 | 6:00 | 5:17 | 5:00 | 4:24 | 3:24 | 2:24 | 1:42 | |
| Average Sunlight Hours/ Month | 58:54 | 81:12 | 114:42 | 162:00 | 198:24 | 180:00 | 163:47 | 155:00 | 132:00 | 105:24 | 72:00 | 52:42 | 1449.1 |
| Total Available Sunlight Hours | 252 | 265 | 358 | 412 | 483 | 485 | 496 | 451 | 375 | 320 | 250 | 236 | 4383 |
| Probable Sunlight Hours Ratio | 23.4% | 30.6% | 32.9% | 39.3% | 41.1% | 37.1% | 33.0% | 34.4% | 35.2% | 32.9% | 16.8% | 22.3% | 33.1% |

**Table 1: Average monthly sunlight hours recorded at Dublin Airport - Data set 1991-2020**

The BRE guidelines (2022) recommend that the centre of a window or 1.6m above ground for a door be assessed and it should receive at least 25% of the APSH and it should receive at least 5% during the period of 21st September to 21st March. If the available APSH is less than this then it should not be reduced below 0.8 times its former value or noticeable loss of sunlight may occur.

### 2.5 Sunlight to Gardens and Open Spaces

For calculations of sunlight analysis it is general practice to use March 21st. The BRE guidelines (2022) states:

> *"It is recommended that for it to appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive at least two hours of sunlight on 21 March. If as a result of new development an existing garden or amenity area does not meet the above, and the area which can receive two hours of sun on 21 March is less than 0.8 times its former value, then the loss of sunlight is likely to be noticeable. If a detailed calculation cannot be carried out, it is recommended that the centre of the area should receive at least two hours of sunlight on 21 March."*

### 2.6 Calculations of Trees & Hedges

Trees are not usually included in the assessments of impact on neighbouring properties, unless specified otherwise. In relation to the effects of trees and hedges the BRE guidelines (2022) states;

> *"It is generally more difficult to calculate the effects of trees on daylight because of their irregular shape and because some light will generally penetrate through the crown. Where the effects of a new building on existing buildings nearby is being analysed, it is usual to ignore the effects of existing trees. This is because daylight is at its scarcest and most valuable in winter when most trees will not be in leaf."*

BR209:2022 recommends that sometimes trees should be taken into account for the proposed development where the new development is proposed near large existing trees. This needs to be done by modelling a representative of the existing trees. Reflectance and transparency should be taken into account. Table G1 in BR209:2022 gives values for transparencies of tree crowns in summer and winter for deciduous trees, dense evergreen can be assessed as opaque. Table G2 gives general reflectance values for shades of trees.

### 2.7 BRE Guidelines (2022) Appendix H: Environmental Impact Assessment

The BRE guidelines sets out criteria for classification for assessment of impact where a new development affects a number of existing buildings or open spaces in relation to an Environmental Impact Assessment. The guide does not give a specific range or percentages but sets out parameters as set out below.

> *"Where the loss of skylight or sunlight fully meets the guidelines in this book, the impact is assessed as negligible or minor adverse. Where the loss of light is well within the guidelines, or only a small number of windows or limited area of open space lose light (within the guidelines), a classification of negligible impact is more appropriate. Where the loss of light is only just within the guidelines, and a larger number of windows or open space area are affected, a minor adverse impact would be more appropriate, especially if there is a particularly strong requirement for daylight and sunlight in the affected building or open space.*
>
> *Where the loss of skylight or sunlight does not meet the guidelines in this book, the impact is assessed as minor, moderate or major adverse. Factors tending towards a minor adverse impact include:*
> - *only a small number of windows or limited area of open space 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.*
>
> *Factors tending towards a major adverse impact include:*
> - *a large number of windows or large area of open space 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, e.g. a living room in a dwelling or a children's playground.*
>
> *Beneficial impacts occur when there is a significant increase in the amount of skylight and sunlight reaching an existing building where it is required, or in the amount of sunlight reaching an open space. Beneficial impacts should be worked out using the same principles as adverse impacts. Thus a tiny increase in light would be classified as a negligible impact, not a minor beneficial impact."*

A flexible approach should be taken when assessing the impact with daylight and sunlight being one of many factors that influence the environment when planning a new development.

The BRE guidelines does not set out a specific value range for the different classification of impact level of Minor, Moderate and Major to each window. For the purpose of this report one of five classification levels will be applied:

1. Imperceptible: There is no reduction in the VSC levels or where the levels are 99% of the existing value.
2. No substantial change: A reduction in the VSC level but it retains a VSC >27% or <27% but >80% of the existing value
3. Minor reduction: A reduction below <27%VSC and <80% of the existing value but greater than 20% VSC.
4. Moderate reduction: A reduction below <20%VSC and <80% of the existing value but greater than 10% VSC.
5. Major reduction: A reduction below <10%VSC and <80% of the existing value.

The evaluation of the impact should be considered in conjunction with other factors when determining the overall impact level to a property.

### 2.8 Daylight in the Proposed Development.

BR209 (2022) Appendix C sets out interior daylight recommendations. The guideline sets out the that; “BS EN 17037 supersedes BS8206 Part 2 ‘Code of practice for daylighting’ which contained a method of assessment based on Average Daylight Factor, which is now no longer recommended.

BS EN 17037:2018+A1 sets out two methods for assessing daylight provision in proposed buildings. One method is called the **Illuminance method.** This is based on Target illuminances for daylight to be achieved across specified fractions of a reference plane at working plane height (0.85m) for half the daylight hours in a year. The Illuminance Method requires the use of a suitable weather file with local climate conditions and takes into account the orientation of the space.

The alternative method is called the **Daylight Factor Method.** This method is based on calculating the daylight factors achieved over specific fractions of a reference plane. The Daylight factor is the illuminance at a point on a reference plane in a space, divided by the illuminance on an unobstructed horizontal surface outdoors. This method uses an overcast sky for calculation and the assessment of the space is orientation independent. BS EN 17037 gives the Median External Diffuse Illuminance (Ev,d,med) for the capital cities throughout Europe to account for external local illuminance levels.

The UK National Annex (NA) sets out additional minimum room specific Target Daylight Factor values for the UK where the target values in A2 are hard to achieve. NA.2 sets out illuminance values to be exceeded over at least 50% of the points on a reference plane 0.85m above the floor for at least half the daylight hours. The UK committee formed the opinion that the Target Illuminance recommendations in Clause A.2 of BS EN 17037 may not be achievable for some buildings, particularly dwellings. The UK committee believes this could be the case for dwellings with basement rooms or those with significant external obstructions.

BR209 (2022) recommends surface reflectances should represent real conditions and where reflectance values have not been measured or specified default values are set out in Table C4 of the guidance document. The surface reflectances have been specified and are set out in Table 2 below. This table also shows the input values for material used and additional assessment model input parameters.

| **Input Values for Assessment Model** | | | |
|---|---|---|---|
| Surface Reflectance | | | |
| Element | Reflectance | Transmittance | Material Description |
| Internal walls | 80% | 0% | White Painted Walls |
| Internal ceiling | 80% | 0% | White Painted Ceiling |
| Floor - light wood | 40% | 0% | Light wood Flooring |
| External walls - proposed development | 50% | 0% | Brick |
| External walls - outside site | 50% | 0% | CIBSE |
| External ground | 20% | 0% | CIBSE |
| Glass | | 68% | Triple glazed clear glass |
| Maintenance Factor for Glass | | Assessment Plane | |
| Suburban Vertical no overhang | 0.96 | Sensor Grid spacing | 0.3m |
| Suburban Vertical sheltered by balcony or overhang | 0.88 | Sensor grid inset | 0.35m |
| Framing Factor: Patio Doors | 0.77 | Minimum inset | 0.3m |
| | | Work plane offset | 0.85m |

**Table 2: Surface reflectance parameters and input values for model calculations**

The EN17037:2018 Standard deals exclusively with new developments and does not give guidance or metrics on loss of light or sunlight to existing properties. EN 17037:2018 sets out values for Minimum and Target levels to be achieved with a minimum, medium and high compliance level for each. The guideline recommends that the minimum level should be achieved for both target levels but it does not give guidance on the number of units or fraction within a multiple residential unit development that

should achieve these values. Additionally it does not differentiate between room use and weighted targets for rooms which would have a lesser requirement. The UK National annex sets out factors for UK specific settings where it is difficult to achieve natural daylighting.

The compliance calculation is based on an annual, climate-based simulation of interior illuminance distributions. BR209 refers to this method as the Illuminance Method. For each hour of the year, the percentage of the floor area achieving minimum and target illuminance thresholds are measured on a room-by-room basis. Two target types are set with the following criteria:

- Target Illuminance: 300 lux over 50% of floor area for at least 50% of daylight hours.
- Minimum Illuminance: 100 lux over 95% of floor area for at least 50% of daylight hours.

BS EN 17037 gives three levels of recommendation for daylight provision in an interior space: Minimum, Medium and High. BR209:2022 Section C3 recommends for compliance with the standard, a space should achieve the Minimum level.

Daylight hours are defined as the 4380 hours with the most diffuse horizontal illuminance in the weather file. In addition to this baseline (Minimum) requirement, rooms can achieve Medium and High levels of compliance by meeting higher illuminance thresholds, as outlined in the table below:

| **Target Illuminance from Daylight over at least half the daylight hours** | | |
|---|---|---|
| Level of recommendation | Target illuminance<br>$E_T$(lx) for half of the assessment grid | Minimum illuminance<br>$E_{TM}$(lx) for 95% of the assessment grid |
| Minimum | 300 lux | 100 lux |
| Medium | 500 lux | 300 lux |
| High | 750 lux | 500 lux |

**Table 3: IS / BS EN 17037:2018 Target Illuminance from Daylight over at least half the daylight hours.**

| **Target Daylight Factor (D) for Dublin*** | | |
|---|---|---|
| Level of recommendation | Target daylight factor<br>D for half of the assessment grid | Minimum daylight factor<br>D for 95% of the assessment grid |
| Minimum | 2% | 0.7% |
| Medium | 3.5% | 2% |
| High | 5% | 3.5% |

**Table 4: IS / BS EN 17037:2018 Target Daylight Factor (D) for Dublin.**

| **Target Minimum Daylight Factor (D) for Dublin* based UK National Annex** | | |
|---|---|---|
| Room Type | Target illuminance<br>$E_T$(lx) for half of the assessment grid | Target daylight factor D from Table A.3 EN17037<br>$E_{v,d,med}$ for Dublin -14,900 |
| Bedroom | 100 lux | 0.7% |
| Living Room | 150 lux | 1% |
| Kitchen | 200 lux | 1.3% |

* EN17037 uses the latitude of the capital city of each European country to set individual values for daylight and sunlight metrics for use in setting the target levels to be achieved in a particular country.

**Table 5: BS EN 17037:2018+A1:2021 Target Illuminance levels and Daylight Factor (D) for Dublin.**

### 2.9 Sunlight within Proposed Developments

The BRE guidelines (2022) recommend that for large residential developments the overall sunlight potential can be initially assessed by counting the number of windows facing south, east and west and the aim should be to minimise the number of living rooms facing solely north, north-east or north-west unless there is some compensating factor such as an appealing view to the north. The guideline acknowledges that it may not be possible to have every living room facing within 90° of south in large developments, however, it recommends maximising the number of units with a southerly aspect.

The BRE guidelines (2022) state that BS EN 17037 should be used to assess for interior access to direct sunlight and that the assessment of APSH should no longer be used. BS EN 17037 sets recommendations for access to sunlight and notes three levels of achievement; Minimum, Medium and High. In dwellings at least one habitable room, preferably a living room, should achieve the Minimum of 1.5 direct hours on a specified date between 1st February and 21st March, with a cloudless sky. This assessment uses the 21st March. The guidelines recommend a time step of 5 minutes or less for the assessment interval. The Minimum level to achieve is 1.5, the Medium level is 3 hours and the High level is 4 hours direct sunlight.

# 3. Daylight to adjacent buildings.

## 3.1 Site Overview

The site is located at the former Croke Villas housing complex, Sackville Avenue, Drumcondra, Dublin 3. The proposal relates to an urban regeneration project involving the demolition of 3 blocks of Flats. The National Handball Centre has been constructed to the east of the site in the initial phase. The current proposal involves the demolition of the third housing block and the construction of 2 apartment blocks.

There are two permitted part 8 developments (Reg. Ref.: 3455/17 and Reg. Ref.: 3789/20) on this and adjacent sites on Sackville Avenue, as shown in Figure 3 below. These developments include 13 no. houses on Sackville avenue, which completed the terrace either side of the existing house No. 31 Sackville Avenue.

The south eastern boundary is formed by a railway line and the Royal Canal. The rear elevations of the houses on the Ballybough Road and Sackville Gardens face towards the proposed development. The site boundary includes the roads on Ardilaun Square and Sackville Avenue. The front elevations of No. 8 - 15 Ardilaun Square are relevant to this study.


**Figure 1: Indicative view of the site, taken from Google Maps.**

### 3.2 Permitted Part 8 Developments

There are permitted developments in the environs of the proposed development, as shown in Figure. 2 below. DCC Reg. Ref.: 3857/17 gives permission for Blocks A & B on this proposed development site. Blocks C, D & E are terraced houses on the opposite side of Sackville Avenue.

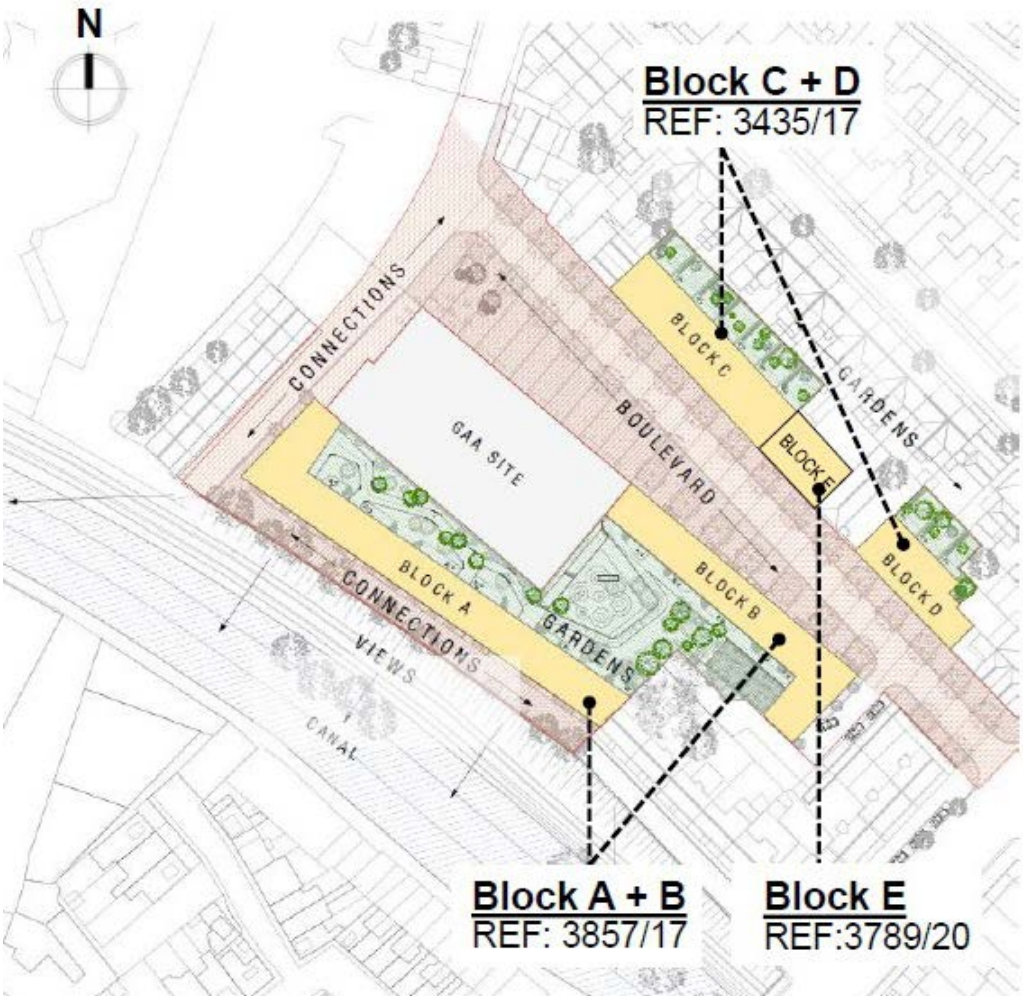



**Figure 2: Plan view showing permitted development**

### 3.2 Preliminary Assessment of Adjoining Dwellings

The BRE guidelines BR209:2022 (third edition) recommend that loss of light to existing windows need not be assessed 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. The zone of influence 3 times the height of the proposal is plotted in Figure 3 in yellow.

Section planes perpendicular to the window wall of the adjacent properties facing the proposed development are indicated in blue in Figure 3. The planes at the indicated locations extend and if they intersect the proposed development, they are plotted in Figure 4 .

The document also states that if part of a new building measured in a vertical section perpendicular to the main window wall of an existing building, from the centre of the lowest window, subtends an angle of more than 25º to the horizontal, then the diffuse light of the existing building may be adversely affected. If a window falls within a 45° angle both in plan and elevation with a new development in place then the window may be affected and should be assessed.

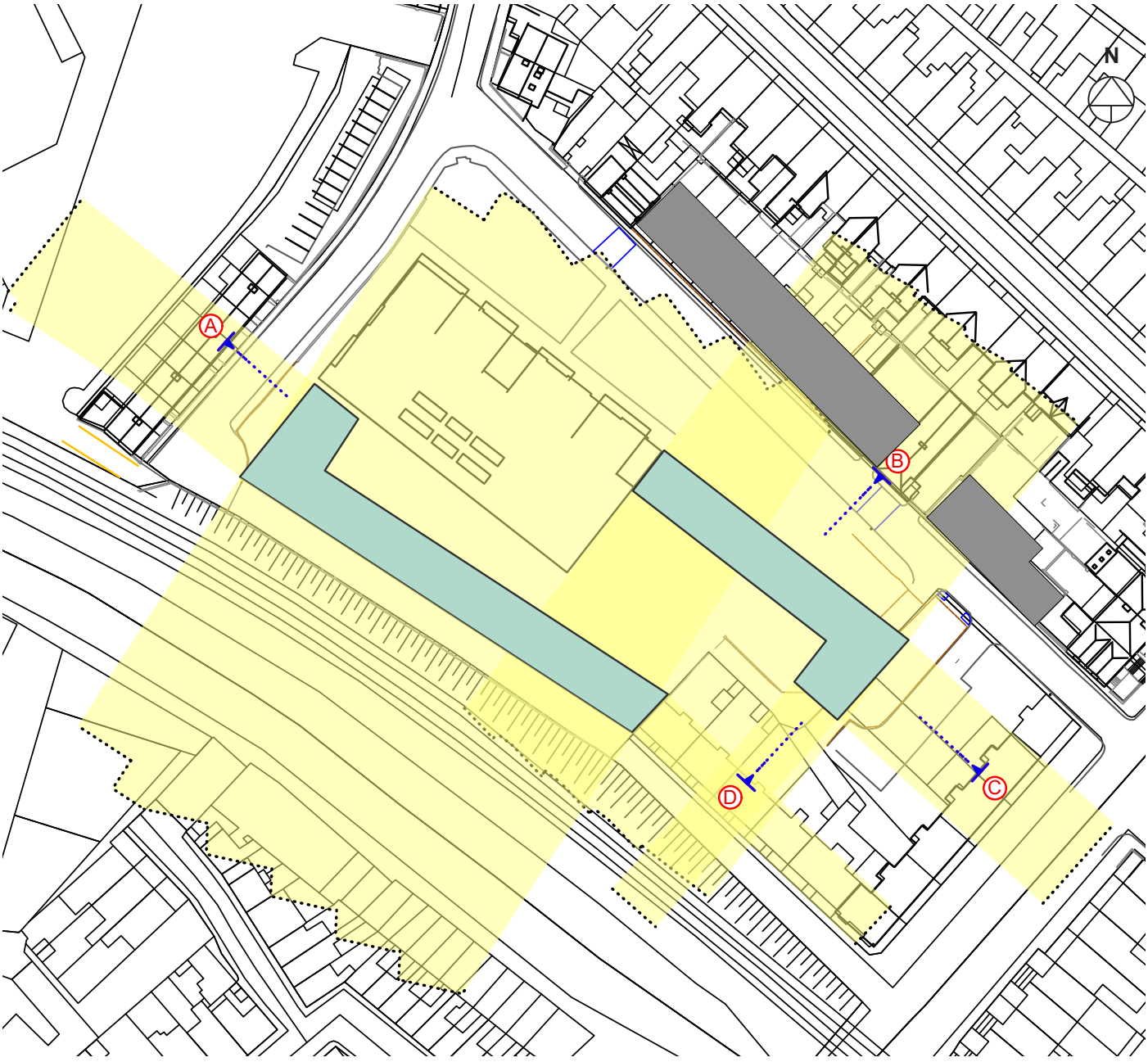
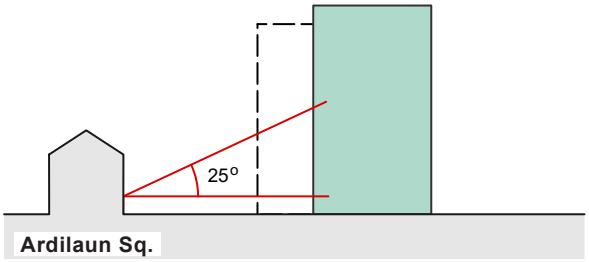
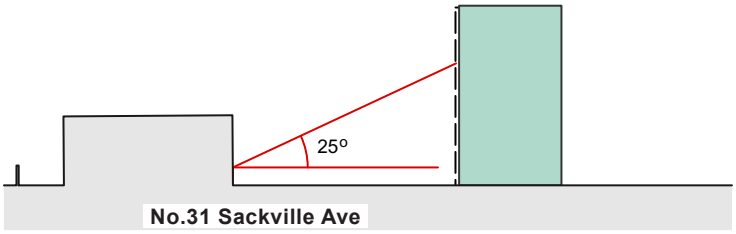


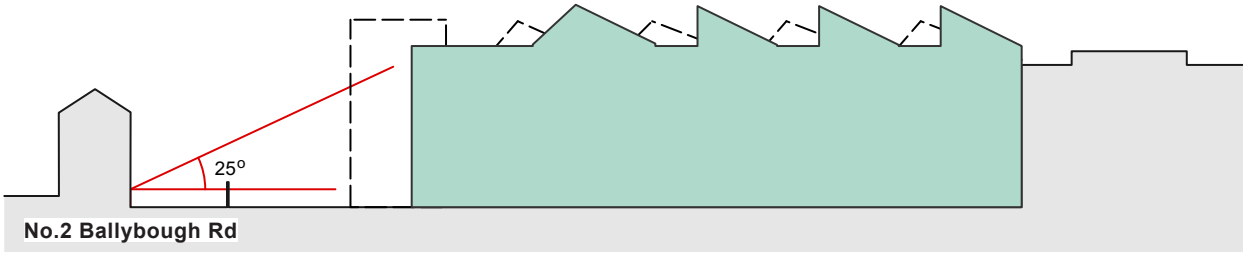

**Figure 3: Proposed site plan showing the zone of influence (3 times the height of the proposed building) and direction of the window wall of adjacent residential properties.**



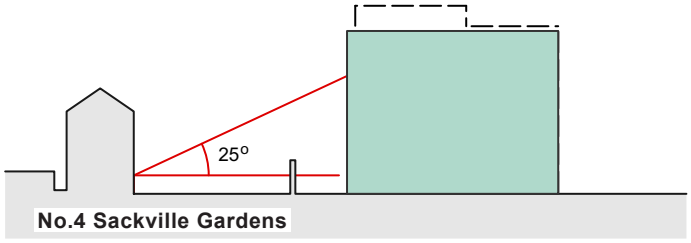

Section through window wall at location A




Section through window wall at location B




Section through window wall at location C




Section through window wall at location D

**Figure 4: Section perpendicular to window wall at locations indicated in Figure 3. Dashed line indicates extent of permitted development**

### 3.3 Comment on Preliminary Assessment

Locations A; Ardilaun Square. The proposed development subtends the 25º line and these houses will be assessed in detail.

Location B; 31 Sackville Avenue. The proposed development subtends the 25º line and these houses will be assessed in detail.

Location C; Ballybough Road. The proposed development subtends the 25º line and these houses will be assessed in detail.

Location D; Sackville Gardens. The proposed development subtends the 25º line and these houses will be assessed in detail.

The windows to the neighbouring houses along each of these terraces will be assessed for VSC levels in Section 3.4

### 3.4 Detailed Assessment to Adjoining Dwellings

The BRE guidelines BR209:2022 (third edition) recommend assessing the Vertical Sky Component (VSC) to adjacent properties, where the layouts are not known. The Annual Probable Sunlight Hours (APSH) will also be assessed where relevant.

The BRE guidelines recommend that if a window retains a VSC in excess of 27% with the proposed development in place then it will still receive enough daylight. If the existing VSC is below 27% or is reduced below 27% and below 0.8 times its former value then the diffuse light maybe adversely affected.

Test points representing windows in the adjacent dwellings at locations identified in the preliminary analysis are indicated in Figures 5-9. The results are shown in Table 6-9.

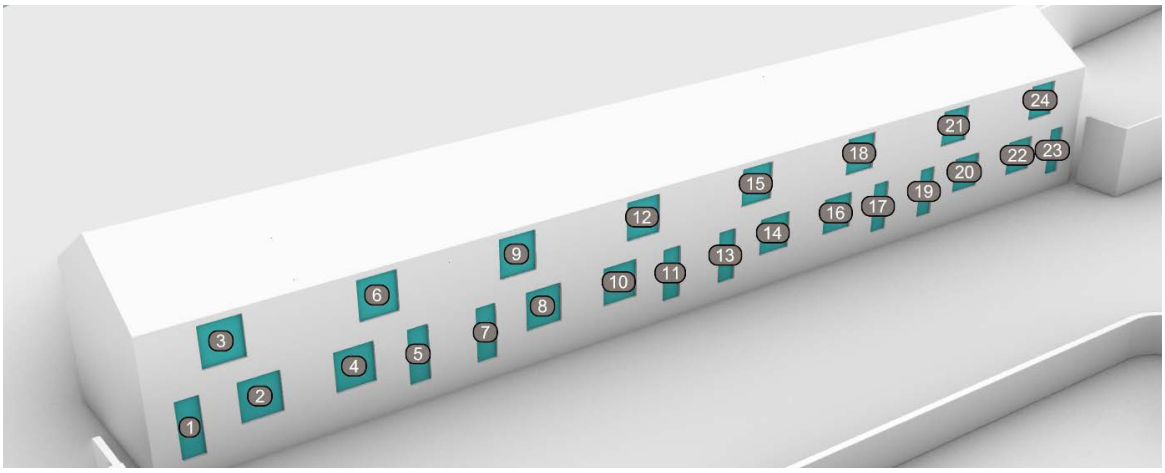



**Figure 5: No.s 8 - 15 Ardilaun Sq. : View of model locating VSC and APSH test points.**

| Vertical Sky Component | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Win ID | Vertical Sky Component Recommended Value > 27% | | | Variation in Proposed to Permitted VSC value | Ratio: Proposal to Existing Recommended > 80% | | Meets criteria if >27% VSC or <27% but >80% existing value | |
| | Existing % | Permitted % | Proposed % | | Permitted to Existing | Proposed to Existing | Permitted | Proposed |
| 1 | 32.2 | 27.7 | 27.1 | -0.59 | 86.0% | 84.2% | Y | Y |
| 2 | 34.4 | 28.7 | 28.9 | 0.21 | 83.4% | 84.0% | Y | Y |
| 3 | 36.2 | 31.4 | 31.3 | -0.14 | 86.7% | 86.3% | Y | Y |
| 4 | 34.6 | 26.8 | 27.8 | 0.97 | 77.6% | 80.4% | N | Y |
| 5 | 33.8 | 23.3 | 25.6 | 2.27 | 68.8% | 75.5% | N | N |
| 6 | 35.6 | 27.2 | 28.8 | 1.57 | 76.4% | 80.8% | Y | Y |
| 7 | 33.5 | 20.3 | 23.8 | 3.49 | 60.7% | 71.2% | N | N |
| 8 | 33.7 | 18.7 | 23.0 | 4.32 | 55.6% | 68.4% | N | N |
| 9 | 34.9 | 21.5 | 25.4 | 3.91 | 61.7% | 72.9% | N | N |
| 10 | 33.0 | 16.6 | 21.4 | 4.80 | 50.3% | 64.8% | N | N |
| 11 | 31.7 | 15.0 | 19.8 | 4.83 | 47.1% | 62.3% | N | N |
| 12 | 33.8 | 18.3 | 23.0 | 4.70 | 54.0% | 67.9% | N | N |
| 13 | 30.9 | 14.5 | 19.0 | 4.48 | 46.8% | 61.3% | N | N |
| 14 | 30.8 | 15.1 | 19.3 | 4.17 | 49.2% | 62.8% | N | N |
| 15 | 32.4 | 17.5 | 21.7 | 4.24 | 54.0% | 67.1% | N | N |
| 16 | 29.5 | 15.5 | 19.0 | 3.42 | 52.6% | 64.2% | N | N |
| 17 | 27.3 | 15.2 | 18.1 | 2.88 | 55.7% | 66.3% | N | N |
| 18 | 30.4 | 18.4 | 21.4 | 3.01 | 60.6% | 70.5% | N | N |
| 19 | 25.5 | 15.7 | 18.0 | 2.38 | 61.4% | 70.7% | N | N |
| 20 | 24.7 | 16.9 | 18.7 | 1.89 | 68.2% | 75.8% | N | N |
| 21 | 27.4 | 19.5 | 21.5 | 1.94 | 71.4% | 78.5% | N | N |
| 22 | 22.8 | 17.2 | 18.6 | 1.40 | 75.3% | 81.4% | N | Y |
| 23 | 19.5 | 14.9 | 16.0 | 1.18 | 76.3% | 82.3% | N | Y |
| 24 | 25.3 | 20.7 | 21.9 | 1.17 | 81.9% | 86.5% | Y | Y |

**Table 6: Vertical sky component for windows to No.s 8 - 15 Ardilaun Square.**

### 3.5 Conclusion No.s 8 - 15 Ardilaun Square

There is a reduction below the VSC levels to a number of windows. The reduction in VSC levels is in-line or less than that of the planning permitted scheme Ref.: 3455/17. The results show no substantial change in impact from the permitted building to the now proposed development.

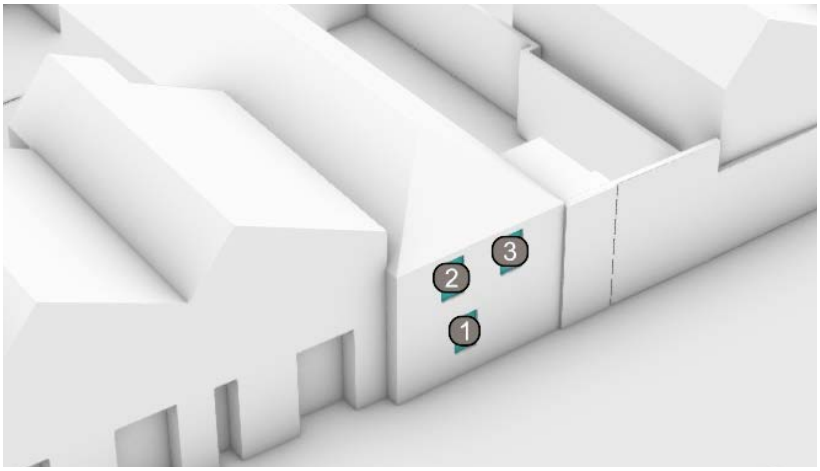



**Figure 6: No. 31 Sackville Avenue : View of model locating VSC and APSH test points.**

| Vertical Sky Component | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Win ID | Vertical Sky Component Recommended Value > 27% | | | Variation in Proposed to Permitted VSC value | Ratio: Proposal to Existing Recommended > 80% | | Meets criteria if >27% VSC or <27% but >80% existing value | |
| | Existing % | Permitted % | Proposed % | | Permitted to Existing | Proposed to Existing | Permitted | Proposed |
| 1 | 24.6 | 21.6 | 21.1 | -0.56 | 88.0% | 85.8% | Y | Y |
| 2 | 26.9 | 24.3 | 23.6 | -0.70 | 90.1% | 87.5% | Y | Y |
| 3 | 27.3 | 24.1 | 23.6 | -0.54 | 88.5% | 86.5% | Y | Y |

**Table 7: Vertical sky component for windows to No. 31 Sackville Avenue**

### 3.6 Conclusion No.31 Sackville Avenue

There is a small reduction to the in VSC levels to the windows at 31 Sackville Avenue, however, the VSC levels are not reduced below 80% of the existing values and meet the recommendations of The BRE guidelines BR209:2022 (third edition). There reduction is in-line with the reduction in VSC values of the planning permitted scheme Reg Ref.: 3455/17. The results show no substantial change in impact from the permitted building to the proposed development.

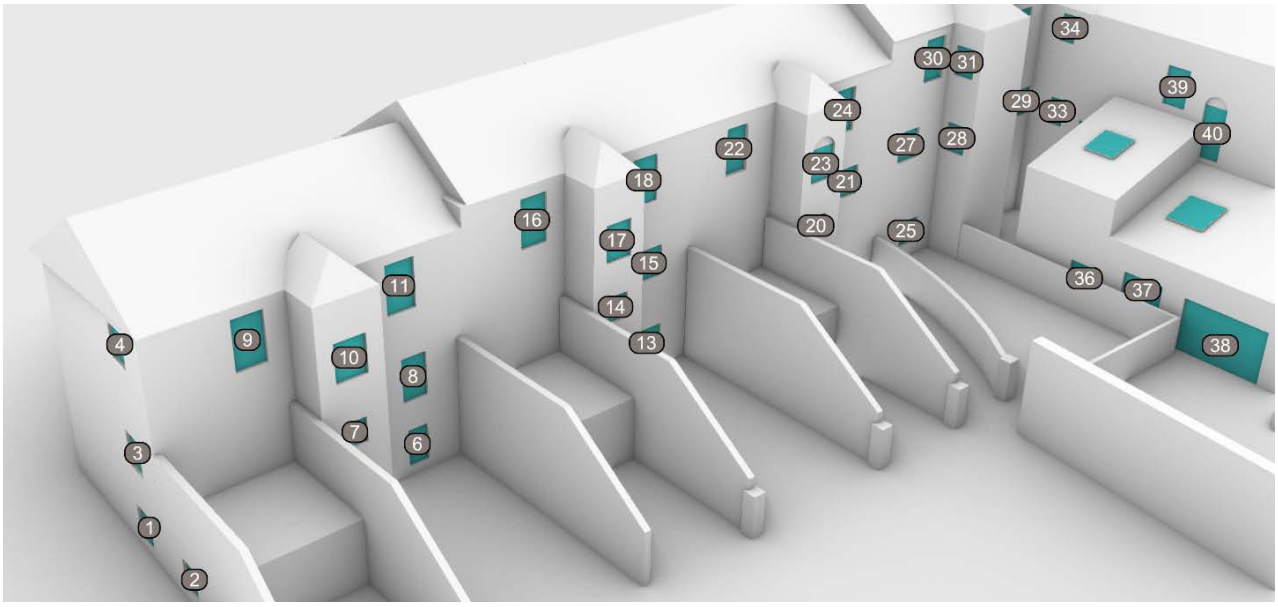



**Figure 7: Ballybough Road : View A of model locating VSC test points.**

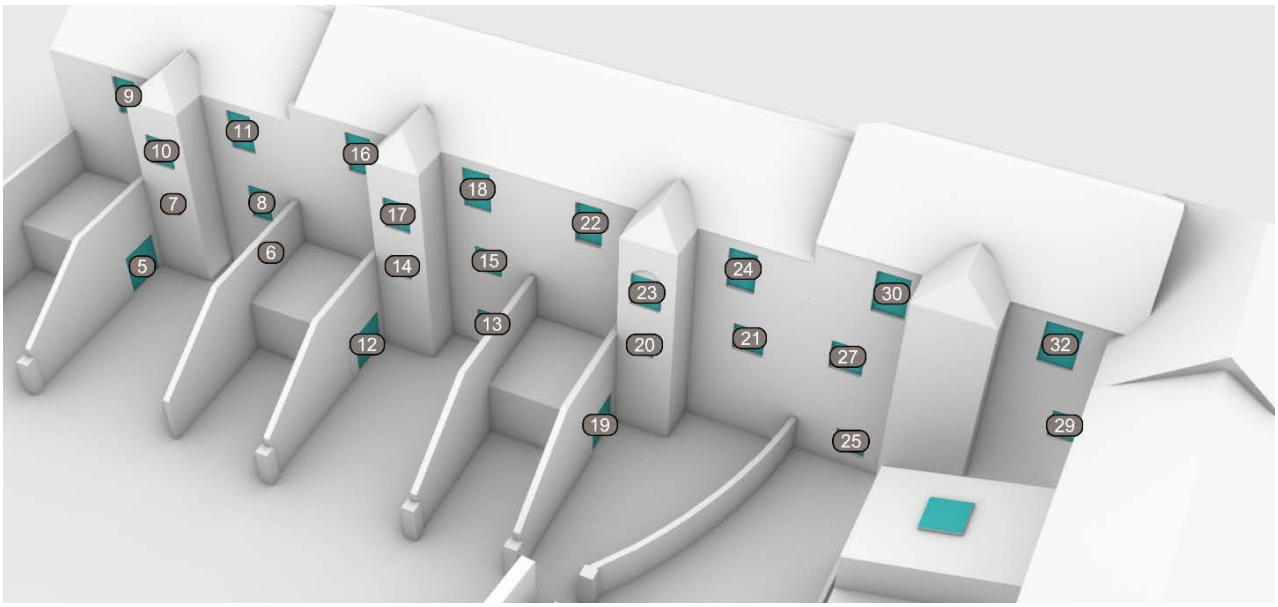



**Figure 8: Ballybough Road : View B of model locating VSC test points.**

| Vertical Sky Component | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Win ID | Vertical Sky Component Recommended Value > 27% | | | Variation in Proposed to Permitted VSC value | Ratio: Proposal to Existing Recommended > 80% | | Meets criteria if >27% VSC or <27% but >80% existing value | |
| | Existing % | Permitted % | Proposed % | | Permitted to Existing | Proposed to Existing | Permitted | Proposed |
| 1 | 31.9 | 31.9 | 31.9 | 0.00 | 100.0% | 100.0% | Y | Y |
| 2 | 30.7 | 30.7 | 30.7 | 0.00 | 100.0% | 100.0% | Y | Y |
| 3 | 33.9 | 33.9 | 33.9 | 0.00 | 100.0% | 100.0% | Y | Y |
| 4 | 36.2 | 36.2 | 36.2 | 0.00 | 100.0% | 100.0% | Y | Y |
| 5 | 15.8 | 13.5 | 14.5 | 1.02 | 85.4% | 91.9% | Y | Y |
| 6 | 17.6 | 11.9 | 15.4 | 3.49 | 67.6% | 87.4% | N | Y |
| 7 | 27.9 | 20.3 | 24.4 | 4.03 | 72.9% | 87.3% | N | Y |
| 8 | 27.9 | 21.2 | 25.2 | 4.08 | 75.8% | 90.4% | N | Y |
| 9 | 31.6 | 26.3 | 29.5 | 3.18 | 83.3% | 93.4% | Y | Y |
| 10 | 35.0 | 28.1 | 32.1 | 4.03 | 80.3% | 91.8% | Y | Y |
| 11 | 33.0 | 27.2 | 30.4 | 3.25 | 82.3% | 92.1% | Y | Y |
| 12 | 15.2 | 15.0 | 14.7 | -0.23 | 98.4% | 96.8% | Y | Y |
| 13 | 17.7 | 13.3 | 15.6 | 2.33 | 75.2% | 88.4% | N | Y |

| Vertical Sky Component | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Win ID | Vertical Sky Component Recommended Value > 27% | | | Variation in Proposed to Permitted VSC value | Ratio: Proposal to Existing Recommended > 80% | | Meets criteria if >27% VSC or <27% but >80% existing value | |
| | Existing % | Permitted % | Proposed % | | Permitted to Existing | Proposed to Existing | Permitted | Proposed |
| 14 | 32.4 | 25.9 | 28.9 | 3.05 | 79.8% | 89.2% | N | Y |
| 15 | 29.4 | 24.2 | 26.5 | 2.31 | 82.2% | 90.0% | Y | Y |
| 16 | 32.0 | 26.7 | 29.5 | 2.75 | 83.5% | 92.1% | Y | Y |
| 17 | 35.2 | 29.3 | 32.3 | 3.01 | 83.2% | 91.8% | Y | Y |
| 18 | 32.4 | 28.2 | 30.2 | 1.95 | 87.1% | 93.1% | Y | Y |
| 19 | 14.2 | 14.1 | 13.9 | -0.20 | 99.8% | 98.4% | Y | Y |
| 20 | 31.0 | 27.2 | 28.5 | 1.34 | 87.9% | 92.2% | Y | Y |
| 21 | 27.9 | 24.9 | 25.9 | 0.98 | 89.4% | 92.9% | Y | Y |
| 22 | 32.5 | 28.9 | 30.5 | 1.56 | 88.9% | 93.7% | Y | Y |
| 23 | 34.7 | 31.1 | 32.5 | 1.35 | 89.8% | 93.7% | Y | Y |
| 24 | 31.4 | 29.4 | 29.9 | 0.53 | 93.4% | 95.1% | Y | Y |
| 25 | 21.2 | 18.9 | 19.9 | 1.02 | 89.1% | 93.9% | Y | Y |
| 26 | 5.3 | 5.1 | 5.2 | 0.12 | 95.5% | 97.7% | Y | Y |
| 27 | 28.2 | 25.8 | 26.8 | 1.00 | 91.6% | 95.1% | Y | Y |
| 28 | 18.6 | 16.5 | 17.8 | 1.24 | 88.8% | 95.4% | Y | Y |
| 29 | 15.4 | 14.2 | 14.8 | 0.53 | 92.2% | 95.6% | Y | Y |
| 30 | 28.7 | 27.0 | 27.4 | 0.48 | 93.8% | 95.4% | Y | Y |
| 31 | 24.4 | 22.7 | 23.8 | 1.08 | 93.1% | 97.5% | Y | Y |
| 32 | 28.0 | 27.3 | 27.4 | 0.06 | 97.7% | 98.0% | Y | Y |

**Table 8: Vertical sky component for windows to No.s 2 - 5 Ballybough Road**

### 3.7 Conclusion No.s 2 - 5 Ballybough Road

There is a small reduction to the in VSC levels to some of the windows at No.s 2 - 5 Ballybough Road, however, the VSC levels are not reduced below 80% of the existing values and meet the recommendations of The BRE guidelines BR209:2022 (third edition). There reduction is in-line with than the reduction in VSC values of the planning permitted scheme Ref.: 3455/17. The results show no substantial change in impact from the permitted building to the proposed development.

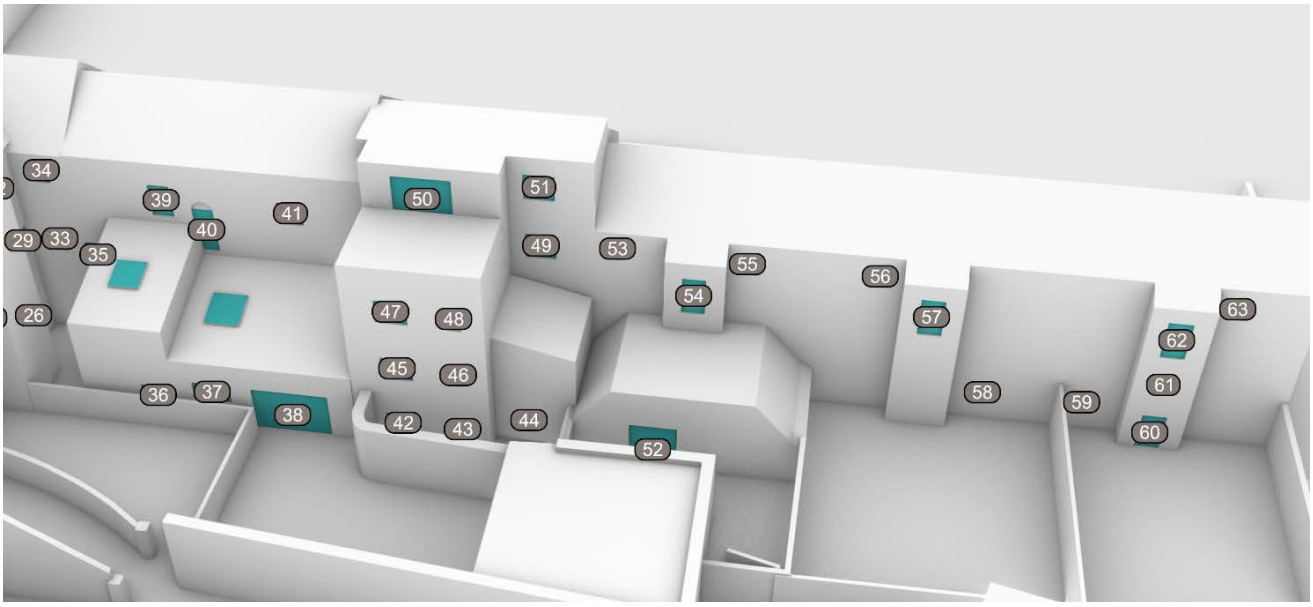



**Figure 9: Sackville Gardens : View of model locating VSC test points.**

| Vertical Sky Component | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Win ID | Vertical Sky Component Recommended Value > 27% | | | Variation in Proposed to Permitted VSC value | Ratio: Proposal to Existing Recommended > 80% | | Meets criteria if >27% VSC or <27% but >80% existing value | |
| | Existing % | Permitted % | Proposed % | | Permitted to Existing | Proposed to Existing | Permitted | Proposed |
| 33 | 16.4 | 14.8 | 15.9 | 1.10 | 90.4% | 97.1% | Y | Y |
| 34 | 26.7 | 25.3 | 26.1 | 0.83 | 94.9% | 98.0% | Y | Y |
| 35 | 13.7 | 13.7 | 13.7 | 0.00 | 100.0% | 100.0% | Y | Y |
| 36 | 16.0 | 15.3 | 15.8 | 0.50 | 95.6% | 98.7% | Y | Y |
| 37 | 28.4 | 24.9 | 26.7 | 1.84 | 87.7% | 94.2% | Y | Y |
| 38 | 27.2 | 23.5 | 25.5 | 1.95 | 86.3% | 93.4% | Y | Y |
| 39 | 33.8 | 31.8 | 33.0 | 1.14 | 94.3% | 97.7% | Y | Y |
| 40 | 31.0 | 28.6 | 30.0 | 1.34 | 92.4% | 96.7% | Y | Y |
| 41 | 33.2 | 30.8 | 32.4 | 1.59 | 92.7% | 97.5% | Y | Y |
| 42 | 14.0 | 12.8 | 13.5 | 0.66 | 91.8% | 96.5% | Y | Y |
| 43 | 16.9 | 15.3 | 16.1 | 0.77 | 90.9% | 95.4% | Y | Y |
| 44 | 18.9 | 16.4 | 17.7 | 1.23 | 86.8% | 93.3% | Y | Y |
| 45 | 33.1 | 27.7 | 30.2 | 2.52 | 83.8% | 91.5% | Y | Y |
| 46 | 32.0 | 26.3 | 28.7 | 2.41 | 82.0% | 89.5% | Y | Y |
| 47 | 35.1 | 30.5 | 32.9 | 2.45 | 86.7% | 93.6% | Y | Y |
| 48 | 33.9 | 28.8 | 31.3 | 2.43 | 85.2% | 92.3% | Y | Y |
| 49 | 24.9 | 21.4 | 22.9 | 1.56 | 85.7% | 92.0% | Y | Y |
| 50 | 37.4 | 34.6 | 36.2 | 1.51 | 92.7% | 96.7% | Y | Y |
| 51 | 32.5 | 29.9 | 31.2 | 1.36 | 91.8% | 96.0% | Y | Y |
| 52 | 16.1 | 15.5 | 16.0 | 0.45 | 96.7% | 99.5% | Y | Y |
| 53 | 32.2 | 28.4 | 30.0 | 1.59 | 88.3% | 93.2% | Y | Y |
| 54 | 33.3 | 28.8 | 30.0 | 1.29 | 86.3% | 90.2% | Y | Y |
| 55 | 30.6 | 26.7 | 27.6 | 0.96 | 87.3% | 90.4% | Y | Y |
| 56 | 30.9 | 27.7 | 28.1 | 0.36 | 89.8% | 91.0% | Y | Y |
| 57 | 32.4 | 28.7 | 28.8 | 0.04 | 88.6% | 88.7% | Y | Y |
| 58 | 25.5 | 21.8 | 21.6 | -0.24 | 85.5% | 84.5% | Y | Y |
| 59 | 19.5 | 19.5 | 18.3 | -1.20 | 100.0% | 93.9% | Y | Y |
| 60 | 25.0 | 23.2 | 22.2 | -1.03 | 93.1% | 89.0% | Y | Y |
| 61 | 28.4 | 25.7 | 25.0 | -0.68 | 90.4% | 88.0% | Y | Y |
| 62 | 31.0 | 28.9 | 28.1 | -0.72 | 93.1% | 90.8% | Y | Y |
| 63 | 28.5 | 27.7 | 24.6 | -3.10 | 97.1% | 86.2% | Y | Y |

**Table 9: Vertical sky component for windows to No. 1- 6 Sackville Gardens**

### 3.8 Conclusion No.s 1 - 6 Sackville Gardens

There is a small reduction to the in VSC levels to some of the windows at No.s 1 - 6 Sackville Gardens, however, the VSC levels are not reduced below 80% of the existing values and meet the recommendations of The BRE guidelines BR209:2022 (third edition). There reduction is in-line with the reduction in VSC values of the planning permitted scheme Ref.: 3455/17. The results show no substantial change in impact from the permitted building to the proposed development.

### 3.9 Conclusions VSC levels

There will be a perceptible level of reduction in daylight received by some accessible windows in the adjoining properties. To provide a suitable development on the subject site which would avoid having any impact outside the BRE guidance parameters for these windows would not result in an appropriate form of development on the site.

Overall the level of reduction is in-line with the permitted scheme Ref.: 3455/17 and in the majority of cases the reduction to the available daylight from the sky is less than the permitted proposal for the 2 apartment blocks.

# 4. Sunlight in Neighbouring Buildings

## 4.1 Sunlight the Neighbouring Dwellings APSH (Annual Probable Sunlight Hours)

The BRE guidelines BR209:2022 (third edition) recommends assessing window walls for the APSH that face within 90º of due south. The guidelines state that;

> *" In housing the main requirement for sunlight is living rooms, where it is valued at any time of 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."*

For a proposed development to have a noticeable impact on the annual Probable Sunlight Hours the value need to be reduced below the recommended 25% annual or 5% in the winter period from September to March. If the value is either below this to begin with or is reduced below this then it should not be reduced below 0.8 times its former value.

The windows in Ardilaun Square and No. 31 Sackville Avenue have windows that face within 90º of due south. These are indicated in Figures 5 & 6 (above) and are assessed regardless of the room use. The results are set out in Table 10 below.

**Annual Probable Sunlight Hours**

| | APSH >25% Target | | | Sept 21 - Mar 21 WPSH >5% Target | | | Meets criteria of >25% APSH and >5% PSH Or <25% or <5% PSH but >80% Existing Value | |
|---|---|---|---|---|---|---|---|---|
| Location ID | Existing | Proposed | Ratio | Existing | Proposed | Ratio | | |
| | % of APSH | % of APSH | If less than 25% APSH Target >80% | % WPSH | % WPSH | If less than 5% WPSH Target >80% | | |
| Arditluan Square | | | | | | | | |
| 1 | 55.4% | 45.5% | 82.0% | 19.2% | 17.8% | 92.8% | Y | Y |
| 2 | 61.9% | 50.8% | 82.1% | 25.0% | 23.5% | 94.1% | Y | Y |
| 3 | 63.6% | 53.4% | 83.9% | 25.4% | 23.9% | 94.0% | Y | Y |
| 4 | 60.1% | 49.2% | 81.9% | 24.9% | 22.6% | 90.9% | Y | Y |
| 5 | 59.5% | 44.3% | 74.5% | 24.4% | 20.4% | 83.8% | Y | Y |
| 6 | 62.2% | 49.9% | 80.3% | 25.2% | 22.1% | 87.7% | Y | Y |
| 7 | 60.6% | 42.7% | 70.5% | 24.8% | 18.8% | 75.6% | Y | Y |
| 8 | 60.2% | 40.8% | 67.9% | 24.5% | 16.8% | 68.5% | Y | Y |
| 9 | 61.8% | 44.8% | 72.6% | 24.9% | 17.7% | 71.1% | Y | Y |
| 10 | 57.2% | 38.6% | 67.5% | 24.1% | 14.9% | 61.7% | Y | Y |
| 11 | 56.2% | 35.9% | 63.8% | 23.7% | 13.2% | 55.8% | Y | Y |
| 12 | 59.1% | 42.3% | 71.6% | 24.1% | 14.1% | 58.3% | Y | Y |
| 13 | 56.1% | 36.0% | 64.1% | 23.6% | 12.2% | 51.9% | Y | Y |
| 14 | 53.5% | 35.9% | 67.1% | 23.0% | 11.4% | 49.7% | Y | Y |
| 15 | 58.3% | 40.2% | 69.0% | 23.7% | 11.9% | 50.4% | Y | Y |
| 16 | 52.0% | 34.0% | 65.5% | 22.0% | 9.8% | 44.7% | Y | Y |
| 17 | 48.6% | 34.4% | 70.8% | 20.3% | 9.8% | 48.2% | Y | Y |
| 18 | 54.1% | 38.6% | 71.3% | 21.4% | 10.2% | 47.7% | Y | Y |
| 19 | 47.5% | 34.8% | 73.2% | 18.5% | 9.0% | 48.7% | Y | Y |
| 20 | 45.4% | 34.2% | 75.4% | 16.8% | 8.5% | 50.3% | Y | Y |
| 21 | 49.6% | 39.9% | 80.4% | 16.8% | 9.2% | 54.7% | Y | Y |
| 22 | 41.5% | 33.7% | 81.2% | 14.3% | 7.9% | 55.5% | Y | Y |
| 23 | 37.0% | 29.9% | 80.8% | 13.2% | 7.4% | 55.9% | Y | Y |
| 24 | 46.9% | 40.8% | 87.0% | 13.6% | 8.5% | 62.8% | Y | Y |
| No. 31 Sackville Ave | | | | | | | | |
| 1 | 50.9% | 43.2% | 84.9% | 15.3% | 10.5% | 68.6% | Y | Y |
| 2 | 54.3% | 47.5% | 87.5% | 15.5% | 11.2% | 72.2% | Y | Y |
| 3 | 53.3% | 46.5% | 87.3% | 15.0% | 10.7% | 71.6% | Y | Y |

**Table 10: Annual Probable Sunlight hours to adjoining properties**

## 4.2 Conclusion

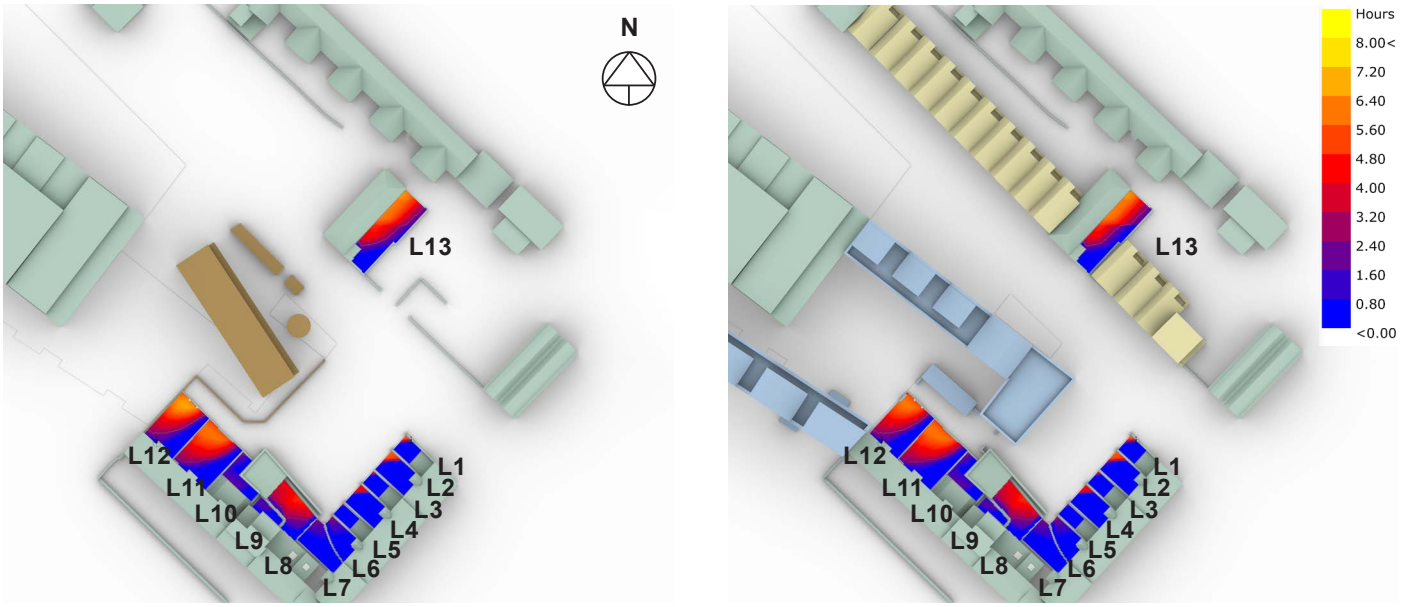
All windows assessed for APSH exceed the target values set out for annual and winter probable sunlight hours. The proposed development meets the recommendations of the BRE guidelines BR209:2022 (third edition) and any potential loss of sunlight will be negligible.

## 5. Sunlight to Amenity in Neighbouring Properties

The BRE guidelines BR209:2022 (third edition) indicates that for an amenity area to have good quality sunlight throughout the year, 50% should receive in excess of 2 hours sunlight on the 21st March. It also states that front gardens need not be assessed for sunlight. Amenity spaces which are entirely south of the proposed development would not perceive an impact from it.

### 5.1 Amenity Space to Neighbouring Properties.

The private amenity spaces that face towards the proposed development have been assessed for a potential impact on their sun of the ground. The existing and proposed generated analysis are shown in Figure 10, the results are shown in Table 11 below.




**Existing** **Proposed**

**Figure 10: Existing & Proposed Radiation map of amenity areas, showing available sunlight on 21st March. The scale represents the percentage of daylight received from 0 - 8 hrs.**

| Sunlight on the ground - Adjacent properties | | | | |
|---|---|---|---|---|
| No. | % Area receiving 2 hours sunlight on 21st March | | Ratio | Meets criteria of >50% area Or if <50% then target >80% Existing Value |
| | Existing | Proposed | Proposed: Existing | |
| L1 | 7.1% | 7.1% | 100.0% | Meets criteria |
| L2 | 9.9% | 9.9% | 100.0% | Meets criteria |
| L3 | 2.2% | 2.2% | 100.0% | Meets criteria |
| L4 | 7.2% | 7.2% | 100.0% | Meets criteria |
| L5 | 0.0% | 0.0% | 100.0% | Meets criteria |
| L6 | 0.0% | 0.0% | 100.0% | Meets criteria |
| L7 | 0.0% | 0.0% | 100.0% | Meets criteria |
| L8 | 60.8% | 60.8% | 100.00% | Meets criteria |
| L9 | 0.0% | 0.0% | 100.0% | Meets criteria |
| L10 | 0.0% | 0.0% | 100.0% | Meets criteria |
| L11 | 56.5% | 56.5% | 100.0% | Meets criteria |
| L12 | 55.0% | 54.0% | 98.1% | Meets criteria |
| L13 | 54.1% | 54.1 | 100.0% | Meets criteria |

**Table 11: Calculation of Sun on the Ground to adjacent amenity areas**

### 5.2 Conclusion

All the private amenity space to the surrounding properties were assessed for sunlight in accordance with the recommendations set out in BR209:2022. On the 21st March, all the amenity spaces will retain 2 hours sunlight over 50% of the area or will not be reduced below 80% of the existing levels. The proposed development meets the recommendations of the BRE guidelines BR209:2022 (third edition) .

# 6. Daylight within the Proposed Development

All habitable rooms within the units were assessed for daylight provision by illuminance method. The Illuminance method assesses the daylight levels over at least 50% daylight hours in the year and uses a weather file data set. These methods take into account the orientation of the space. They provide an accurate representation of the daylight provision to a specific room in the context of the proposed environment.

Compliance is demonstrated by a calculation of Daylight Provision with the illuminance method under BS EN 17037:2018+A1:2021. A summary of the results are presented in Table 12 below and a complete set of room results are shown in Appendix A.

For supplementary information, an assessment of Daylight Provision with the illuminance method under IS /BS EN 17037:2018 is undertaken. A summary of the results are presented in Table 13 below and a complete set of room results are shown in Appendix B.

## 6.1 Assessment for Daylight Provision BS EN 17037:2018+A1:2021

The UK National Annex (A1) contains minimum room specific target values for dwellings in the UK. The UK committee fully supports the recommendations of EN17037:2018 but considers the target daylight levels may be hard to achieve in UK dwellings, in particular in urban areas and areas with mature trees. The Target and Minimum levels set out in IS / BS EN17037:2018 do not take into account room use or make allowance for room that have a lesser requirement for daylight. The UK National Annex A1 in BS EN17037:2018+A1:2021 sets out room specific minimum values to be achieved in the UK and Channel Islands. These target values are set to achieve similar minimum daylight levels as the superseded Average Daylight Factor method (ADF) in BS8206-2 2008.

| Minimum daylight provision UK NA.1 - BS EN 17037:2018+A1:2021 | | | | | |
|---|---|---|---|---|---|
| | Room Use | Number of rooms | Target illuminance $E_T$(lx) for half of the assessment grid | Number of rooms to achieve target Lux over 50% of the assessment grid | Percentage of rooms achieving Target |
| Apartments | LKD | 52 | 200 | 52 | 100.0% |
| | Bedrooms | 99 | 100 | 99 | 100.0% |
| Total | | 151 | | 151 | 100.0% |

**Table 12: Summary of room for Target Illuminance compliance with BS EN 17037:2018+A1:2021. Individual room results can be viewed in Appendix A.**

## 6.2 Conclusion

BR209:2022 recommends the assessment methods set out in BS EN 17037: 2018 for daylight provision. 100% of the Living, Dining, Kitchen and Bedroom spaces achieve the target values set out in BS EN 17037:2018+A1:2021 section NA1. These are the minimum values, per specified use, to be achieved in habitable rooms.

## 6.3 Supplementary Information - Assessment for Daylight Provision IS / BS EN 17037:2018

A summary of Minimum and Target Illuminance levels under IS EN 17037:2018 Annex A Table A1 are set out in the table below.

| Daylight provision Illuminance Method IS EN 17037:2018 | | | | | | |
|---|---|---|---|---|---|---|
| | | Below Target | Minimum | Medium | High | Percentage of rooms achieving Target |
| Overall total | Target Illuminance | 11.9% | 31.1% | 34.4% | 22.5% | 88.1% |
| | Minimum Illuminance | 4.0% | 34.4% | 39.1% | 22.5% | 96.0% |

**Table 13: Percentage of rooms at each level to IS/BS EN 17037:2018. Individual room results can be viewed in Appendix B.**

The results indicate a high level of daylight provision, with 96.0% of rooms achieving Minimum Illuminance and 88.1% achieving Target Illuminance. The rooms will be bright and pleasant spaces.

The recommendations for Daylight provision in Table A1 are not specific for dwellings and do not make allowance for room use. BS EN 17037:2018+A1:2021 address this with the National Annex NA.1 which sets out room specific targets for dwellings and compliance for this is presented in Section 6.1.

# 7. Sunlight within the Proposed Development

## 7.1 Sunlight Hours

The BRE guidelines BR209:2022 (third edition) and BS EN 17037:2018+A1:2021 set out recommendations for sunlight hours to be achieved. It states that; *"For dwellings, at least one habitable room, preferably a main living room, should meet at least the minimum criterion."* The guidelines recommend the sunlight hours should be assessed preferably on the 21st March over the course of the day. The guidelines set three levels of achievement. Minimum 1.5h, Medium 3h and High 4h. The guideline does not set the percentage of units that need the achieve the recommendations but they do give an example of a well designed floor layout in Figure 11 below where 4 out of 5 units in an apartment building would achieve the target sunlight.

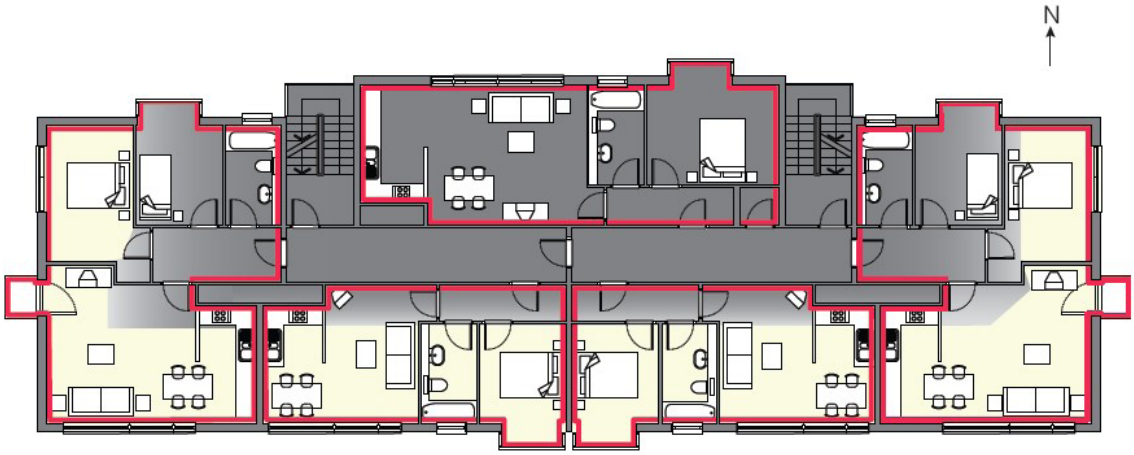



**Figure 26: Careful layout design means that four out of the five flats shown have a south-facing living room**

**Figure 11: Extract from BR209:2022 Section 3 Sun-lighting: Diagram indicating sample floor plan to maximise units with a main living space facing south.**

Appendix C details the results per habitable room, indicating if this room has a relevant South facing window. A summary of these results are displayed in the table below.

| Sunlight Hours Summary Table | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total Units | Rooms with a window within 90° South | | Below recommendation <1.5 hours | Minimum >1.5 hours | Medium >3 Hours | High >4 Hours | Number meets criteria | Ratio meets criteria |
| | | No. | Ratio | | | | | | |
| Overall Total | 52 | 46 | 88.5% | 17 | 4 | 3 | 30 | 37 | 71.2% |

**Table 14: Summary of results of assessment of Sunlight Hours**

## 7.2 Comment on EN 17037 Sunlight Hours

The BRE Guidelines recommend maximising the amount of units that have a window within 90° due South but does not have set targets. The guidelines acknowledges that for large developments with site constraints its not possible to achieve south facing windows to all main living spaces. In this development all of the units were assessed, 88.5% (46 no.) have window to a Living room or Kitchen/ Dining room which face within 90° South.

Often windows with an aspect of greater than 90° due South, to the North West or North East, will still receive sunlight, but it is likely to be lesser amounts especially in the winter period. In this development of 52 units 71.2% (37 no.) of units have a living spaces achieve the minimum recommended 1.5 direct sunlight hours.

## 7.3 Conclusion

This scheme is well designed for sunlight, with 71.2% of units meeting the minimum recommended 1.5 direct sunlight hours. This is in line with the BRE guideline example for an apartment layout where 4 in 5 achieves the target sunlight hours.

## 8. Sunlight to Amenity Spaces within the Proposed Development

The BRE guidelines BR209:2022 (third edition) indicates that for an amenity area to have good quality sunlight throughout the year, 50% should receive in excess of 2 hours sunlight on the 21st March. It also states that front gardens need not be assessed for sunlight.

### 8.1 Sunlight to Amenity within the Proposed Development

The amenity area within this proposal have been assessed with a calculation of Sun on the Ground on the 21st March. Generated analysis is shown in Figure 12 and the results are set out in Table 15 below.

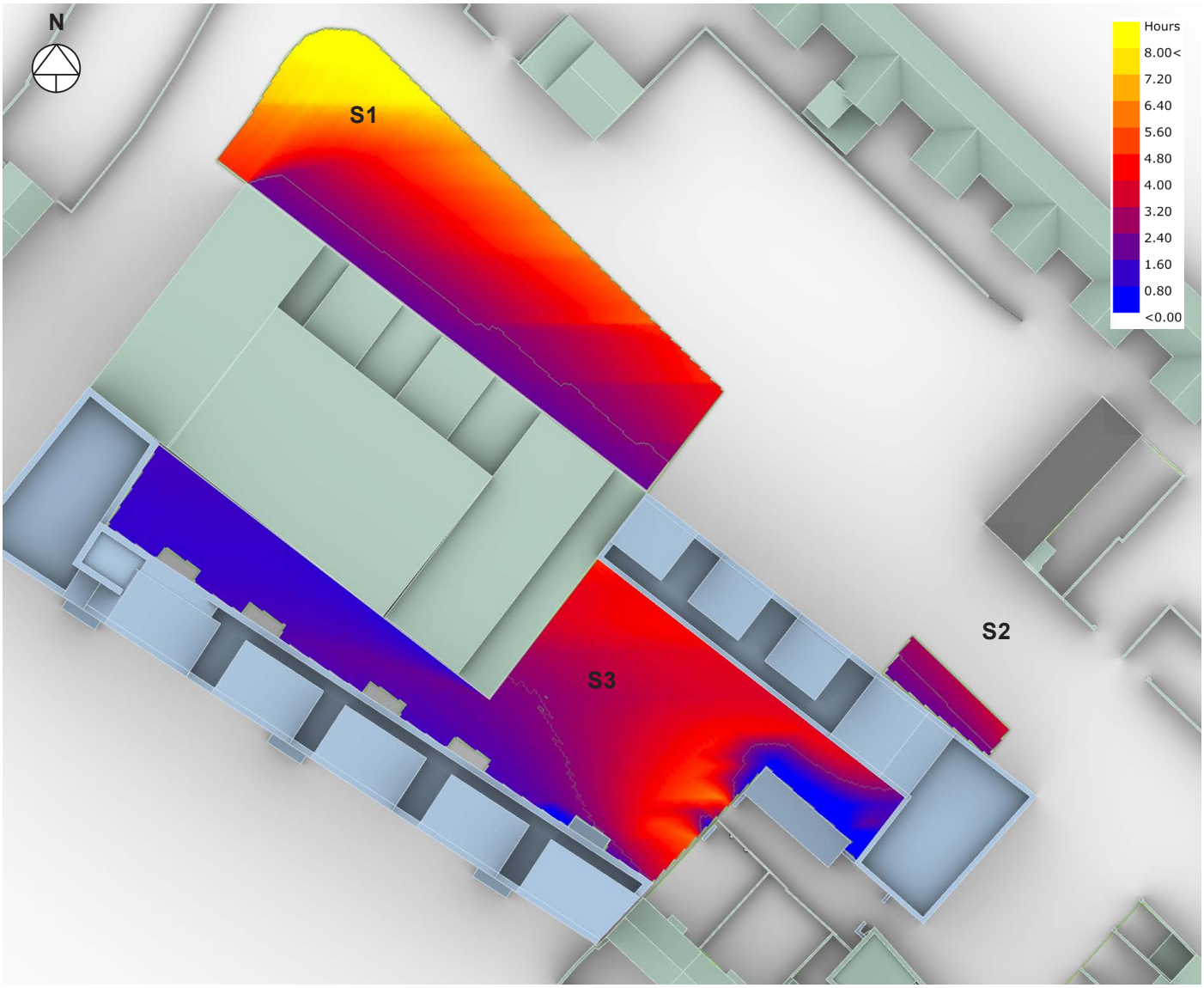



**Figure 12: Communal Open Space - Radiation map of amenity area, showing available sunlight on 21st March. The scale represents the percentage of daylight received from 0 - 8 hrs.**

| Sunlight on the Ground - Communal Amenity | | |
|---|---|---|
| | Proposed: % Area receiving 2 hours sunlight on 21st March | Meets criteria of >50% area |
| S1 | 82.3% | Yes |
| S2 | 62.0% | Yes |
| S3 | 50.2% | Yes |

**Table 15: Calculation of Sun on the Ground to public amenity spaces within the development**

### 8.2 Comment on Public and Communal Amenity Areas

The communal and public amenity areas all achieve in excess of 2 hours sunlight on the 21st March over 50% of the amenity area. The proposed development meets the recommendations of the The BRE guidelines BR209:2022 (third edition) for gardens and open spaces.

# 9. Shadow Study

## 9.1 BRE Guidance on Shadow Studies

The BRE guidelines recommend using the March Equinox due the equal length of the day and night time. It states:

> *"If a space is used all year round, the equinox (21 March) is the best date for which to prepare shadow plots as it gives an average level of shadowing. Lengths of shadows at the autumn equinox (21 September) will be the same as those for 21 March, so a separate set of plots for September is not required."*

June 21st and December 21st are provided below for information but it should be noted that the summer solstice is the best case scenario with shadows at their shortest. The summer solstice diagrams in section 9.2 are included here with the Daylight Saving Time (UTC+1) applied. In Winter even low buildings will cast long shadows and it is common for large areas of the ground to be in shadow throughout the day especially in a built up area and sun barely rises above an altitude of 10° during the course of the day. The guidelines recommend that Sunlight at an altitude of 10° or less does not count. Below are the times for the Equinox and Solstice that the sun is above 10° altitude rounded to the nearest half hour.

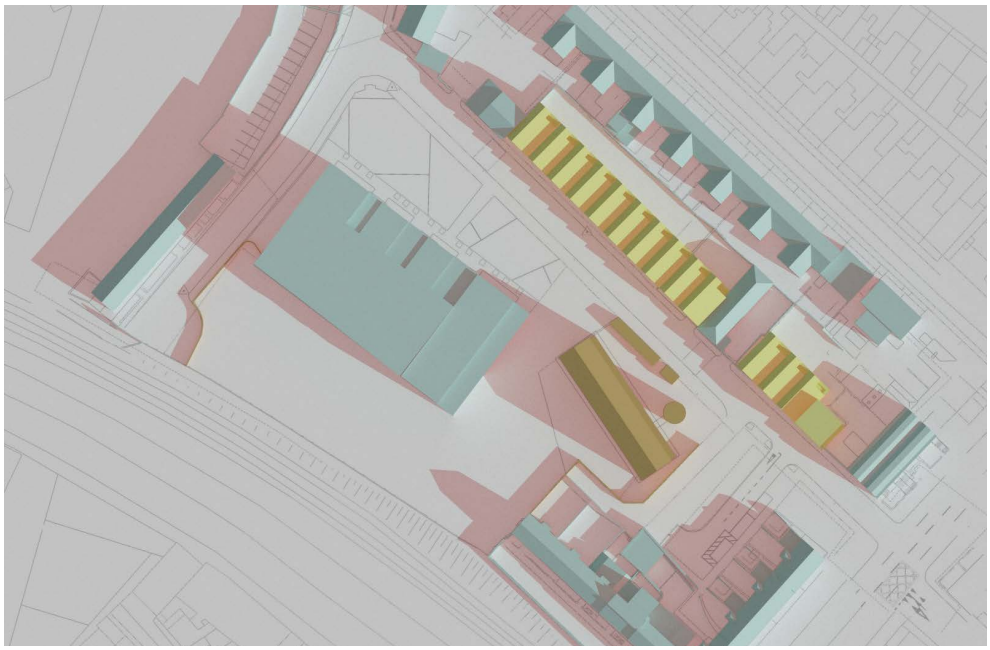
Equinox: between 8:30 and 17:30
Summer Solstice: Between 6:30 and 20:00
Winter Solstice: Between 10:30 and 14:00

Each time stop of the shadow study shows the existing, proposed and the part 8 development permitted in 2017.

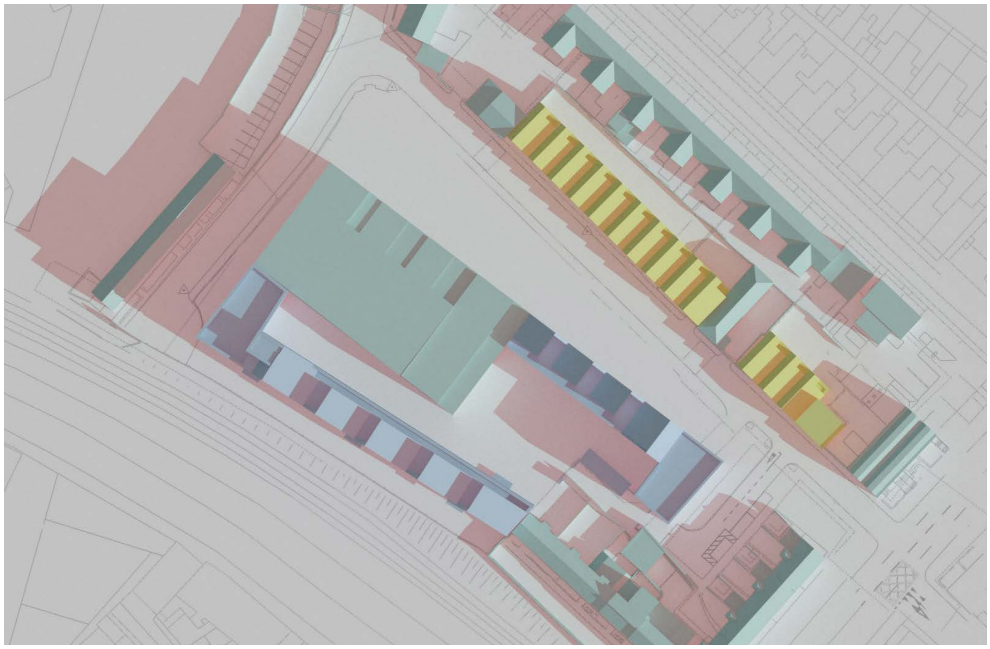
Section 9.2 presents the shadow diagrams for the Equinox on the 21st March at 2 hourly intervals during the day between 09:00 and 17:00.
Section 9.3 shows the shadow diagrams for the Summer Solstice on the 21st June at 2 hourly intervals during the day between 09:00 and 19:00.
Section 9.4 shows the shadow diagrams for the Winter Solstice on the 21st December at 2 hourly intervals during the day between 09:00 and 15:00.

Shadow diagrams are a visual aid to understand where possible shading may occur. The use of shadow diagrams as an assessment method should be taken over the course of the day and not a specific time due to the transient nature of the sun and the shade caused by obstructions.

## 9.2 Shadow Casting diagrams March Equinox

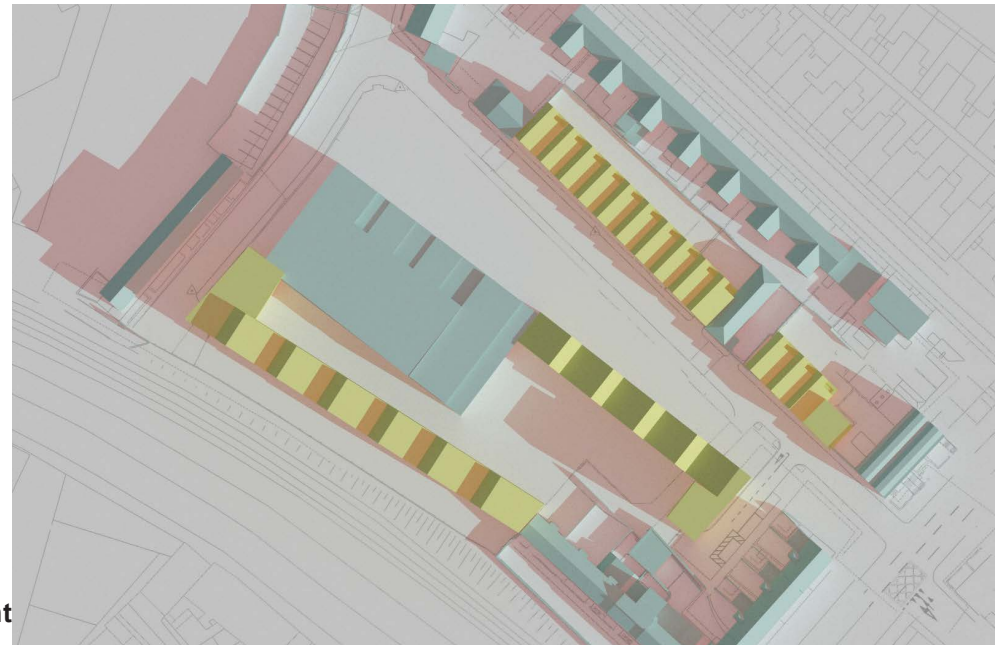


**Existing**



**N**

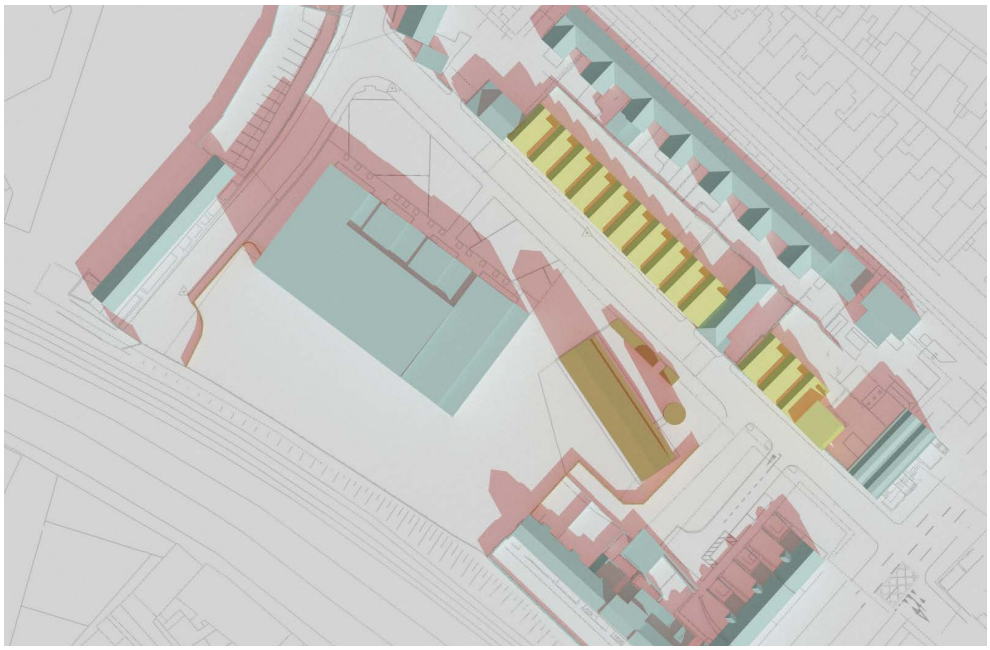
**Proposed**



**Permitted Development**

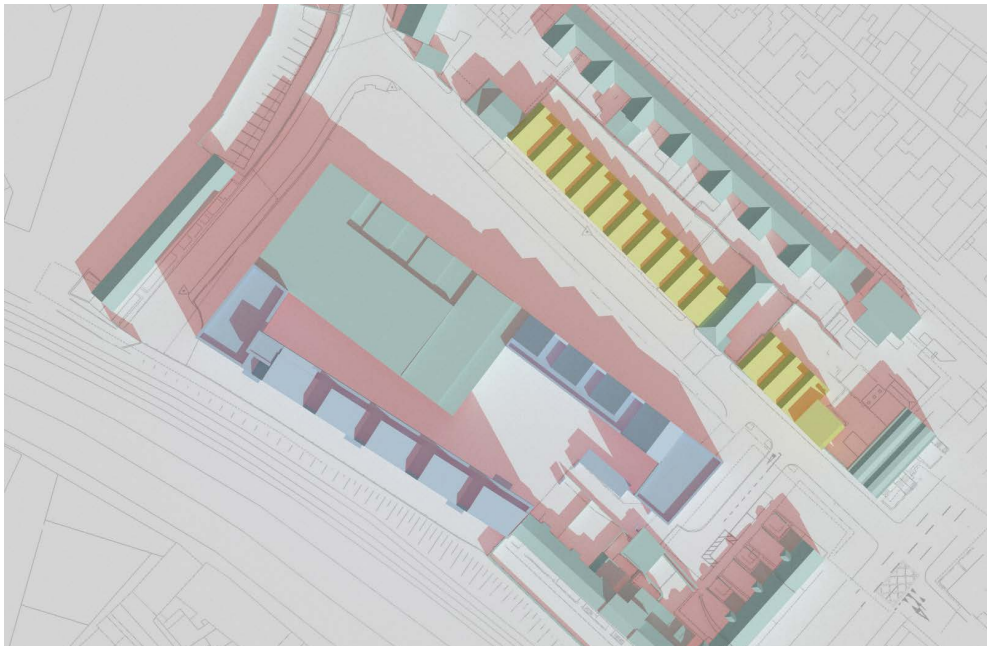
**Figure 13: Shadow diagrams 21 March 09:00 UTC**

Existing



N

Proposed



Permitted Development

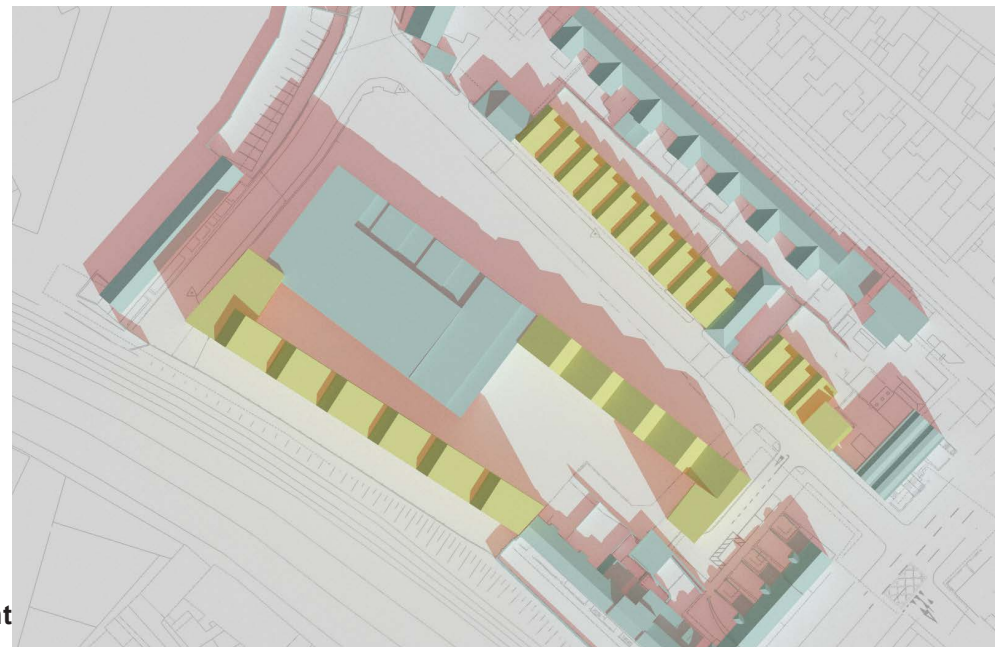
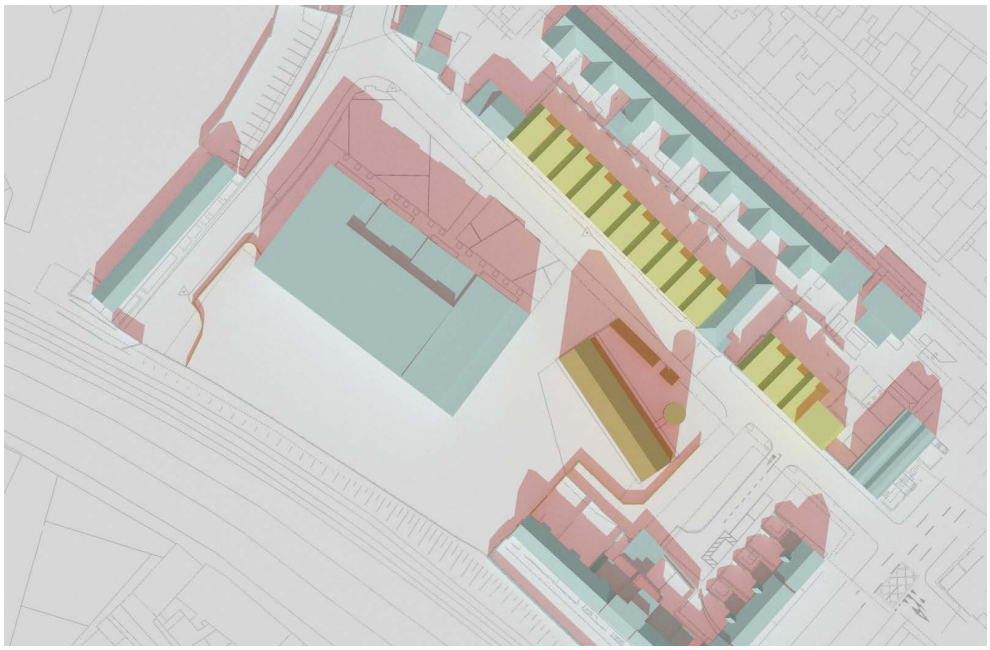


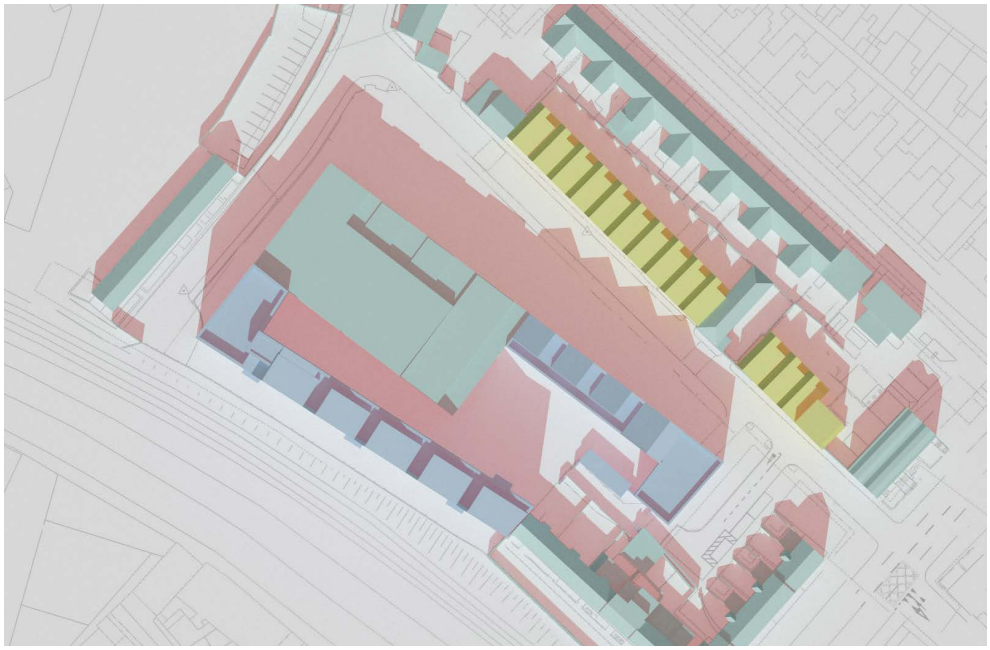
**Figure 14: Shadow diagrams 21 March 11:00 UTC**

Existing



N

Proposed



Permitted Development

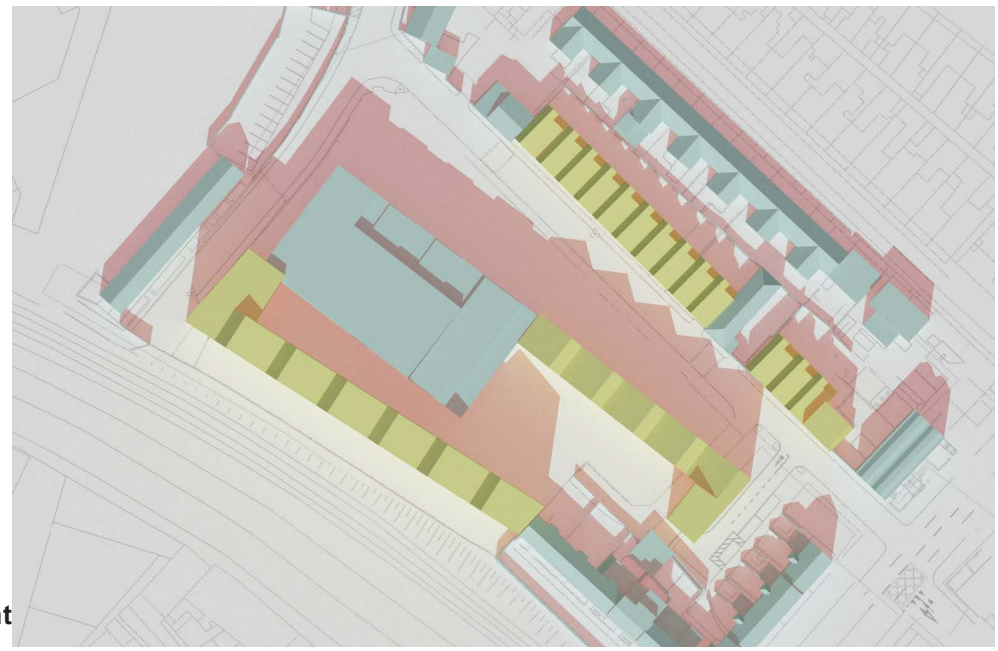
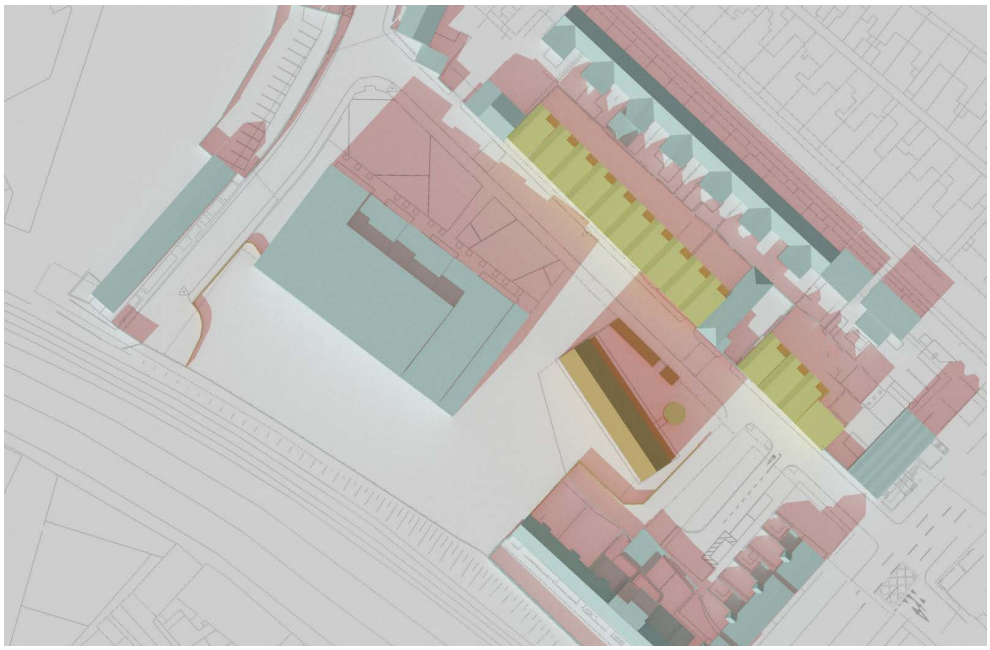


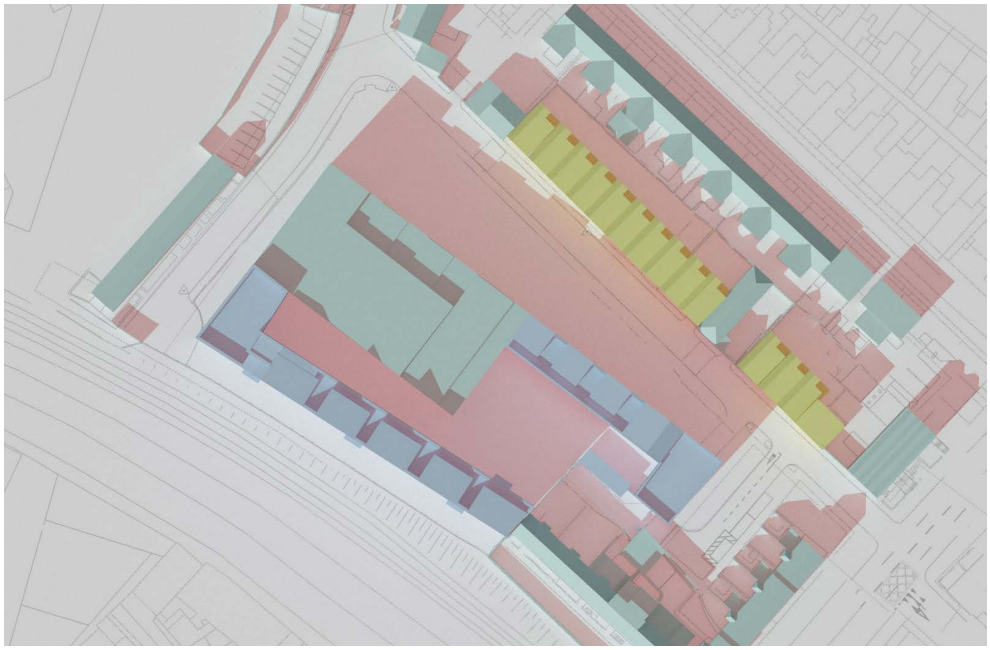
**Figure 15: Shadow diagrams 21 March 13:00 UTC**

Existing



N

Proposed



Permitted Development

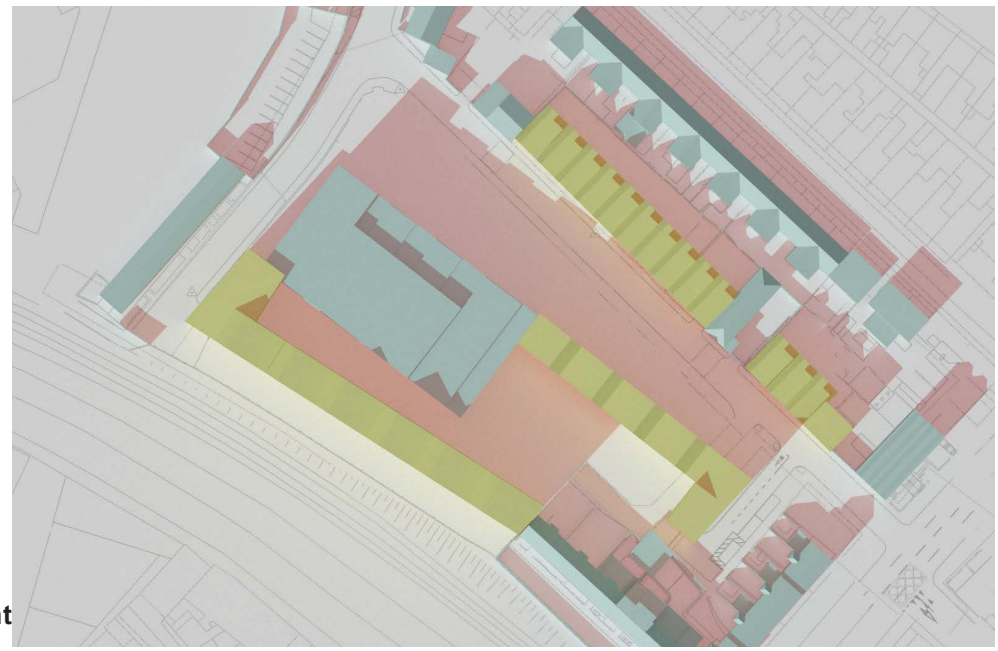
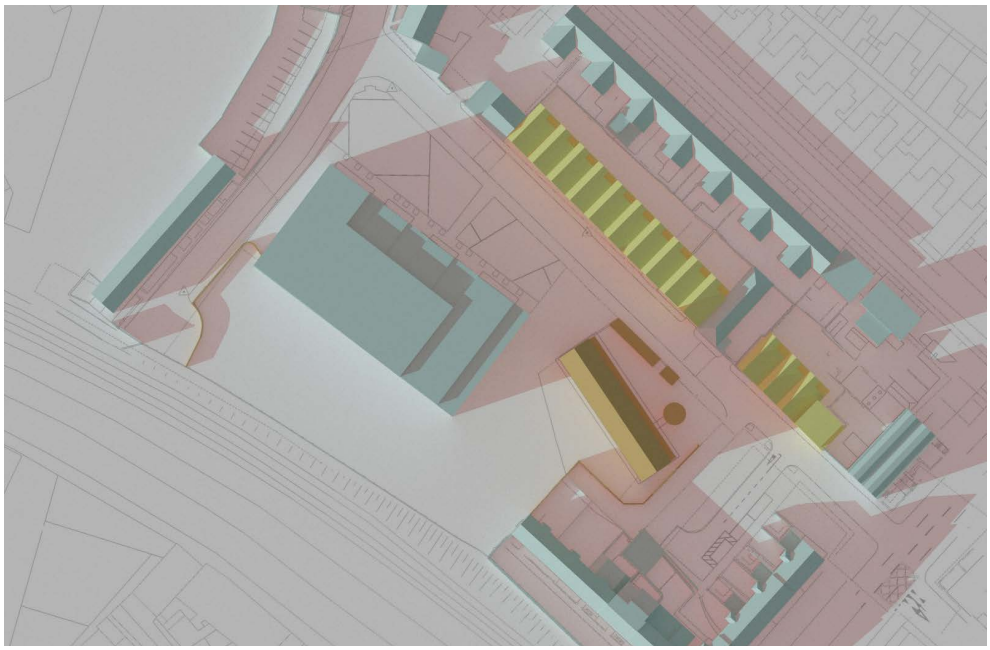


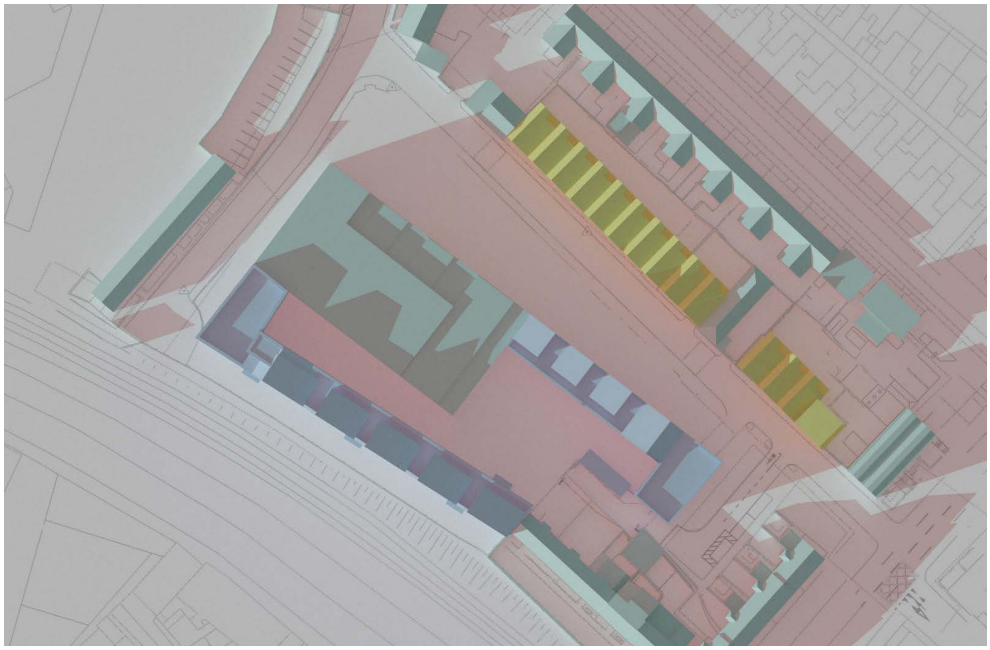
**Figure 16: Shadow diagrams 21 March 15:00 UTC**

Existing



N

Proposed



Permitted Development

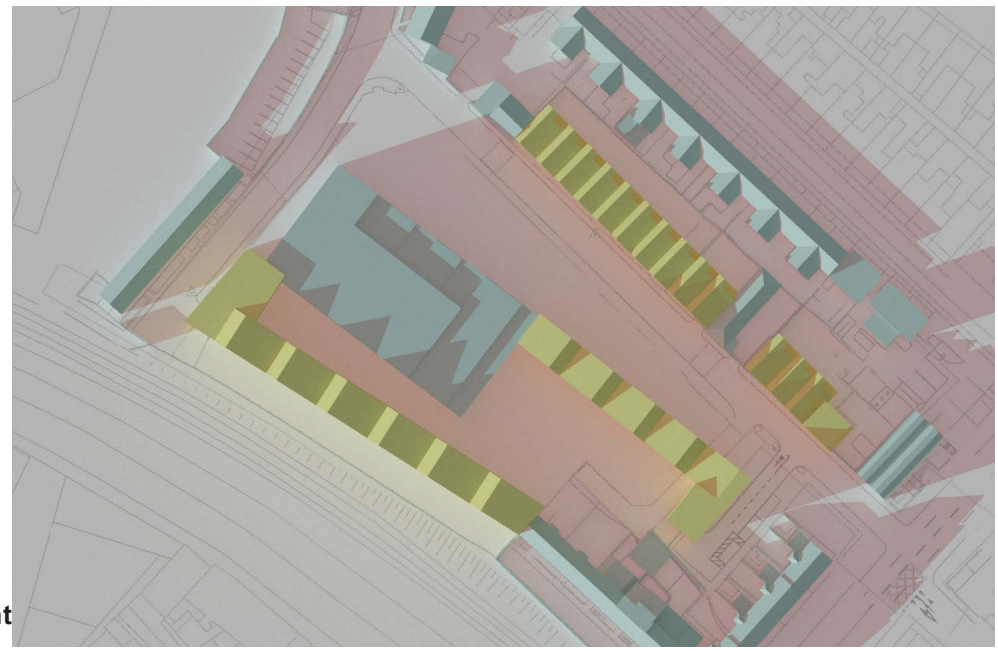


**Figure 17: Shadow diagrams 21 March 17:00 UTC**

## 9.3 Shadow Casting diagrams June Solstice

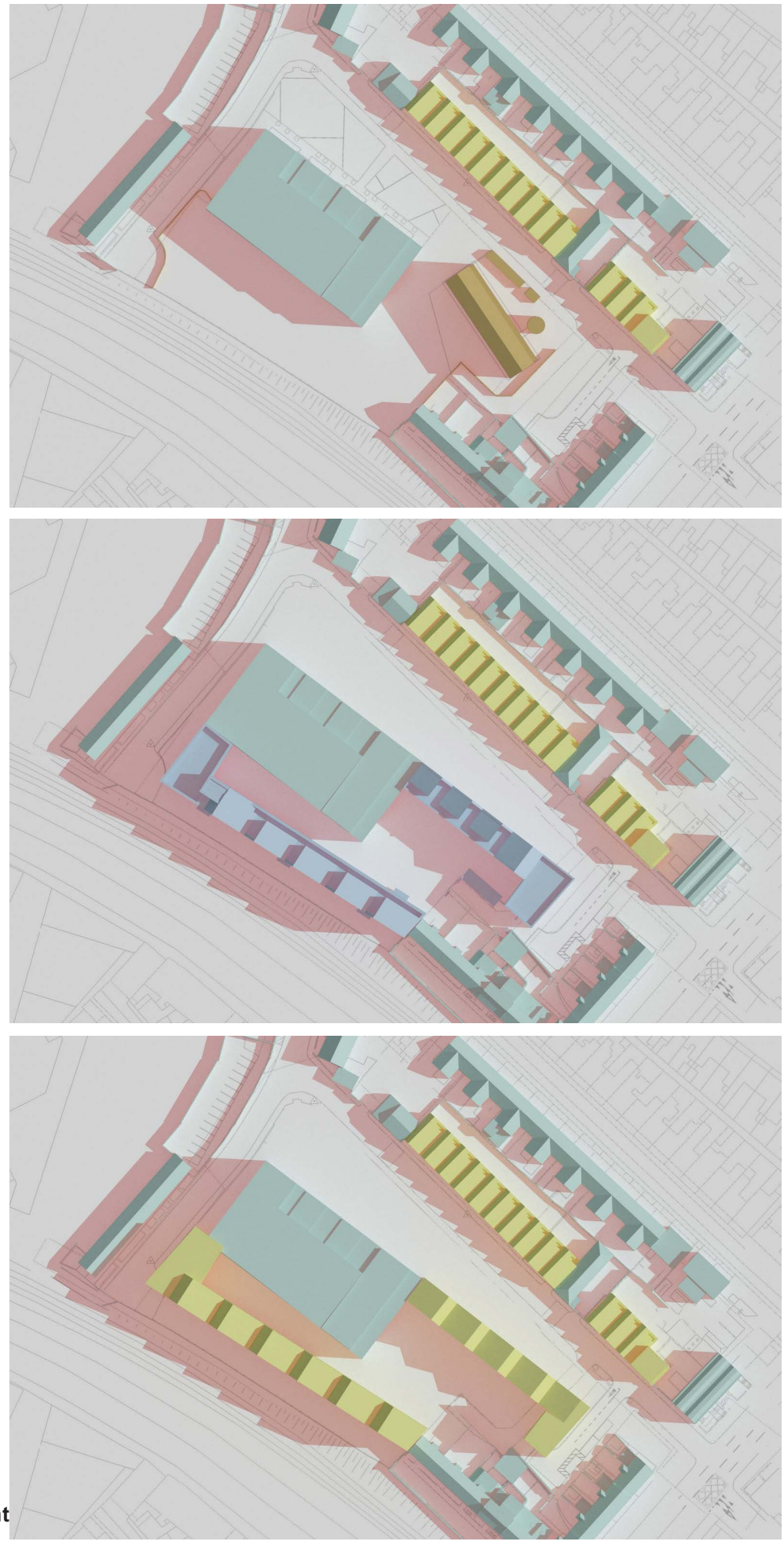
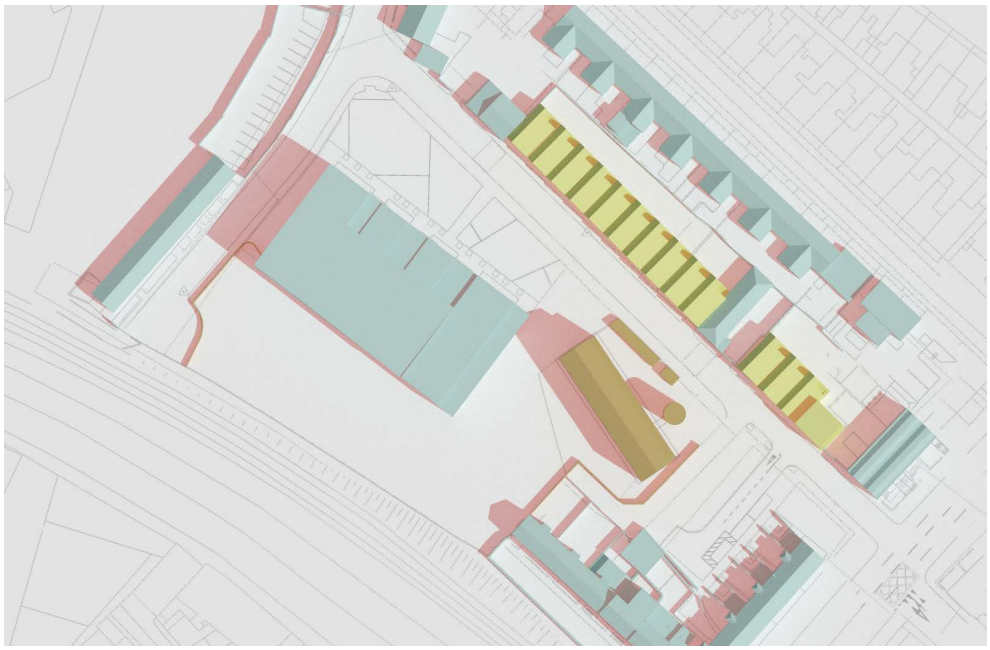


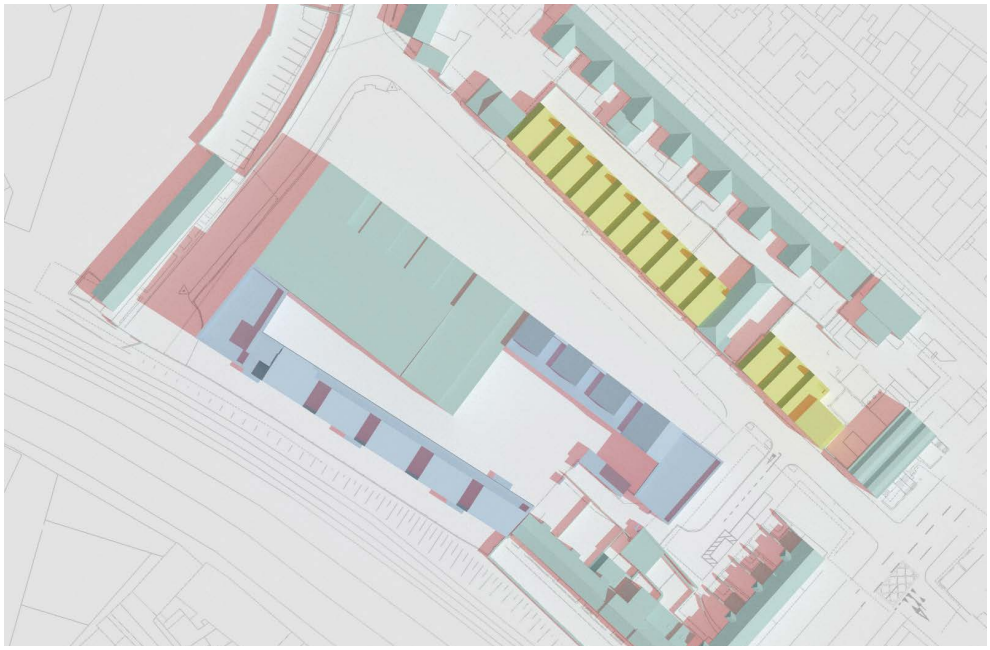

**Figure 18: Shadow diagrams 21 June 09:00 UTC +1**

Existing



N

Proposed



Permitted Development

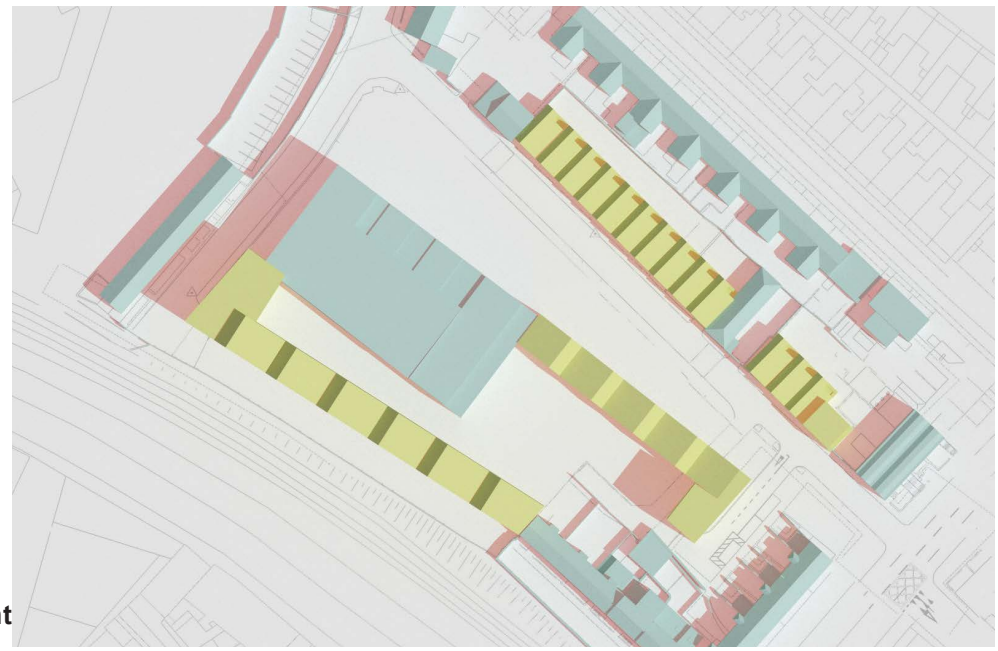
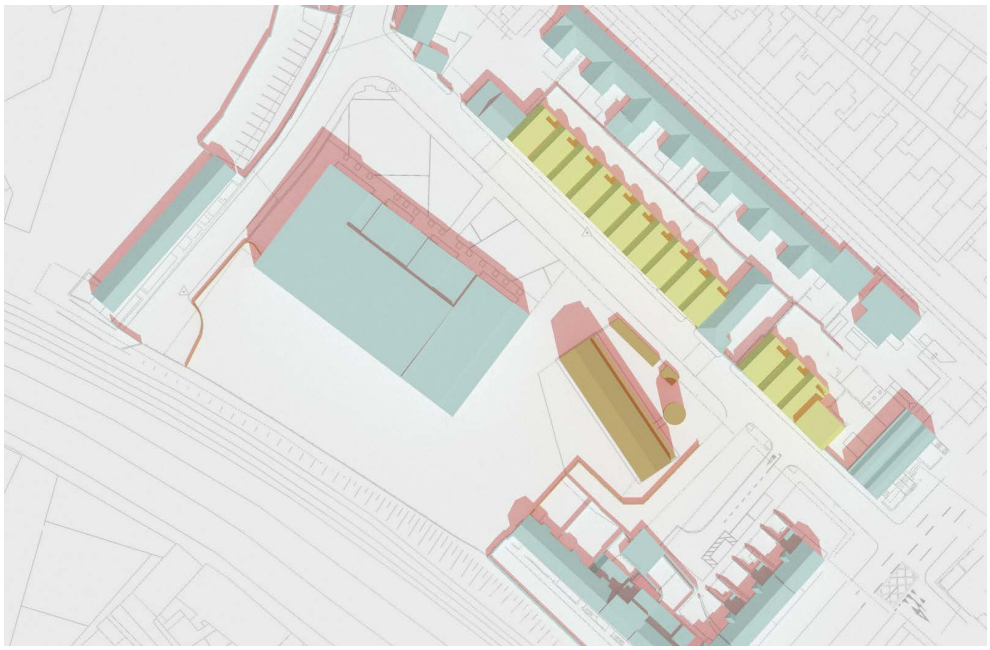


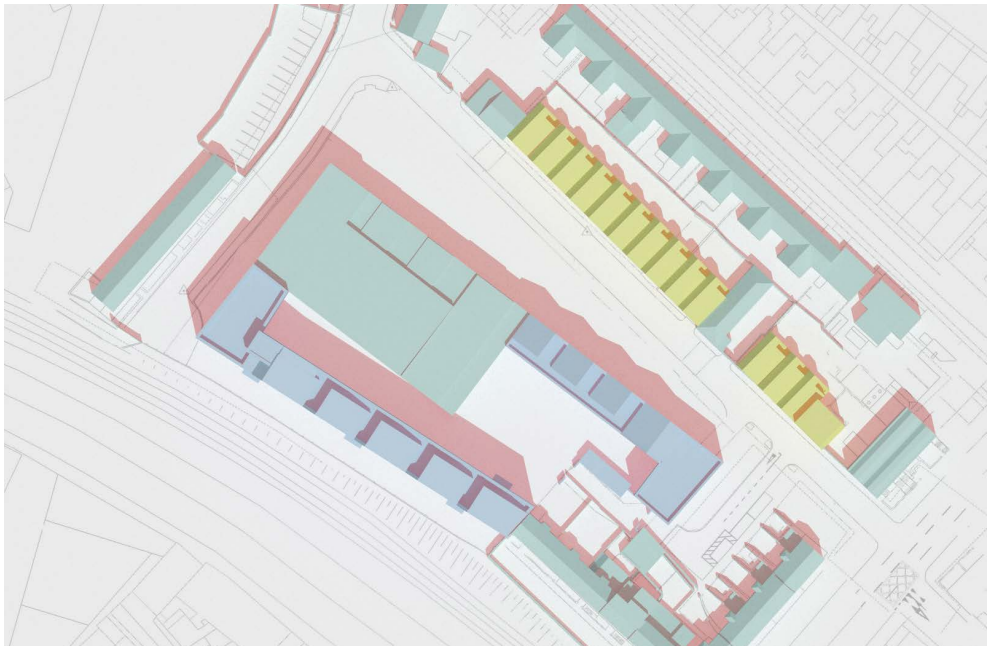
**Figure 19: Shadow diagrams 21 June 11:00 UTC +1**

Existing



N

Proposed



Permitted Development

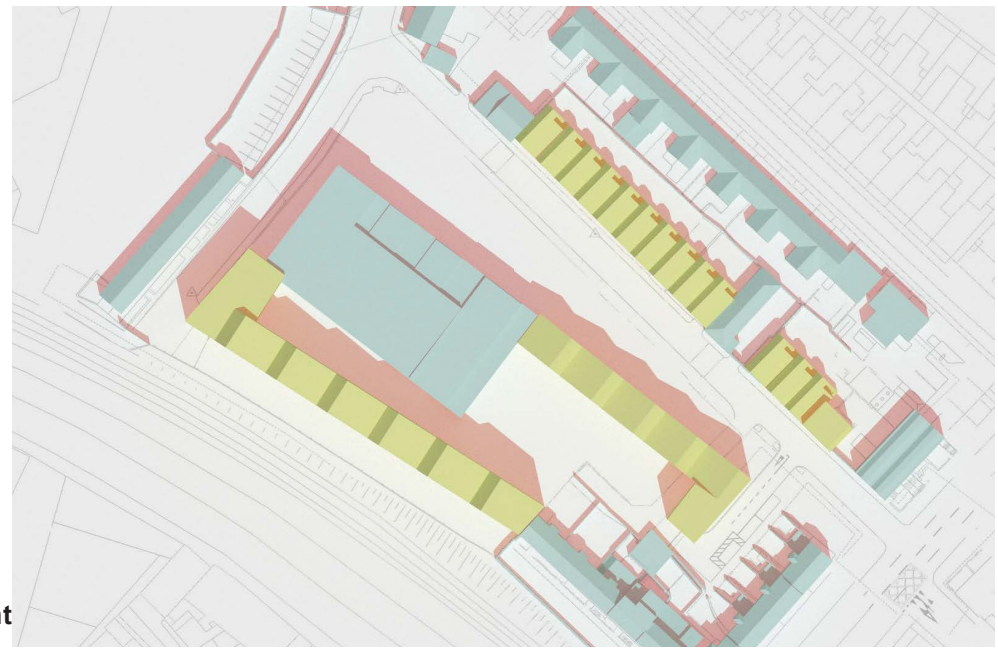
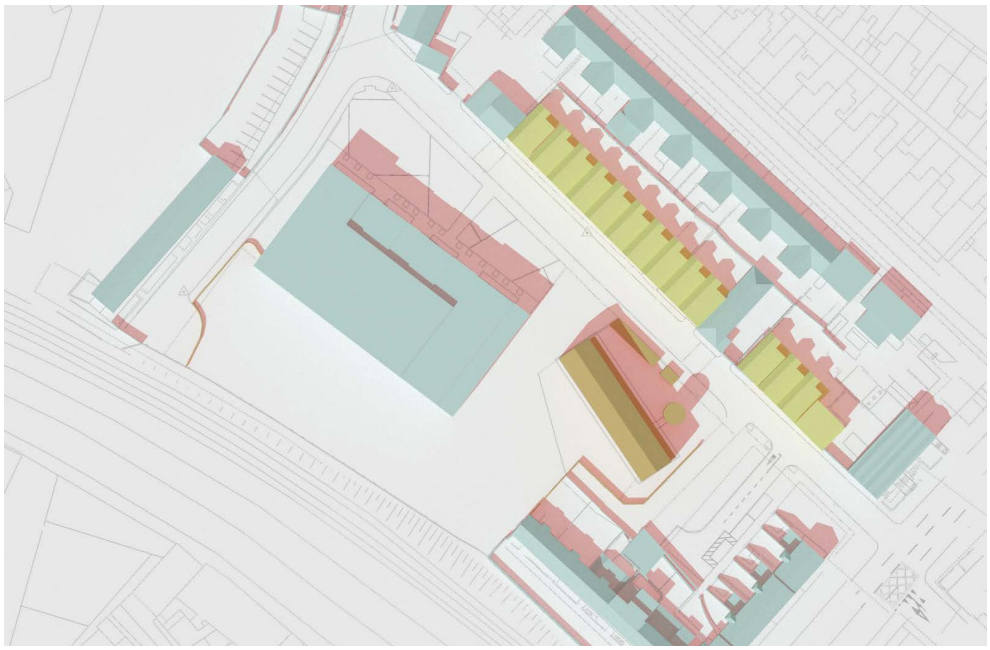


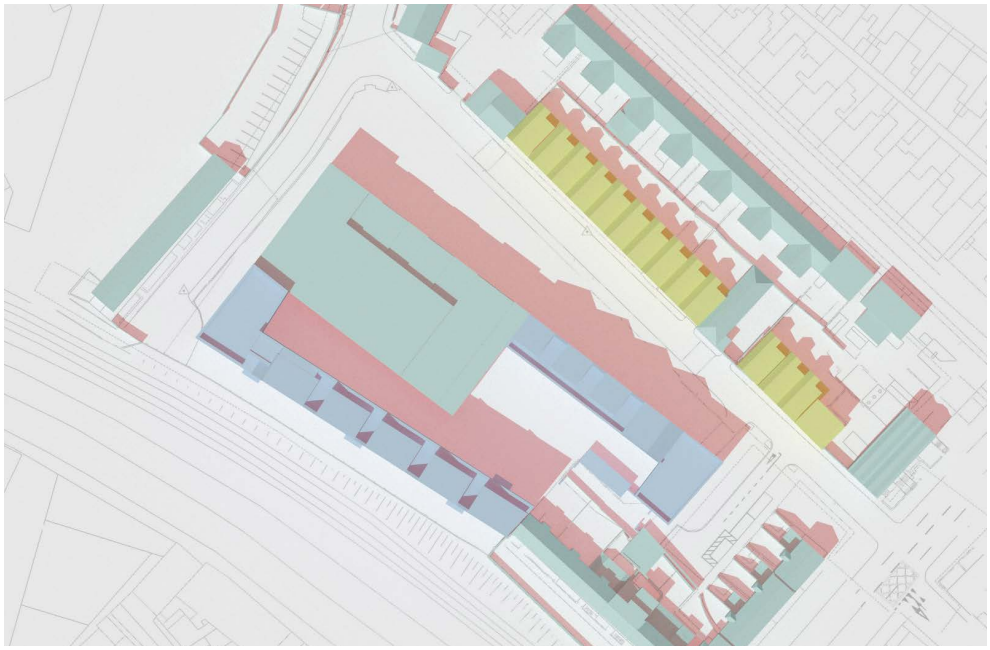
**Figure 20: Shadow diagrams 21 June 13:00 UTC +1**

Existing



N

Proposed



Permitted Development

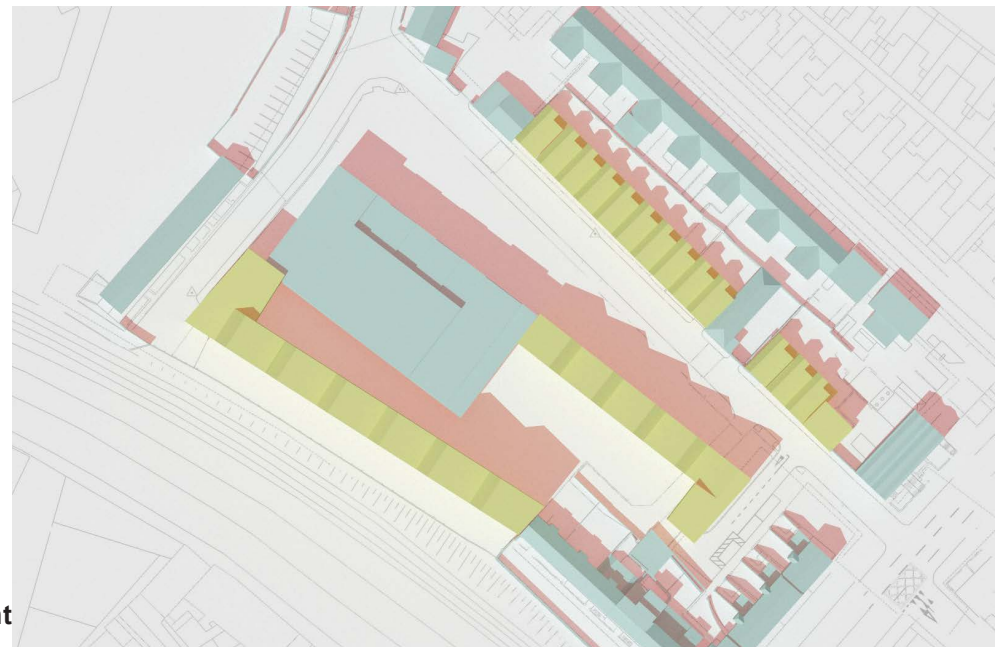
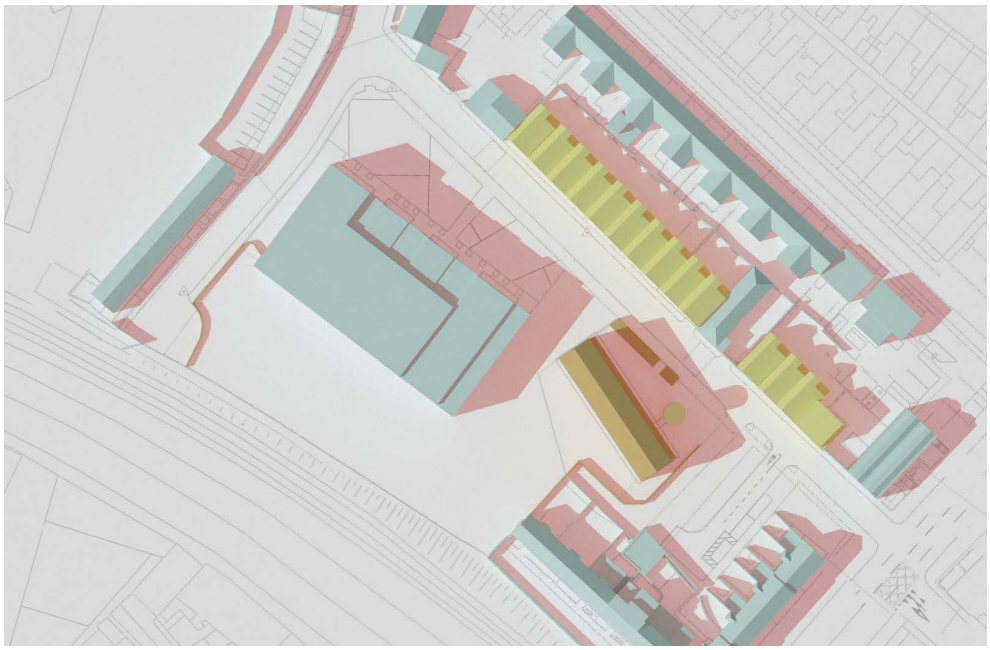


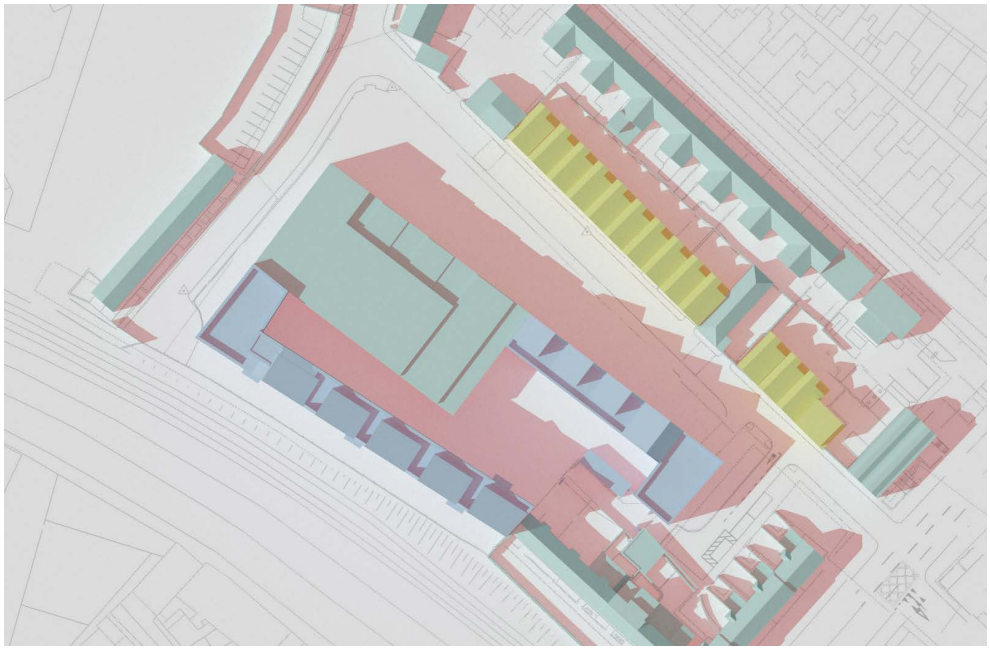
**Figure 21: Shadow diagrams 21 June 15:00 UTC +1**

Existing



N

Proposed



Permitted Development

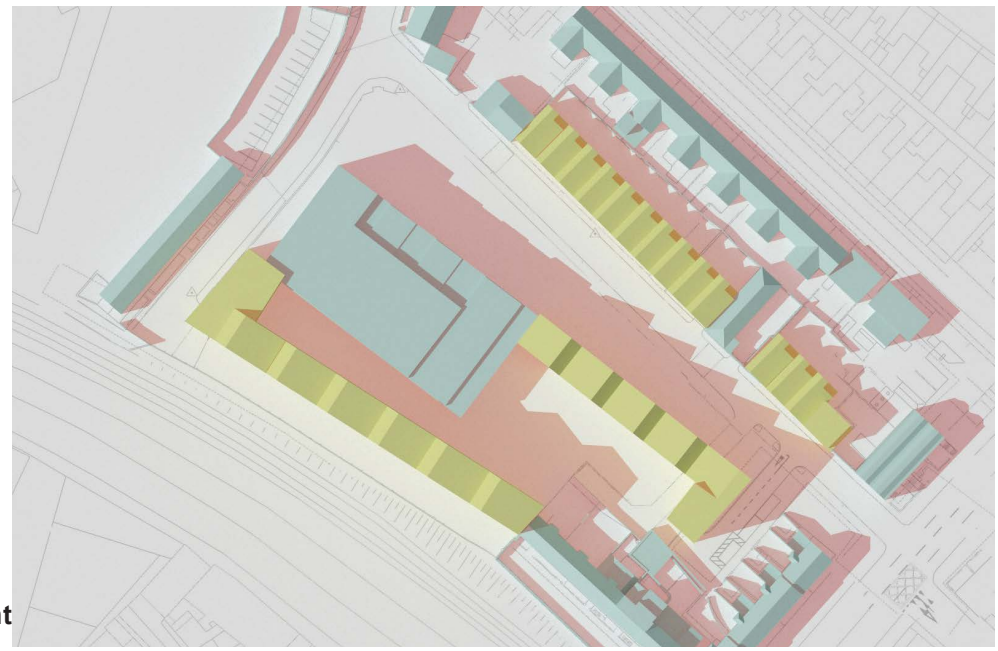
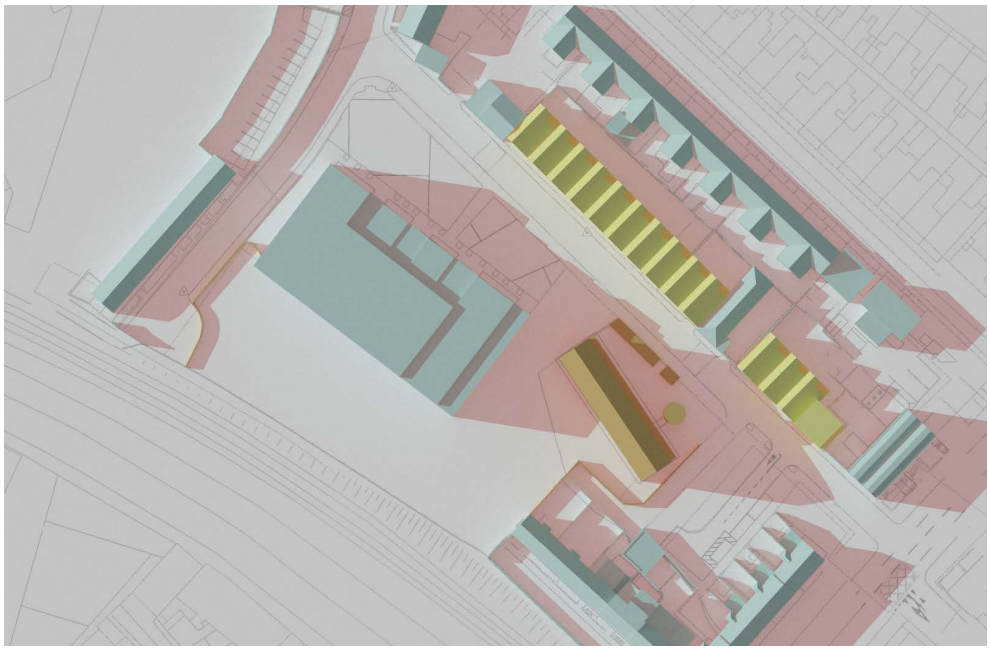


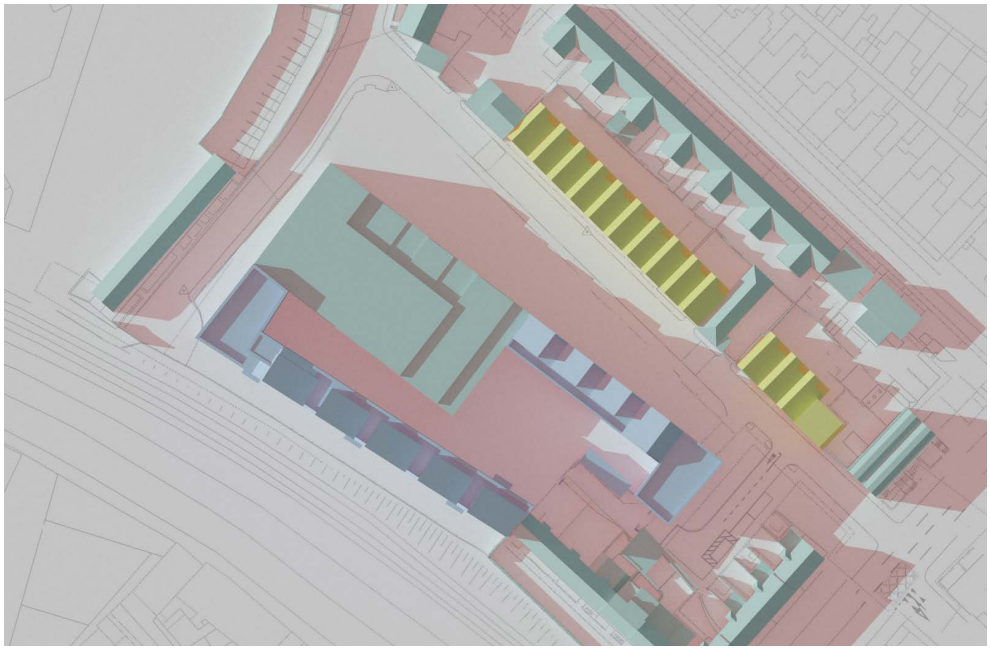
**Figure 22: Shadow diagrams 21 June 17:00 UTC +1**

Existing



N

Proposed



Permitted Development

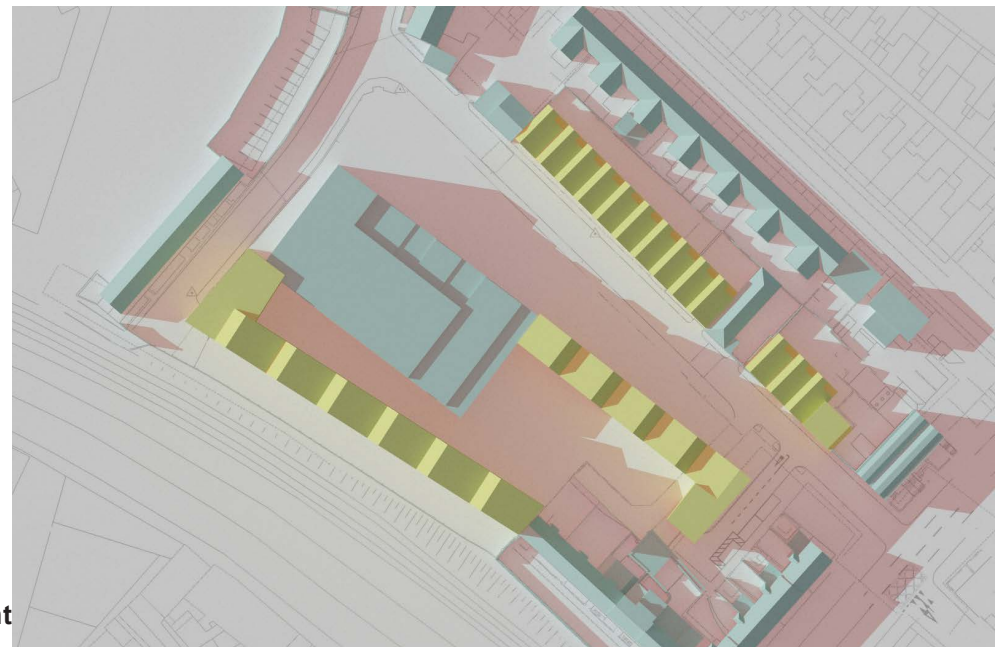
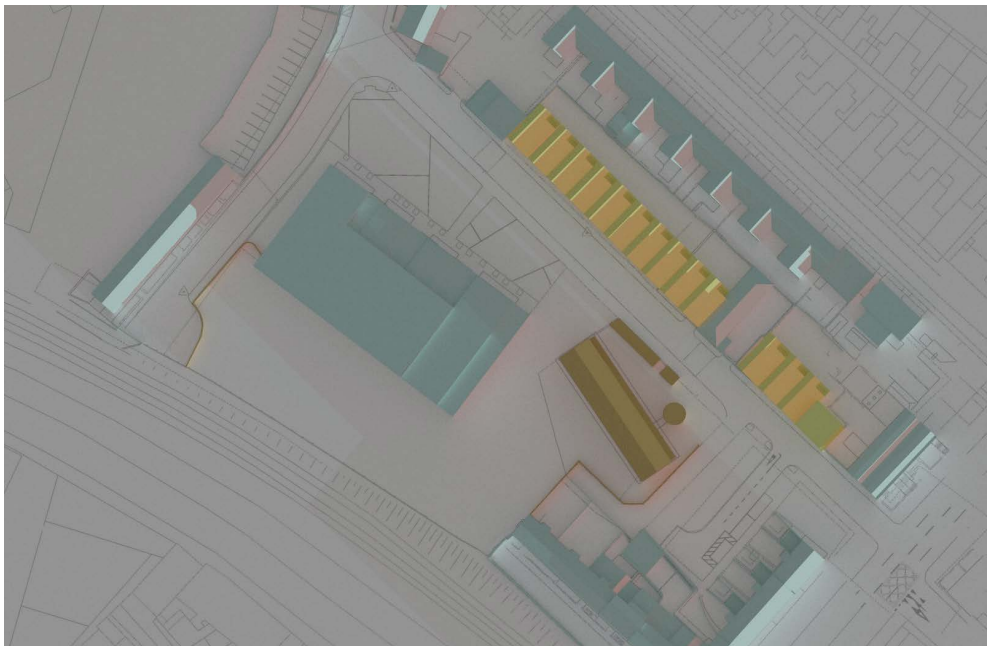
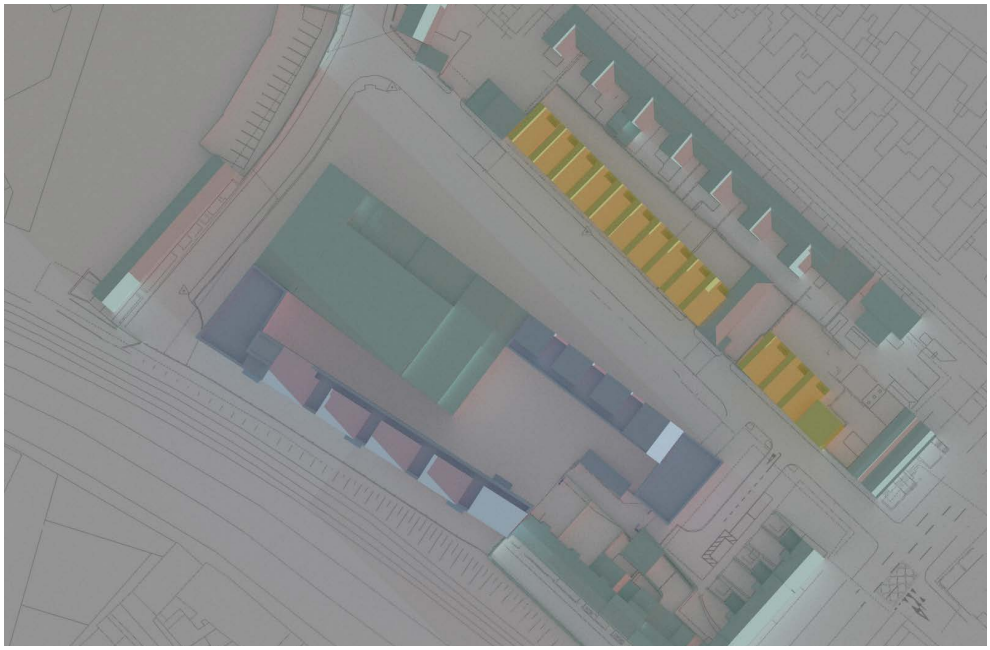


**Figure 23: Shadow diagrams 21 June 19:00 UTC +1**

## 9.5 Shadow Casting diagrams December Solstice

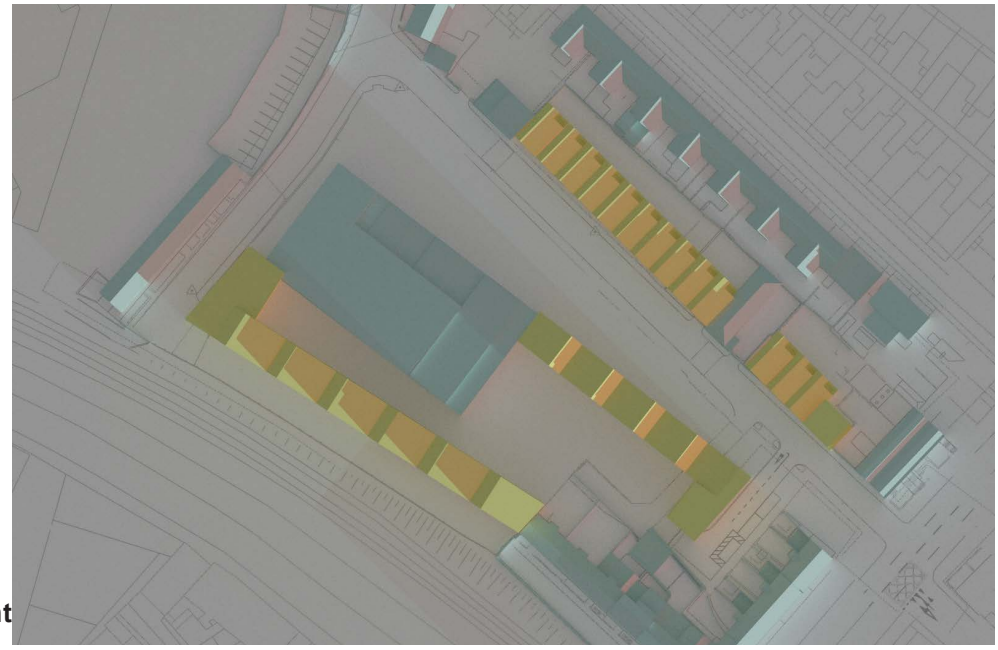


**Existing**



**N**

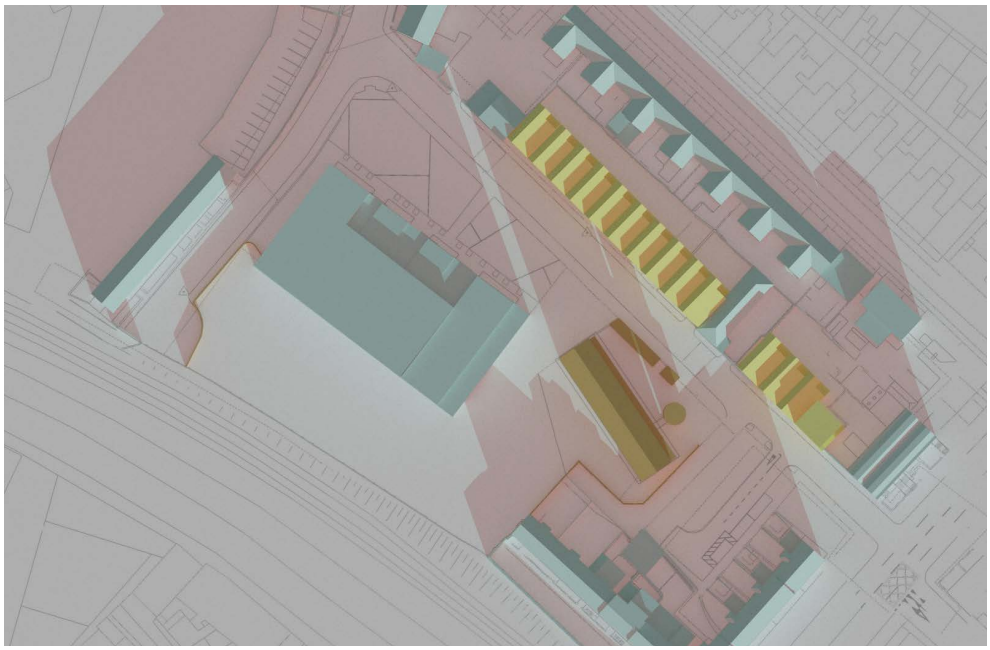
**Proposed**



**Permitted Development**

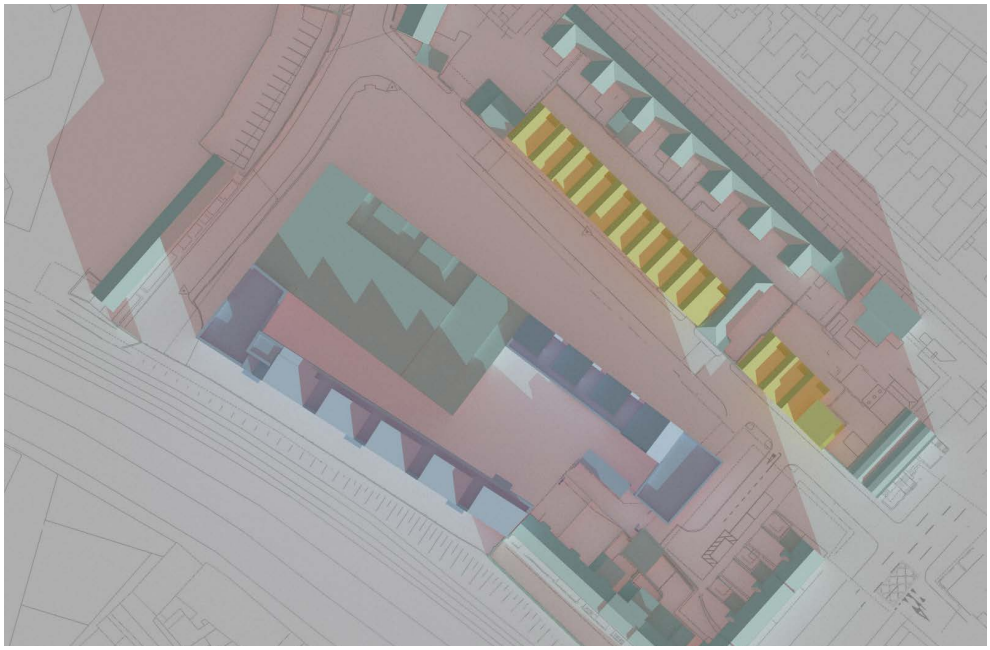
**Figure 24: Shadow diagrams 21 December 09:00 UTC**

**Existing**



**N**

**Proposed**



**Permitted Development**

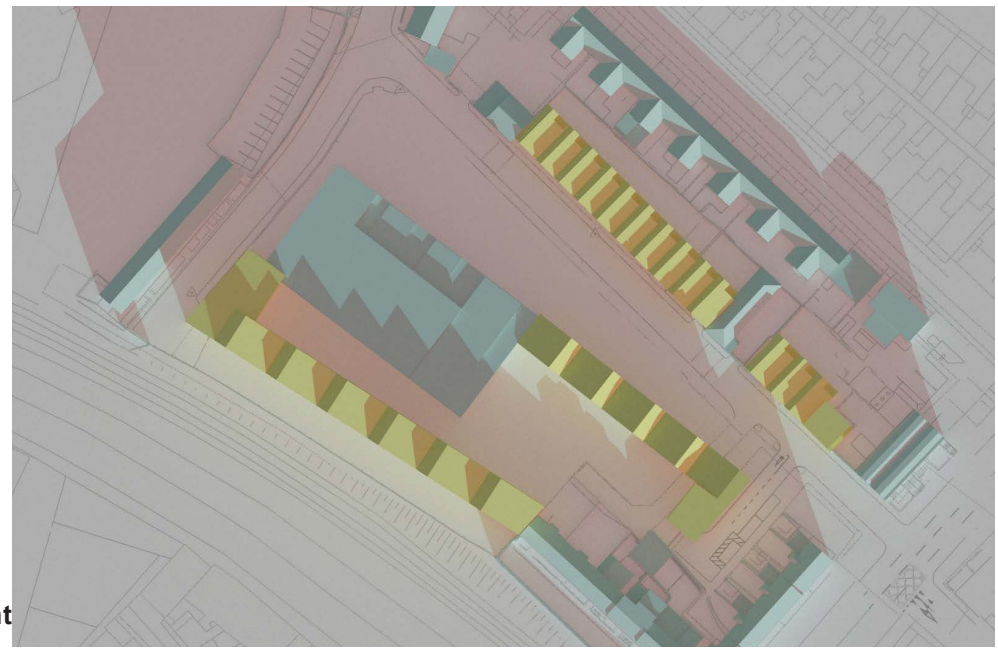
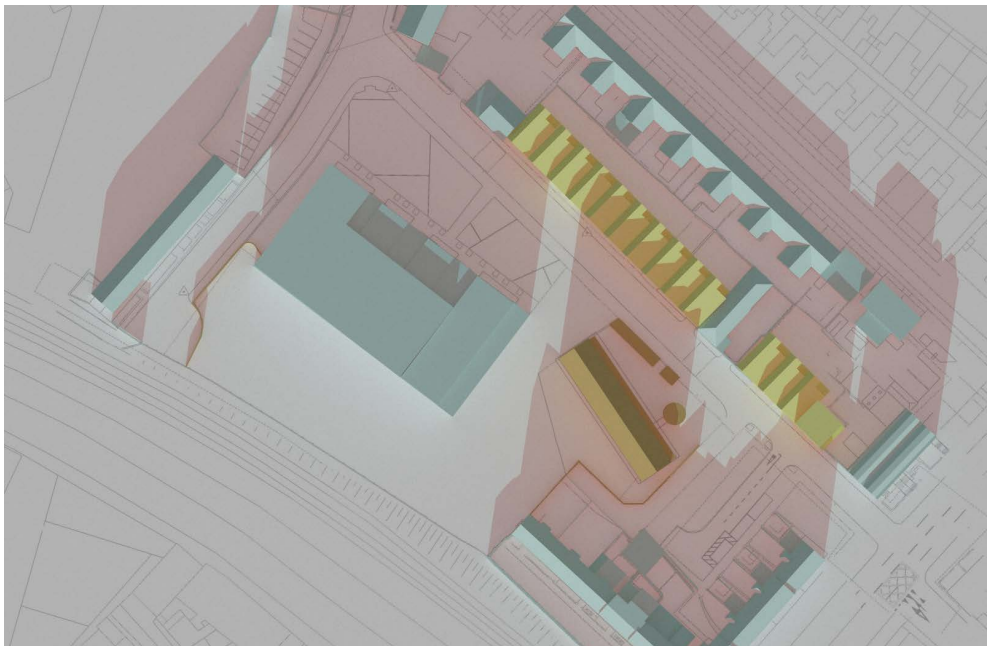


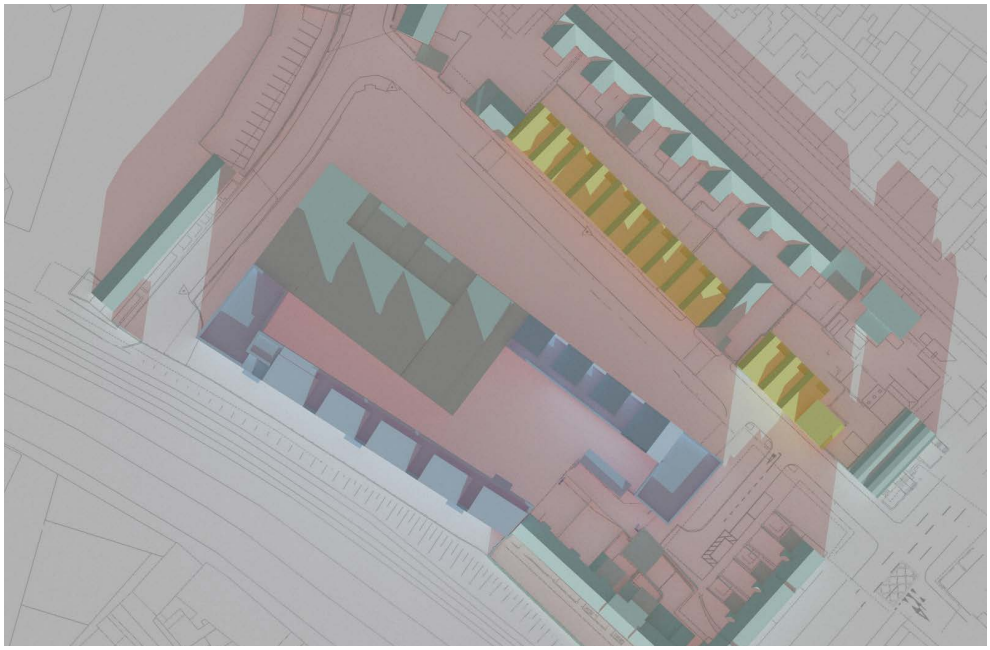
**Figure 25: Shadow diagrams 21 December 11:00 UTC**

Existing



N

Proposed



Permitted Development

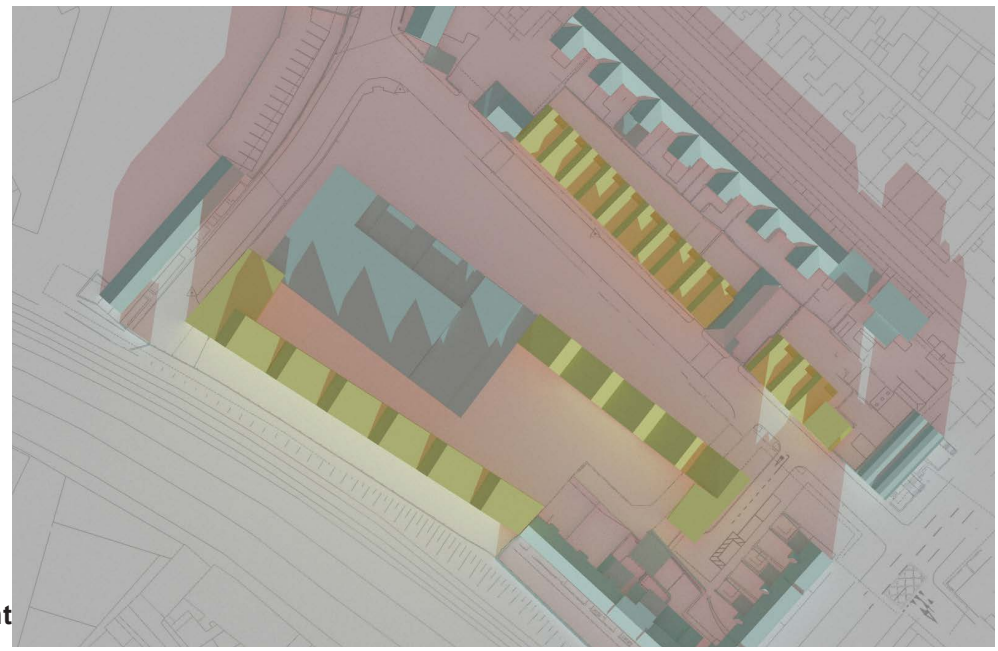
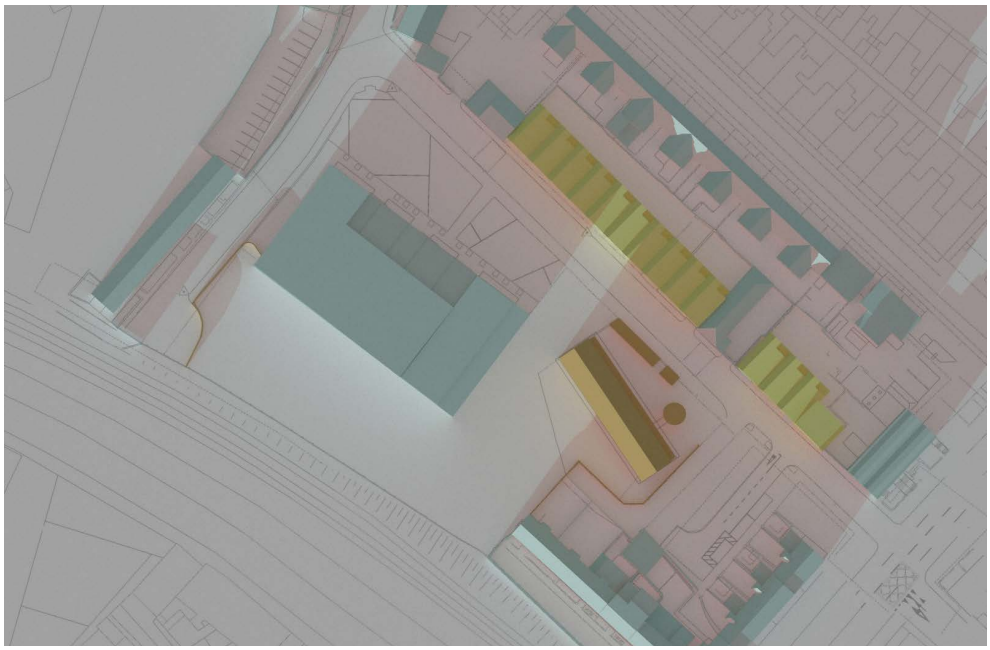


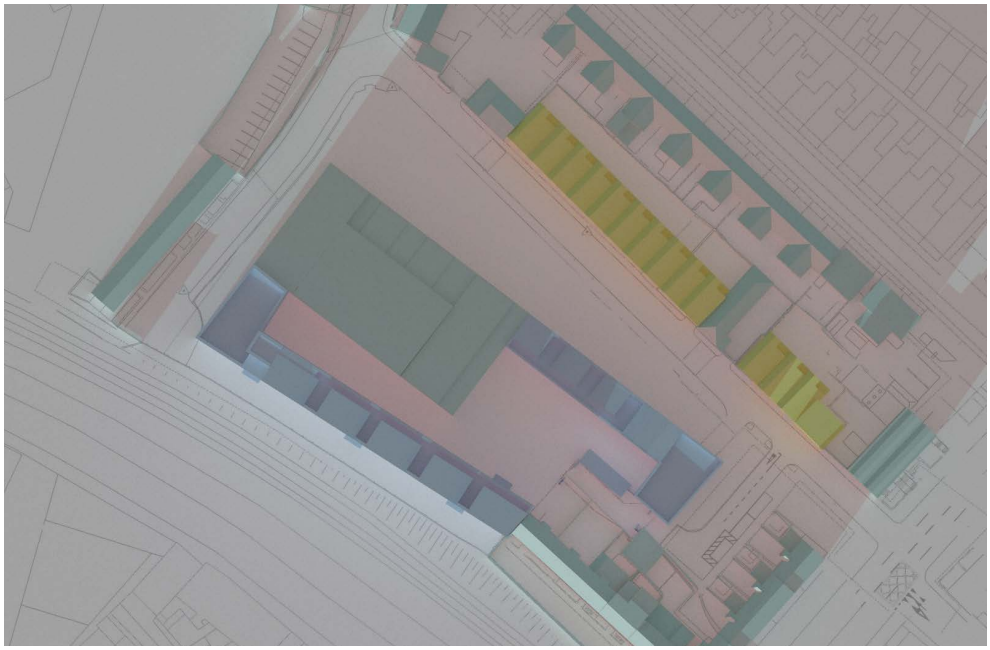
**Figure 26: Shadow diagrams 21 December 13:00 UTC**

Existing



N

Proposed



Permitted Development

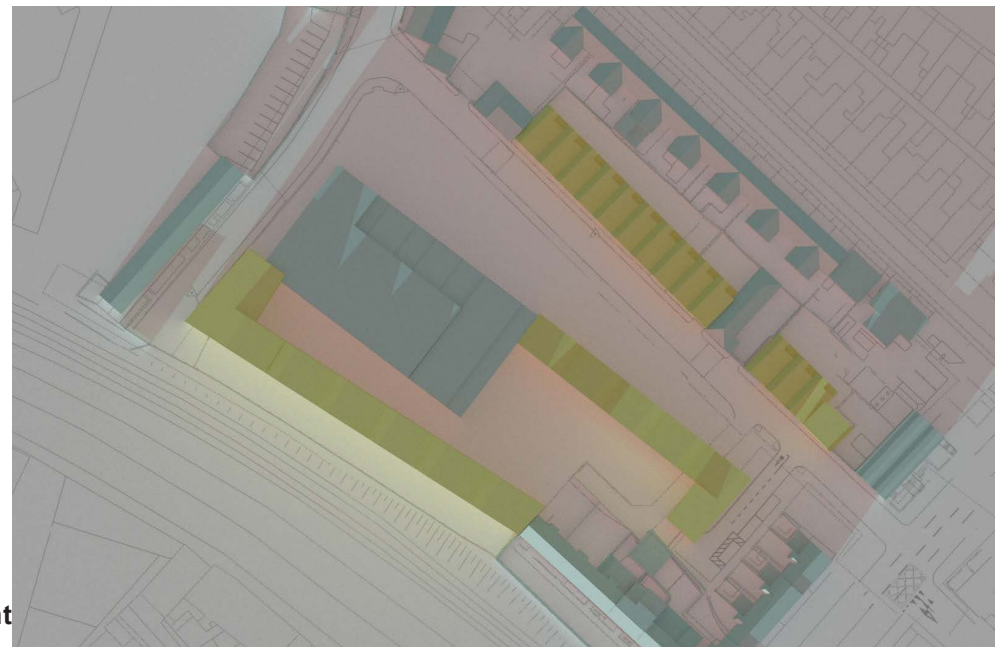
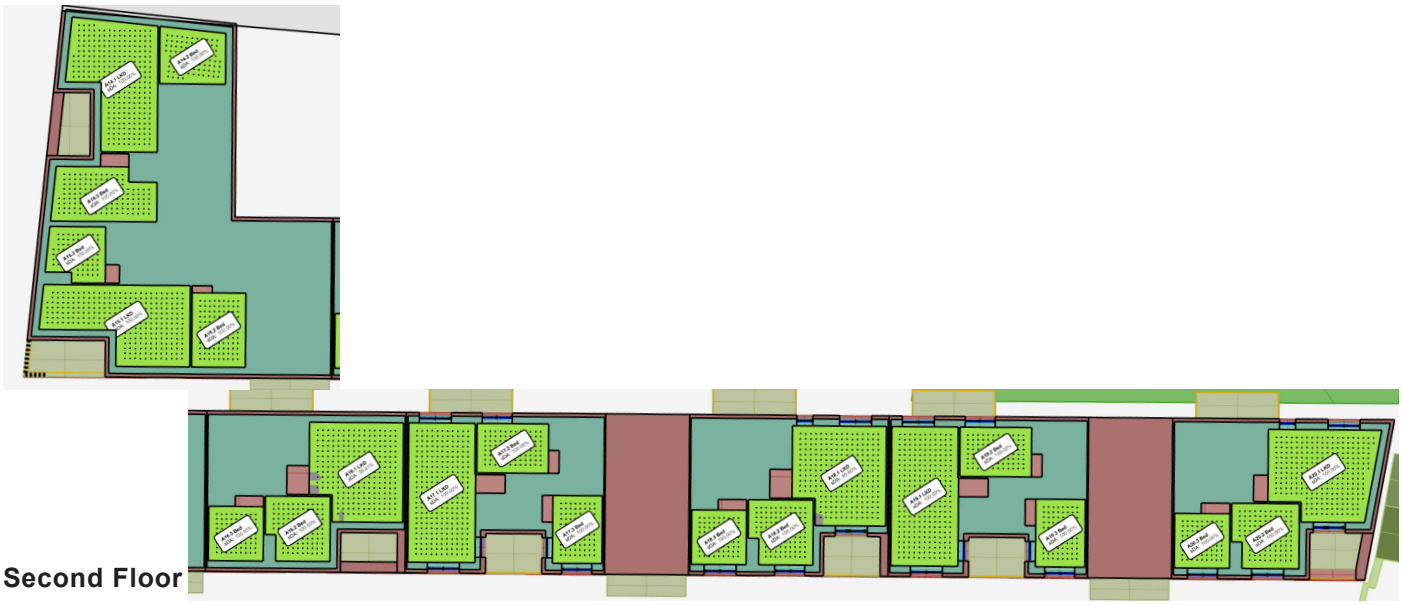


**Figure 27: Shadow diagrams 21 December 15:00 UTC**

## Appendix A -BS EN17037:2021+A1 Minimum room specific Daylight Provision in accordance with UK National Annex Table NA.1.

Ground Floor

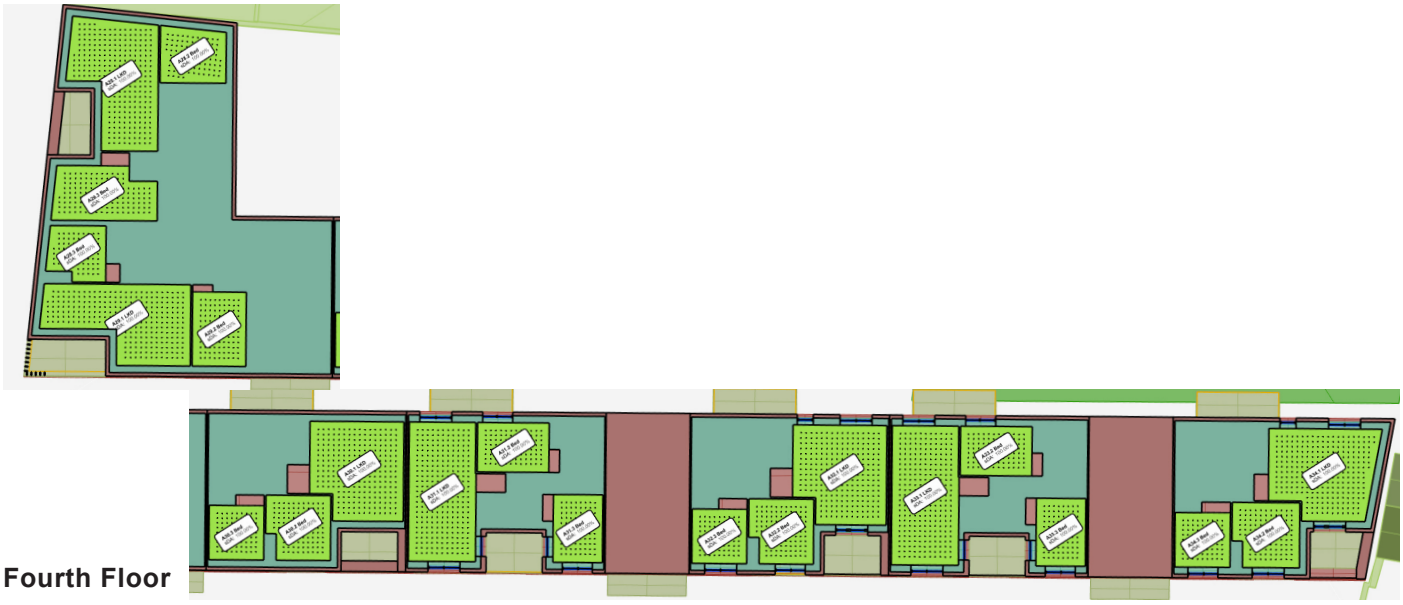
First Floor



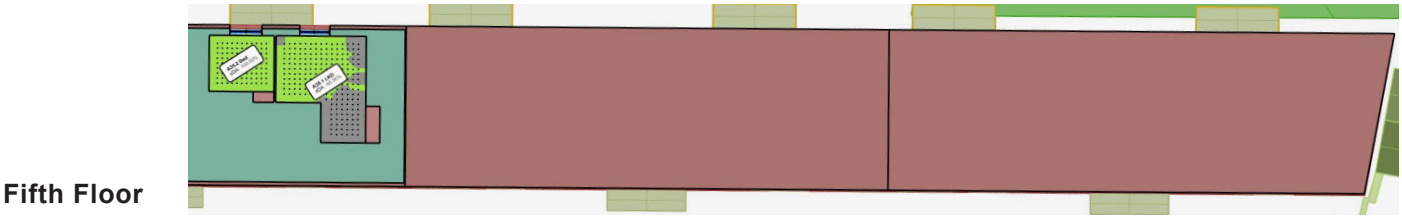
Second Floor

**Figure 28: Block A - Floor plans indicating Daylight Provision to BS EN17037:2021+A1 Table NA.1**

Third Floor



Fourth Floor



Fifth Floor

**Figure 29: Block A - Floor plans indicating Daylight Provision to BS EN17037:2021+A1 Table NA.1**

| Block A - Minimum illuminance levels from BS EN17037:2018+A1:2021 - Table NA.1 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Space ID | Use | Area m2 | Sensor Count | Target Lux | Mean Lux | % of grid target exceeded: Minimum 50% of grid | Meets Criteria |
| A01.1 | LKD | 29.9 | 282 | 200 | 1078 | 100.0% | Y |
| A01.2 | Bed | 9.9 | 80 | 100 | 237 | 100.0% | Y |
| A01.3 | Bed | 13.2 | 112 | 100 | 523 | 100.0% | Y |
| A02.1 | LKD | 27.8 | 249 | 200 | 859 | 100.0% | Y |
| A02.2 | Bed | 9.3 | 72 | 100 | 2018 | 100.0% | Y |
| A02.3 | Bed | 13.1 | 110 | 100 | 191 | 60.0% | Y |
| A03.1 | LKD | 27.8 | 249 | 200 | 835 | 100.0% | Y |
| A03.2 | Bed | 9.3 | 72 | 100 | 1076 | 100.0% | Y |
| A03.3 | Bed | 13.1 | 110 | 100 | 180 | 58.2% | Y |

| Block A - Minimum illuminance levels from BS EN17037:2018+A1:2021 - Table NA.1 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Space ID | Use | Area m2 | Sensor Count | Target Lux | Mean Lux | % of grid target exceeded: Minimum 50% of grid | Meets Criteria |
| A04.1 | LKD | 27.8 | 249 | 200 | 858 | 100.0% | Y |
| A04.2 | Bed | 9.3 | 72 | 100 | 1996 | 100.0% | Y |
| A04.3 | Bed | 13.1 | 110 | 100 | 237 | 95.5% | Y |
| A05.1 | LKD | 27.8 | 249 | 200 | 880 | 100.0% | Y |
| A05.2 | Bed | 9.3 | 72 | 100 | 1030 | 100.0% | Y |
| A05.3 | Bed | 13.1 | 110 | 100 | 427 | 100.0% | Y |
| A06.1 | LKD | 28.1 | 249 | 200 | 953 | 100.0% | Y |
| A06.2 | Bed | 9.2 | 75 | 100 | 1790 | 100.0% | Y |
| A06.3 | Bed | 13.1 | 118 | 100 | 463 | 100.0% | Y |
| A07.1 | LKD | 30.0 | 276 | 200 | 490 | 100.0% | Y |
| A07.2 | Bed | 11.4 | 92 | 100 | 621 | 100.0% | Y |
| A07.3 | Bed | 18.0 | 143 | 100 | 522 | 100.0% | Y |
| A08.1 | LKD | 30.1 | 277 | 300 | 1167 | 78.7% | Y |
| A08.2 | Bed | 12.7 | 117 | 100 | 1613 | 100.0% | Y |
| A08.3 | Bed | 11.6 | 92 | 100 | 685 | 100.0% | Y |
| A09.1 | LKD | 29.2 | 267 | 200 | 927 | 100.0% | Y |
| A09.2 | Bed | 11.3 | 96 | 100 | 286 | 95.8% | Y |
| A09.3 | Bed | 10.6 | 88 | 100 | 1999 | 100.0% | Y |
| A10.1 | LKD | 27.0 | 236 | 200 | 362 | 92.8% | Y |
| A10.2 | Bed | 13.2 | 108 | 100 | 1482 | 100.0% | Y |
| A10.3 | Bed | 10.1 | 80 | 100 | 1813 | 100.0% | Y |
| A11.1 | LKD | 29.2 | 267 | 200 | 943 | 100.0% | Y |
| A11.2 | Bed | 11.3 | 96 | 100 | 311 | 100.0% | Y |
| A11.3 | Bed | 10.6 | 88 | 100 | 1992 | 100.0% | Y |
| A12.1 | LKD | 27.0 | 236 | 200 | 453 | 100.0% | Y |
| A12.2 | Bed | 13.2 | 108 | 100 | 1494 | 100.0% | Y |
| A12.3 | Bed | 10.1 | 80 | 100 | 1810 | 100.0% | Y |
| A13.1 | LKD | 28.3 | 263 | 200 | 1019 | 100.0% | Y |
| A13.2 | Bed | 11.4 | 96 | 100 | 582 | 100.0% | Y |
| A13.3 | Bed | 10.6 | 88 | 100 | 1873 | 100.0% | Y |
| A14.1 | LKD | 30.0 | 276 | 200 | 518 | 100.0% | Y |
| A14.2 | Bed | 11.4 | 92 | 100 | 773 | 100.0% | Y |
| A14.3 | Bed | 16.8 | 142 | 100 | 598 | 100.0% | Y |
| A15.1 | LKD | 30.1 | 271 | 200 | 1105 | 100.0% | Y |
| A15.2 | Bed | 12.8 | 108 | 100 | 1528 | 100.0% | Y |
| A15.3 | Bed | 9.6 | 77 | 100 | 864 | 100.0% | Y |
| A16.1 | LKD | 28.0 | 252 | 200 | 417 | 98.8% | Y |
| A16.2 | Bed | 12.6 | 111 | 100 | 1556 | 100.0% | Y |
| A16.3 | Bed | 9.6 | 81 | 100 | 2071 | 100.0% | Y |
| A17.1 | LKD | 29.9 | 275 | 200 | 984 | 100.0% | Y |
| A17.2 | Bed | 11.3 | 96 | 100 | 418 | 100.0% | Y |
| A17.3 | Bed | 10.8 | 88 | 100 | 1768 | 100.0% | Y |
| A18.1 | LKD | 28.0 | 252 | 200 | 408 | 99.6% | Y |
| A18.2 | Bed | 12.6 | 111 | 100 | 1554 | 100.0% | Y |
| A18.3 | Bed | 9.6 | 81 | 100 | 2076 | 100.0% | Y |
| A19.1 | LKD | 29.9 | 275 | 200 | 1026 | 100.0% | Y |
| A19.2 | Bed | 11.3 | 96 | 100 | 590 | 100.0% | Y |
| A19.3 | Bed | 10.8 | 88 | 100 | 1776 | 100.0% | Y |
| A20.1 | LKD | 29.0 | 270 | 200 | 510 | 100.0% | Y |
| A20.2 | Bed | 13.2 | 111 | 100 | 1635 | 100.0% | Y |
| A20.3 | Bed | 9.7 | 81 | 100 | 1922 | 100.0% | Y |

| Block A - Minimum illuminance levels from BS EN17037:2018+A1:2021 - Table NA.1 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Space ID | Use | Area m2 | Sensor Count | Target Lux | Mean Lux | % of grid target exceeded: Minimum 50% of grid | Meets Criteria |
| A21.1 | LKD | 30.0 | 276 | 200 | 531 | 100.0% | Y |
| A21.2 | Bed | 11.4 | 92 | 100 | 1025 | 100.0% | Y |
| A21.3 | Bed | 16.8 | 142 | 100 | 605 | 100.0% | Y |
| A22.1 | LKD | 30.1 | 271 | 200 | 1102 | 100.0% | Y |
| A22.2 | Bed | 12.8 | 108 | 100 | 1524 | 100.0% | Y |
| A22.3 | Bed | 9.6 | 77 | 100 | 892 | 100.0% | Y |
| A23.1 | LKD | 29.2 | 267 | 200 | 1023 | 100.0% | Y |
| A23.2 | Bed | 11.3 | 96 | 100 | 548 | 100.0% | Y |
| A23.3 | Bed | 10.6 | 88 | 100 | 2001 | 100.0% | Y |
| A24.1 | LKD | 27.0 | 236 | 200 | 532 | 100.0% | Y |
| A24.2 | Bed | 13.2 | 108 | 100 | 1506 | 100.0% | Y |
| A24.3 | Bed | 10.1 | 80 | 100 | 1806 | 100.0% | Y |
| A25.1 | LKD | 29.2 | 267 | 200 | 1056 | 100.0% | Y |
| A25.2 | Bed | 11.3 | 96 | 100 | 607 | 100.0% | Y |
| A25.3 | Bed | 10.6 | 88 | 100 | 1995 | 100.0% | Y |
| A26.1 | LKD | 27.0 | 236 | 200 | 583 | 100.0% | Y |
| A26.2 | Bed | 13.2 | 108 | 100 | 1492 | 100.0% | Y |
| A26.3 | Bed | 10.1 | 80 | 100 | 1827 | 100.0% | Y |
| A27.1 | LKD | 28.3 | 263 | 200 | 1078 | 100.0% | Y |
| A27.2 | Bed | 11.4 | 96 | 100 | 700 | 100.0% | Y |
| A27.3 | Bed | 10.6 | 88 | 100 | 1900 | 100.0% | Y |
| A28.1 | LKD | 30.0 | 276 | 200 | 536 | 100.0% | Y |
| A28.2 | Bed | 11.4 | 92 | 100 | 1421 | 100.0% | Y |
| A29.1 | LKD | 30.1 | 271 | 200 | 1097 | 100.0% | Y |
| A29.2 | Bed | 12.8 | 108 | 100 | 1526 | 100.0% | Y |
| A29.3 | Bed | 9.6 | 77 | 100 | 903 | 100.0% | Y |
| A29.3 | Bed | 16.8 | 142 | 100 | 616 | 100.0% | Y |
| A30.1 | LKD | 28.0 | 252 | 200 | 596 | 100.0% | Y |
| A30.2 | Bed | 12.6 | 111 | 100 | 1556 | 100.0% | Y |
| A30.3 | Bed | 9.6 | 81 | 100 | 2090 | 100.0% | Y |
| A31.1 | LKD | 29.9 | 275 | 200 | 1096 | 100.0% | Y |
| A31.2 | Bed | 11.3 | 96 | 100 | 707 | 100.0% | Y |
| A31.3 | Bed | 10.8 | 88 | 100 | 1771 | 100.0% | Y |
| A32.1 | LKD | 28.0 | 252 | 200 | 579 | 100.0% | Y |
| A32.2 | Bed | 12.6 | 111 | 100 | 1471 | 100.0% | Y |
| A32.3 | Bed | 9.6 | 81 | 100 | 2077 | 100.0% | Y |
| A33.1 | LKD | 29.9 | 275 | 200 | 1109 | 100.0% | Y |
| A33.2 | Bed | 11.3 | 96 | 100 | 760 | 100.0% | Y |
| A33.3 | Bed | 10.8 | 88 | 100 | 1784 | 100.0% | Y |
| A34.1 | LKD | 29.0 | 270 | 200 | 571 | 100.0% | Y |
| A34.2 | Bed | 13.2 | 111 | 100 | 1652 | 100.0% | Y |
| A34.3 | Bed | 9.7 | 81 | 100 | 1933 | 100.0% | Y |
| A35.1 | LKD | 25.0 | 214 | 200 | 328 | 66.4% | Y |
| A35.2 | Bed | 11.7 | 99 | 100 | 684 | 100.0% | Y |

**Table 16: Minimum Daylight Provision BS EN17037:2018+A1:2021 Table NA.1 compliance for habitable rooms**

Ground Floor

First Floor

Second Floor

Third Floor

**Figure 30: Block B - Floor plans indicating Daylight Provision to BS EN17037:2021+A1 Table NA.1**

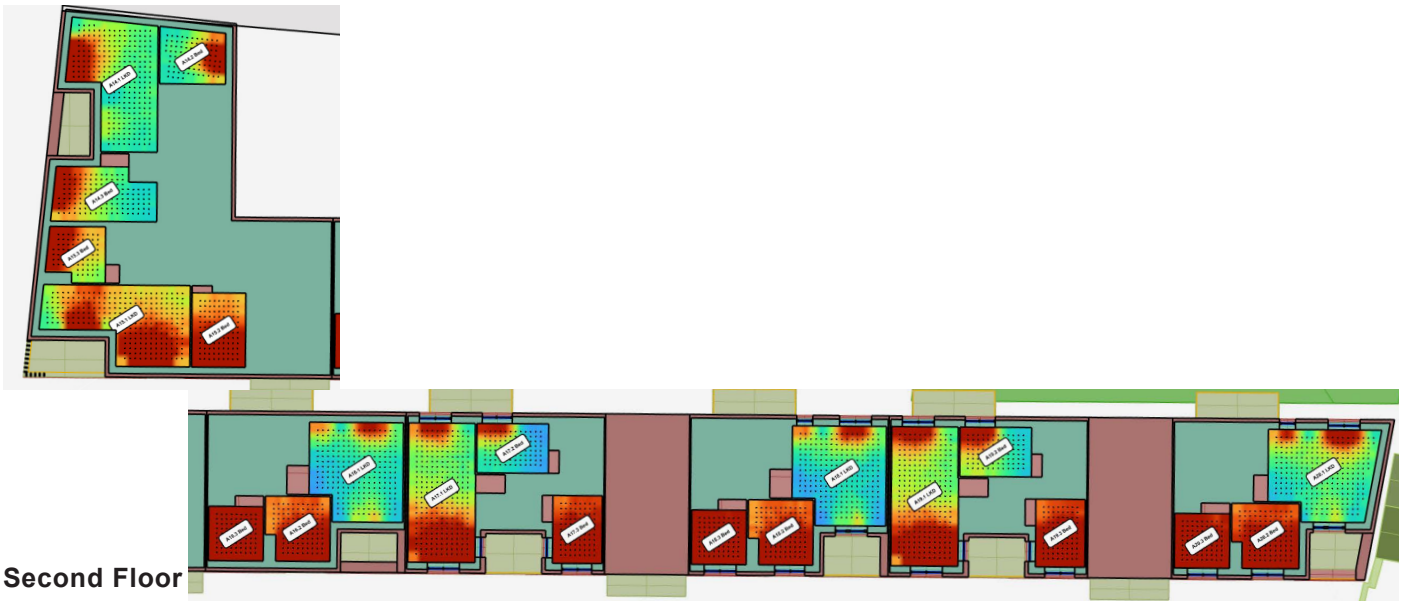
| Block B - Minimum illuminance levels from BS EN17037:2018+A1:2021 - Table NA.1 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Space ID | Use | Area m2 | Sensor Count | Target Lux | Mean Lux | % of grid target exceeded: Minimum 50% of grid | Meets Criteria |
| B01.1 | LKD | 25.5 | 223 | 200 | 630 | 100.0% | Y |
| B01.2 | Bed | 9.3 | 72 | 100 | 665 | 100.0% | Y |
| B01.3 | Bed | 13.1 | 110 | 100 | 320 | 70.0% | Y |
| B02.1 | LKD | 25.4 | 217 | 200 | 599 | 100.0% | Y |
| B02.2 | Bed | 11.7 | 96 | 100 | 751 | 100.0% | Y |
| B03.1 | LKD | 30.6 | 274 | 200 | 697 | 76.3% | Y |
| B03.2 | Bed | 12.0 | 104 | 100 | 611 | 100.0% | Y |
| B03.3 | Bed | 14.0 | 119 | 100 | 1268 | 100.0% | Y |
| B04.1 | LKD | 22.4 | 195 | 200 | 1515 | 100.0% | Y |
| B04.2 | Bed | 9.8 | 80 | 100 | 765 | 100.0% | Y |
| B05.1 | LKD | 29.9 | 275 | 200 | 879 | 100.0% | Y |
| B05.2 | Bed | 11.3 | 96 | 100 | 714 | 100.0% | Y |
| B05.3 | Bed | 8.9 | 72 | 100 | 1554 | 100.0% | Y |
| B06.1 | LKD | 26.7 | 236 | 200 | 462 | 100.0% | Y |
| B06.2 | Bed | 12.0 | 100 | 100 | 1133 | 100.0% | Y |
| B06.3 | Bed | 10.1 | 80 | 100 | 1172 | 100.0% | Y |
| B07.1 | LKD | 27.2 | 240 | 200 | 766 | 100.0% | Y |
| B07.2 | Bed | 12.0 | 104 | 100 | 726 | 100.0% | Y |
| B07.3 | Bed | 10.3 | 82 | 100 | 1107 | 100.0% | Y |
| B08.1 | LKD | 30.6 | 274 | 200 | 765 | 85.4% | Y |
| B08.2 | Bed | 12.0 | 104 | 100 | 555 | 100.0% | Y |
| B08.3 | Bed | 14.0 | 119 | 100 | 1353 | 100.0% | Y |
| B09.1 | LKD | 22.4 | 195 | 200 | 1618 | 100.0% | Y |
| B09.2 | Bed | 9.8 | 80 | 100 | 841 | 100.0% | Y |
| B10.1 | LKD | 28.0 | 252 | 200 | 619 | 100.0% | Y |
| B10.2 | Bed | 12.6 | 111 | 100 | 1275 | 100.0% | Y |
| B10.3 | Bed | 9.6 | 81 | 100 | 1560 | 100.0% | Y |
| B11.1 | LKD | 29.9 | 275 | 200 | 971 | 100.0% | Y |
| B11.2 | Bed | 11.3 | 96 | 100 | 733 | 100.0% | Y |
| B11.3 | Bed | 10.8 | 88 | 100 | 1278 | 100.0% | Y |
| B12.1 | LKD | 27.4 | 255 | 200 | 581 | 100.0% | Y |
| B12.2 | Bed | 11.9 | 100 | 100 | 1058 | 100.0% | Y |
| B12.3 | Bed | 9.9 | 80 | 100 | 1297 | 100.0% | Y |
| B13.1 | LKD | 30.6 | 274 | 200 | 794 | 93.1% | Y |
| B13.2 | Bed | 12.0 | 104 | 200 | 709 | 100.0% | Y |
| B13.3 | Bed | 14.0 | 119 | 200 | 1372 | 100.0% | Y |
| B14.1 | LKD | 22.4 | 195 | 200 | 1649 | 100.0% | Y |
| B14.2 | Bed | 9.8 | 80 | 200 | 858 | 100.0% | Y |
| B15.1 | LKD | 29.9 | 275 | 200 | 1005 | 100.0% | Y |
| B15.2 | Bed | 11.3 | 96 | 200 | 783 | 100.0% | Y |
| B15.3 | Bed | 8.9 | 72 | 200 | 1810 | 100.0% | Y |
| B16.1 | LKD | 26.7 | 236 | 200 | 527 | 100.0% | Y |
| B16.2 | Bed | 12.0 | 100 | 200 | 1374 | 100.0% | Y |
| B16.3 | Bed | 10.1 | 80 | 200 | 1451 | 100.0% | Y |
| B17.1 | LKD | 27.2 | 240 | 200 | 1001 | 100.0% | Y |
| B17.2 | Bed | 12.0 | 104 | 200 | 793 | 100.0% | Y |
| B17.3 | Bed | 10.3 | 82 | 200 | 1443 | 100.0% | Y |

**Table 17: Block B - Minimum Daylight Provision BS EN17037:2018+A1:2021 Table NA.1 compliance for habitable rooms**

## Appendix B - Supplementary Information - IS/ BS EN17037:2018 Table A.1 Daylight Provision Room Results

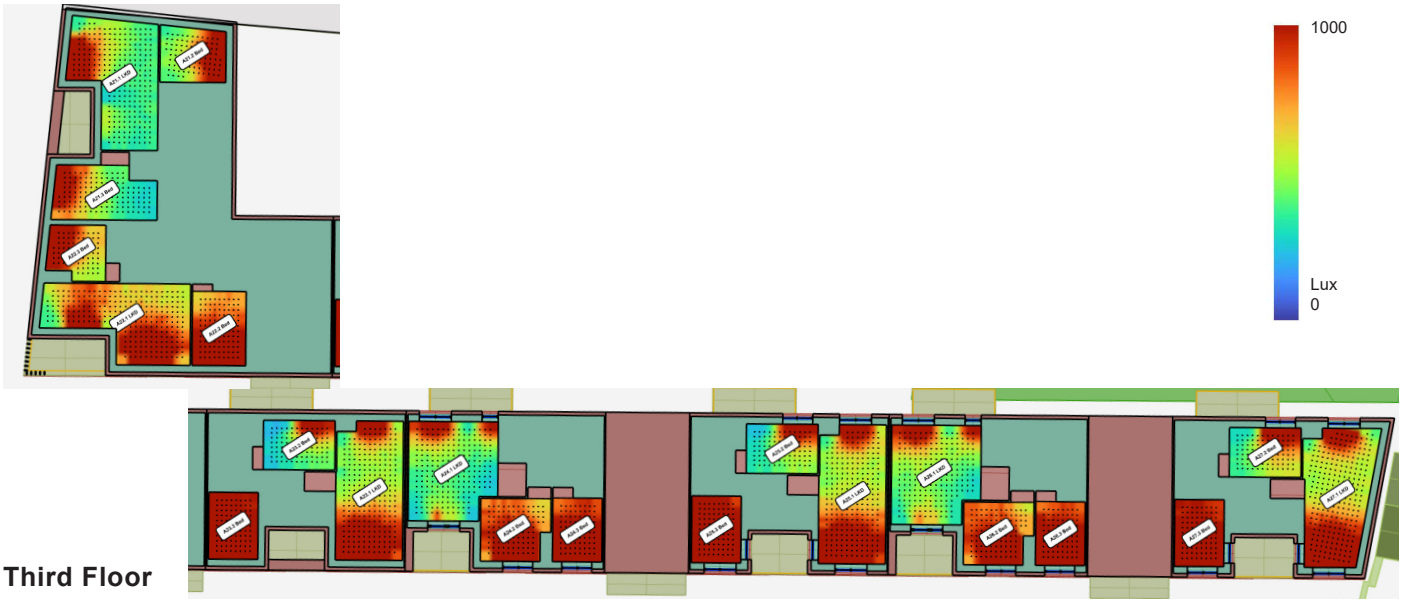

Ground Floor

First Floor

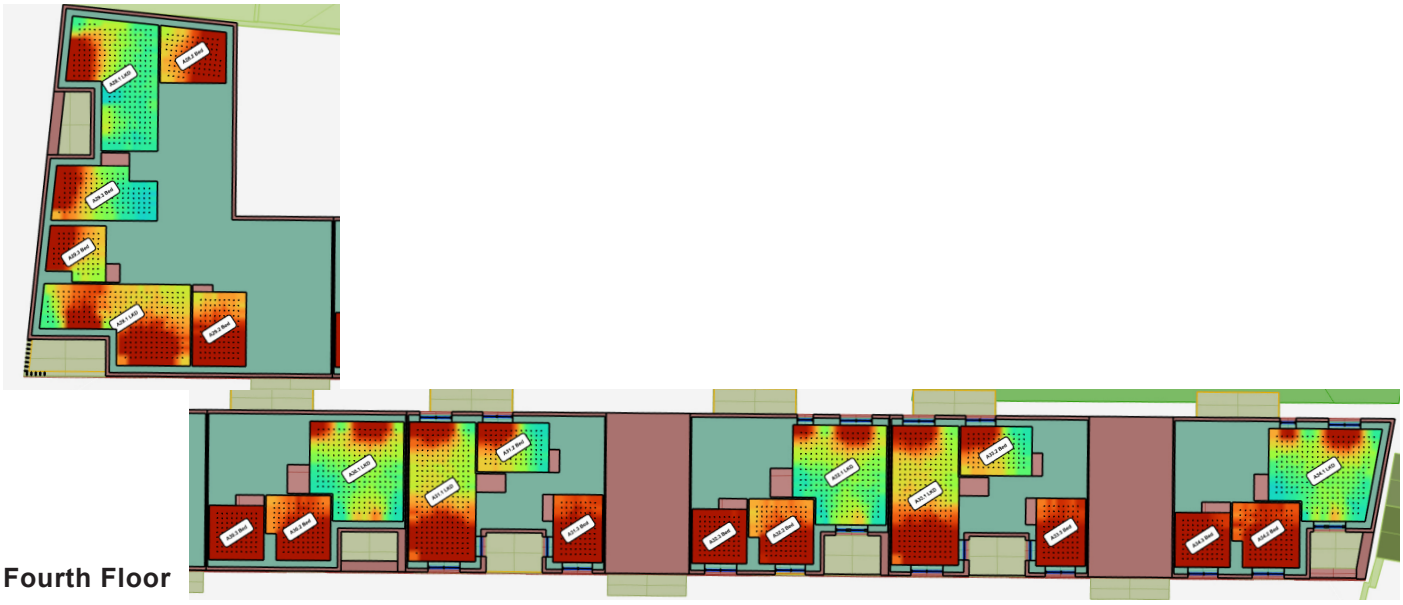


Second Floor

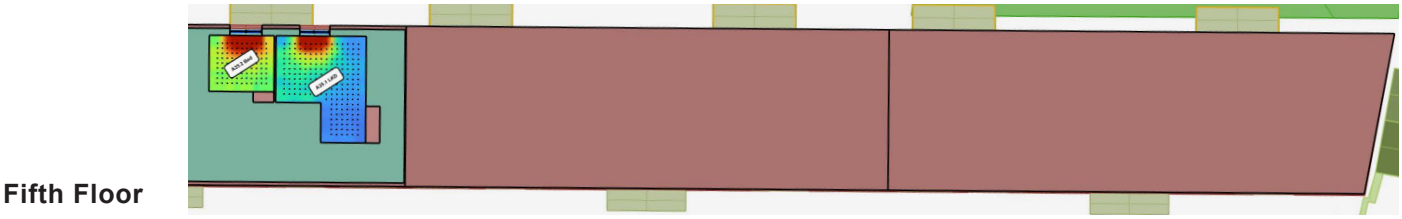
**Figure 31: Block A - Daylight Provision and Annual Average Illuminance to all habitable rooms**




Third Floor



Fourth Floor



Fifth Floor

**Figure 32: Block A - Daylight Provision and Annual Average Illuminance to all habitable rooms**

**Block A - EN17037:2018 Table A.1 Daylight Provision Room Schedule**

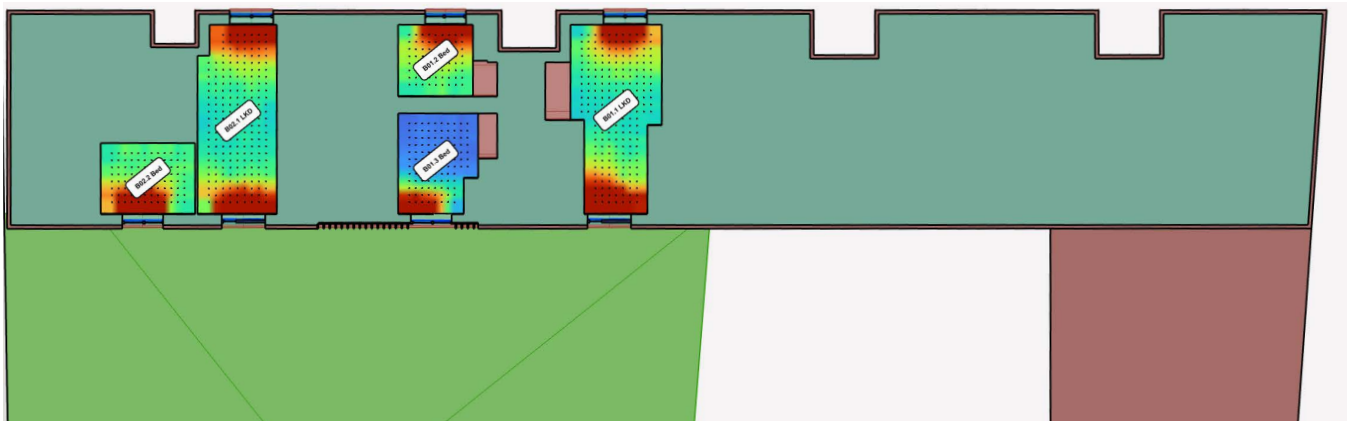
| Space ID | Description | Area m2 | Sensor Count | Target Illuminance | 300lux_50 | 500lux_50 | 750lux_50 | Minimum Target Illuminance | 100lux_95 | 300lux_95 | 500lux_95 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A01.1 | LKD | 29.9 | 282 | Medium | 70.3% | 55.8% | 42.6% | Medium | 80.1% | 54.1% | 37.1% |
| A01.2 | Bed | 9.9 | 80 | Fail | 28.5% | 3.3% | 0.3% | Minimum | 60.0% | 7.6% | 0.3% |
| A01.3 | Bed | 13.2 | 112 | Fail | 38.3% | 20.6% | 7.9% | Minimum | 58.3% | 20.3% | 4.9% |
| A02.1 | LKD | 27.8 | 249 | Minimum | 56.5% | 41.7% | 25.6% | Minimum | 74.4% | 44.4% | 21.1% |
| A02.2 | Bed | 9.3 | 72 | High | 78.5% | 67.6% | 56.9% | High | 87.2% | 74.3% | 60.7% |
| A02.3 | Bed | 13.1 | 110 | Fail | 6.5% | 2.9% | 0.0% | Fail | 31.2% | 0.5% | 0.0% |
| A03.1 | LKD | 27.8 | 249 | Minimum | 55.7% | 39.5% | 23.3% | Minimum | 73.5% | 41.8% | 16.8% |
| A03.2 | Bed | 9.3 | 72 | Minimum | 63.6% | 48.0% | 34.8% | Medium | 79.2% | 51.6% | 36.0% |

## Block A - EN17037:2018 Table A.1 Daylight Provision Room Schedule

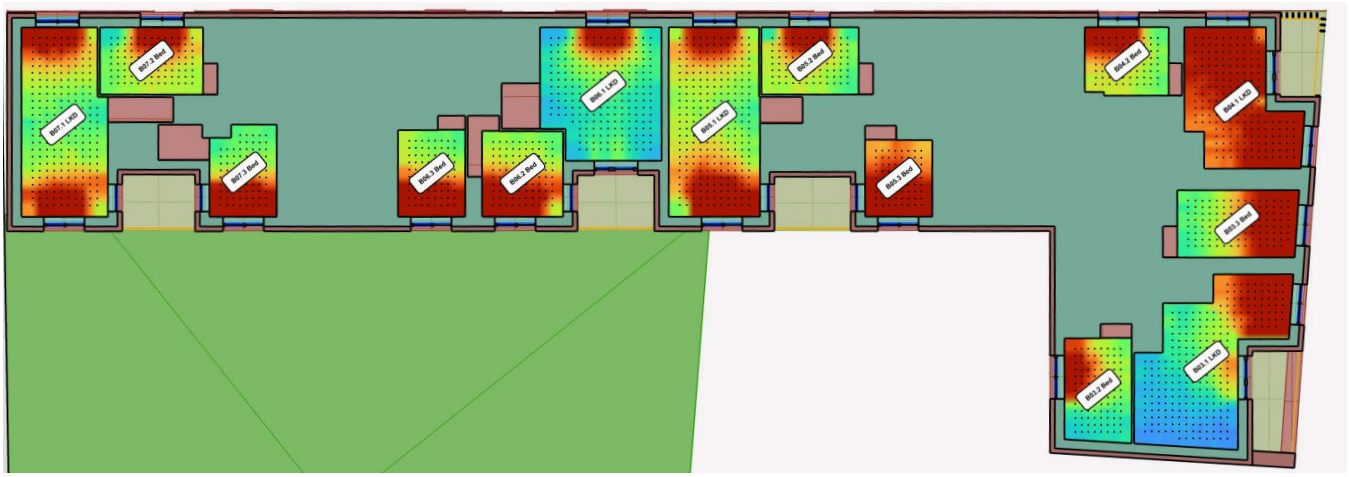
| Space ID | Description | Area m2 | Sensor Count | Target Illuminance | 300lux_50 | 500lux_50 | 750lux_50 | Minimum Target Illuminance | 100lux_95 | 300lux_95 | 500lux_95 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A03.3 | Bed | 13.1 | 110 | Fail | 6.1% | 1.2% | 0.0% | Fail | 29.9% | 0.1% | 0.0% |
| A04.1 | LKD | 27.8 | 249 | Minimum | 57.6% | 42.0% | 24.5% | Minimum | 75.2% | 45.7% | 20.4% |
| A04.2 | Bed | 9.3 | 72 | High | 78.1% | 66.8% | 56.6% | High | 87.1% | 73.7% | 59.8% |
| A04.3 | Bed | 13.1 | 110 | Fail | 15.5% | 3.0% | 1.0% | Fail | 40.4% | 2.0% | 0.4% |
| A05.1 | LKD | 27.8 | 249 | Minimum | 61.4% | 46.1% | 27.9% | Minimum | 77.0% | 48.9% | 27.3% |
| A05.2 | Bed | 9.3 | 72 | Minimum | 62.8% | 47.2% | 33.3% | Minimum | 77.8% | 49.8% | 33.7% |
| A05.3 | Bed | 13.1 | 110 | Fail | 42.1% | 16.3% | 2.8% | Minimum | 62.9% | 17.3% | 1.0% |
| A06.1 | LKD | 28.1 | 249 | Minimum | 63.8% | 49.0% | 33.9% | Medium | 80.2% | 54.4% | 36.8% |
| A06.2 | Bed | 9.2 | 75 | High | 75.5% | 63.3% | 51.7% | High | 85.5% | 68.0% | 54.0% |
| A06.3 | Bed | 13.1 | 118 | Minimum | 51.1% | 27.1% | 5.1% | Minimum | 65.9% | 24.3% | 0.8% |
| A07.1 | LKD | 30.0 | 276 | Minimum | 53.5% | 30.4% | 7.6% | Minimum | 77.2% | 42.6% | 13.9% |
| A07.2 | Bed | 11.4 | 92 | Fail | 37.5% | 21.4% | 10.9% | Minimum | 61.8% | 22.8% | 9.2% |
| A07.3 | Bed | 18.0 | 143 | Minimum | 57.2% | 34.9% | 12.3% | Minimum | 72.7% | 32.9% | 4.1% |
| A08.1 | LKD | 30.1 | 277 | High | 75.8% | 63.1% | 51.7% | Minimum | 63.7% | 21.9% | 0.5% |
| A08.2 | Bed | 12.7 | 117 | High | 75.8% | 63.8% | 52.6% | High | 84.7% | 66.2% | 52.1% |
| A08.3 | Bed | 11.6 | 92 | Minimum | 66.3% | 48.4% | 28.2% | Medium | 81.3% | 54.5% | 30.2% |
| A09.1 | LKD | 29.2 | 267 | Minimum | 60.4% | 44.9% | 29.3% | Minimum | 75.9% | 46.8% | 25.5% |
| A09.2 | Bed | 11.3 | 96 | Fail | 27.4% | 7.8% | 2.8% | Fail | 42.0% | 2.7% | 0.0% |
| A09.3 | Bed | 10.6 | 88 | High | 78.7% | 68.2% | 57.8% | High | 86.8% | 73.0% | 59.5% |
| A10.1 | LKD | 27.0 | 236 | Fail | 42.4% | 15.8% | 4.0% | Minimum | 63.4% | 21.8% | 1.0% |
| A10.2 | Bed | 13.2 | 108 | Medium | 72.1% | 59.0% | 47.1% | Medium | 83.3% | 63.3% | 48.5% |
| A10.3 | Bed | 10.1 | 80 | High | 76.9% | 65.7% | 55.5% | High | 85.7% | 68.7% | 55.5% |
| A11.1 | LKD | 29.2 | 267 | Minimum | 62.9% | 48.2% | 30.9% | Medium | 78.3% | 51.3% | 29.9% |
| A11.2 | Bed | 11.3 | 96 | Fail | 31.3% | 9.9% | 2.6% | Fail | 49.5% | 3.9% | 0.7% |
| A11.3 | Bed | 10.6 | 88 | High | 79.2% | 69.0% | 58.6% | High | 86.8% | 73.2% | 59.6% |
| A12.1 | LKD | 27.0 | 236 | Minimum | 51.9% | 30.6% | 6.7% | Minimum | 70.4% | 35.4% | 4.2% |
| A12.2 | Bed | 13.2 | 108 | Medium | 72.1% | 59.0% | 47.1% | Medium | 83.1% | 62.9% | 48.3% |
| A12.3 | Bed | 10.1 | 80 | High | 76.5% | 65.5% | 55.2% | High | 85.4% | 68.1% | 54.6% |
| A13.1 | LKD | 28.3 | 263 | Medium | 65.9% | 52.6% | 36.8% | Medium | 80.7% | 56.5% | 37.2% |
| A13.2 | Bed | 11.4 | 96 | Minimum | 63.1% | 45.4% | 24.2% | Minimum | 73.9% | 35.7% | 5.5% |
| A13.3 | Bed | 10.6 | 88 | High | 78.3% | 67.6% | 57.3% | High | 86.7% | 72.4% | 58.9% |
| A14.1 | LKD | 30.0 | 276 | Minimum | 56.9% | 34.8% | 10.5% | Minimum | 78.9% | 47.1% | 18.5% |
| A14.2 | Bed | 11.4 | 92 | Fail | 49.3% | 31.4% | 18.6% | Minimum | 69.3% | 31.0% | 16.3% |
| A14.3 | Bed | 16.8 | 142 | Minimum | 63.5% | 45.1% | 22.9% | Minimum | 77.2% | 42.9% | 10.9% |
| A15.1 | LKD | 30.1 | 271 | Medium | 66.5% | 52.9% | 38.5% | Medium | 80.2% | 55.1% | 37.7% |
| A15.2 | Bed | 12.8 | 108 | Medium | 73.9% | 60.9% | 48.9% | Medium | 83.4% | 64.1% | 48.9% |
| A15.3 | Bed | 9.6 | 77 | Medium | 74.7% | 60.7% | 45.0% | Medium | 85.3% | 63.3% | 44.2% |
| A16.1 | LKD | 28.0 | 252 | Fail | 47.0% | 23.4% | 6.7% | Minimum | 65.9% | 27.5% | 3.5% |
| A16.2 | Bed | 12.6 | 111 | Medium | 74.0% | 61.1% | 49.3% | High | 84.2% | 65.9% | 51.4% |
| A16.3 | Bed | 9.6 | 81 | High | 79.6% | 69.9% | 59.7% | High | 87.5% | 74.6% | 61.8% |
| A17.1 | LKD | 29.9 | 275 | Medium | 64.3% | 50.0% | 35.2% | Medium | 78.4% | 51.5% | 32.4% |
| A17.2 | Bed | 11.3 | 96 | Fail | 42.9% | 23.2% | 6.4% | Minimum | 60.5% | 17.9% | 1.5% |
| A17.3 | Bed | 10.8 | 88 | High | 77.6% | 66.4% | 56.1% | High | 85.9% | 69.5% | 55.7% |
| A18.1 | LKD | 28.0 | 252 | Fail | 47.6% | 20.1% | 1.9% | Minimum | 66.0% | 20.2% | 0.3% |
| A18.2 | Bed | 12.6 | 111 | Medium | 73.9% | 60.7% | 48.9% | High | 84.1% | 65.9% | 51.5% |
| A18.3 | Bed | 9.6 | 81 | High | 79.5% | 70.0% | 59.7% | High | 87.5% | 74.7% | 62.0% |
| A19.1 | LKD | 29.9 | 275 | Medium | 66.7% | 53.9% | 39.6% | Medium | 80.4% | 56.2% | 37.7% |
| A19.2 | Bed | 11.3 | 96 | Minimum | 64.1% | 45.6% | 25.1% | Minimum | 74.5% | 36.5% | 8.9% |
| A19.3 | Bed | 10.8 | 88 | High | 77.7% | 66.5% | 56.3% | High | 85.8% | 68.9% | 55.7% |
| A20.1 | LKD | 29.0 | 270 | Minimum | 57.9% | 40.0% | 9.7% | Minimum | 75.3% | 44.1% | 8.2% |

| Block A - EN17037:2018 Table A.1 Daylight Provision Room Schedule | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Space ID | Description | Area m2 | Sensor Count | Target Illuminance | 300lux_50 | 500lux_50 | 750lux_50 | Minimum Target Illuminance | 100lux_95 | 300lux_95 | 500lux_95 |
| A20.2 | Bed | 13.2 | 111 | High | 75.0% | 63.2% | 51.9% | High | 85.5% | 68.1% | 54.7% |
| A20.3 | Bed | 9.7 | 81 | High | 78.3% | 67.6% | 57.6% | High | 87.0% | 73.4% | 60.0% |
| A21.1 | LKD | 30.0 | 276 | Minimum | 57.3% | 36.1% | 12.3% | Minimum | 78.9% | 47.7% | 20.1% |
| A21.2 | Bed | 11.4 | 92 | Minimum | 60.2% | 43.0% | 28.6% | Minimum | 76.6% | 43.2% | 24.5% |
| A21.3 | Bed | 16.8 | 142 | Minimum | 65.1% | 47.4% | 26.1% | Minimum | 77.1% | 42.8% | 11.7% |
| A22.1 | LKD | 30.1 | 271 | Medium | 66.8% | 53.0% | 38.8% | Medium | 80.3% | 55.4% | 37.8% |
| A22.2 | Bed | 12.8 | 108 | Medium | 73.9% | 60.8% | 48.7% | Medium | 83.4% | 64.2% | 49.0% |
| A22.3 | Bed | 9.6 | 77 | Medium | 75.7% | 62.2% | 47.0% | Medium | 86.1% | 65.6% | 47.7% |
| A23.1 | LKD | 29.2 | 267 | Medium | 66.8% | 53.9% | 38.1% | Medium | 80.9% | 56.8% | 37.8% |
| A23.2 | Bed | 11.3 | 96 | Minimum | 56.3% | 37.7% | 18.0% | Minimum | 69.8% | 28.1% | 4.2% |
| A23.3 | Bed | 10.6 | 88 | High | 79.2% | 69.0% | 58.9% | High | 87.1% | 73.8% | 60.8% |
| A24.1 | LKD | 27.0 | 236 | Minimum | 57.8% | 39.3% | 10.8% | Minimum | 75.5% | 42.9% | 10.5% |
| A24.2 | Bed | 13.2 | 108 | Medium | 72.8% | 59.9% | 47.9% | Medium | 83.3% | 63.5% | 48.9% |
| A24.3 | Bed | 10.1 | 80 | High | 77.1% | 66.1% | 55.6% | High | 85.7% | 68.8% | 55.8% |
| A25.1 | LKD | 29.2 | 267 | Medium | 69.7% | 56.2% | 41.9% | Medium | 82.3% | 60.0% | 43.8% |
| A25.2 | Bed | 11.3 | 96 | Minimum | 64.2% | 45.5% | 26.1% | Minimum | 76.5% | 38.4% | 8.5% |
| A25.3 | Bed | 10.6 | 88 | High | 79.4% | 69.2% | 59.5% | High | 87.0% | 73.6% | 60.4% |
| A26.1 | LKD | 27.0 | 236 | Minimum | 62.9% | 47.1% | 20.8% | Medium | 78.5% | 50.6% | 20.3% |
| A26.2 | Bed | 13.2 | 108 | Medium | 72.4% | 59.6% | 47.9% | Medium | 83.5% | 64.2% | 49.2% |
| A26.3 | Bed | 10.1 | 80 | High | 76.6% | 65.6% | 55.3% | High | 85.8% | 69.0% | 55.9% |
| A27.1 | LKD | 28.3 | 263 | Medium | 69.7% | 56.4% | 41.5% | Medium | 82.6% | 60.9% | 44.5% |
| A27.2 | Bed | 11.4 | 96 | Medium | 69.9% | 55.1% | 37.0% | Minimum | 78.5% | 48.0% | 19.5% |
| A27.3 | Bed | 10.6 | 88 | High | 78.3% | 67.4% | 57.3% | High | 86.8% | 72.6% | 59.4% |
| A28.1 | LKD | 30.0 | 276 | Minimum | 57.3% | 36.0% | 12.8% | Minimum | 79.3% | 48.7% | 22.0% |
| A28.2 | Bed | 11.4 | 92 | Medium | 70.7% | 54.8% | 41.5% | Medium | 83.2% | 59.7% | 41.8% |
| A29.1 | LKD | 30.1 | 271 | Medium | 66.8% | 53.4% | 39.0% | Medium | 80.8% | 56.4% | 38.0% |
| A29.2 | Bed | 12.8 | 108 | Medium | 73.7% | 60.9% | 49.2% | Medium | 83.2% | 63.6% | 48.5% |
| A29.3 | Bed | 9.6 | 77 | Medium | 75.3% | 61.3% | 46.1% | Medium | 85.7% | 64.5% | 46.9% |
| A29.3 | Bed | 16.8 | 142 | Minimum | 64.1% | 46.1% | 24.7% | Minimum | 77.4% | 43.5% | 12.7% |
| A30.1 | LKD | 28.0 | 252 | Minimum | 63.2% | 47.4% | 22.4% | Medium | 78.9% | 51.8% | 23.7% |
| A30.2 | Bed | 12.6 | 111 | High | 74.2% | 62.0% | 50.0% | High | 84.1% | 66.0% | 51.5% |
| A30.3 | Bed | 9.6 | 81 | High | 79.5% | 70.0% | 59.9% | High | 87.7% | 75.0% | 62.7% |
| A31.1 | LKD | 29.9 | 275 | Medium | 71.7% | 58.3% | 45.5% | Medium | 83.3% | 62.4% | 46.9% |
| A31.2 | Bed | 11.3 | 96 | Medium | 71.1% | 54.2% | 37.0% | Minimum | 79.5% | 48.0% | 21.4% |
| A31.3 | Bed | 10.8 | 88 | High | 77.1% | 66.1% | 55.9% | High | 85.8% | 68.9% | 55.7% |
| A32.1 | LKD | 28.0 | 252 | Minimum | 63.5% | 47.3% | 20.4% | Medium | 79.2% | 52.0% | 22.9% |
| A32.2 | Bed | 12.6 | 111 | Medium | 72.2% | 58.9% | 46.7% | Medium | 83.5% | 64.2% | 49.2% |
| A32.3 | Bed | 9.6 | 81 | High | 79.5% | 70.0% | 60.0% | High | 87.5% | 74.7% | 62.1% |
| A33.1 | LKD | 29.9 | 275 | Medium | 72.2% | 59.0% | 46.8% | Medium | 83.9% | 63.4% | 48.8% |
| A33.2 | Bed | 11.3 | 96 | Medium | 72.3% | 57.2% | 41.1% | Medium | 80.9% | 52.6% | 27.7% |
| A33.3 | Bed | 10.8 | 88 | High | 77.7% | 66.5% | 56.4% | High | 86.0% | 69.5% | 56.2% |
| A34.1 | LKD | 29.0 | 270 | Minimum | 62.3% | 46.7% | 17.9% | Medium | 79.1% | 52.1% | 22.2% |
| A34.2 | Bed | 13.2 | 111 | High | 75.0% | 63.0% | 51.7% | High | 85.3% | 67.9% | 54.3% |
| A34.3 | Bed | 9.7 | 81 | High | 78.3% | 67.3% | 57.6% | High | 87.0% | 73.4% | 60.2% |
| A35.1 | LKD | 25.0 | 214 | Fail | 40.0% | 7.4% | 0.0% | Minimum | 51.0% | 0.0% | 0.0% |
| A35.2 | Bed | 11.7 | 99 | Minimum | 66.8% | 49.0% | 29.7% | Medium | 83.4% | 58.0% | 36.7% |

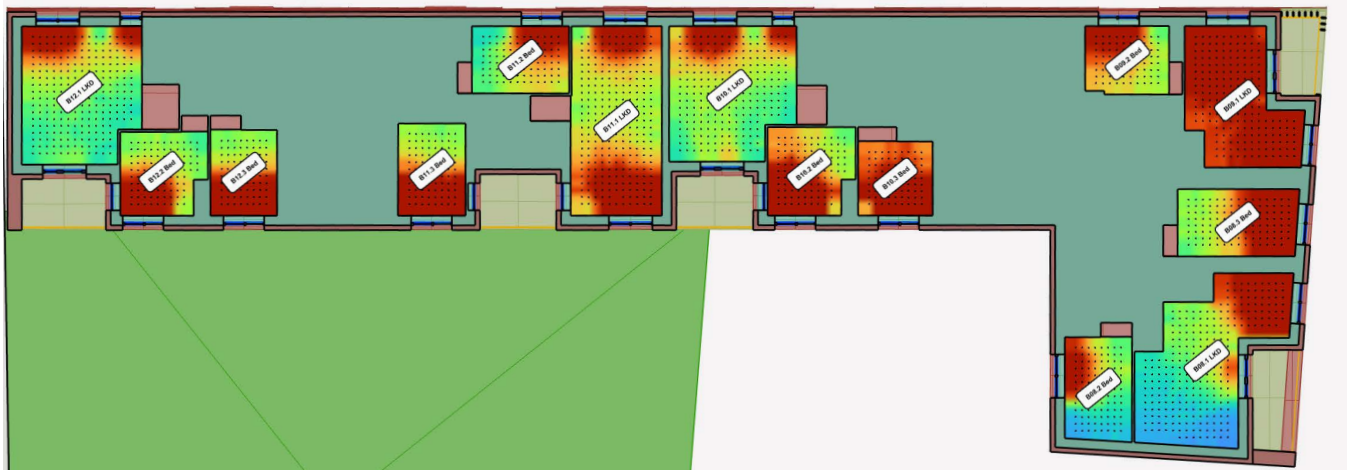
**Table 18: Block A - Daylight Provision individual values for all habitable rooms to EN 17037 Table A.1.**



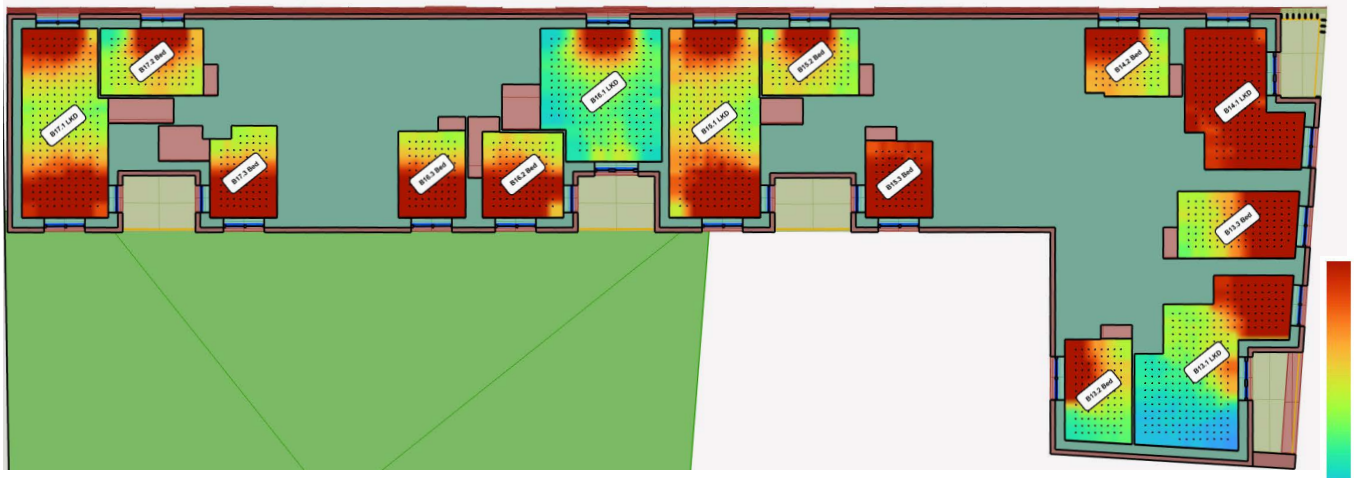
Ground Floor



First Floor



Second Floor




Third Floor

**Figure 33: Block A - Daylight Provision and Annual Average Illuminance to all habitable rooms**

| Block B - EN17037:2018 Table A.1 Daylight Provision Room Schedule | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Space ID | Description | Area m2 | Sensor Count | Target Illuminance | 300lux_50 | 500lux_50 | 750lux_50 | Minimum Target Illuminance | 100lux_95 | 300lux_95 | 500lux_95 |
| B01.1 | LKD | 25.5 | 223 | Minimum | 55.1% | 35.8% | 10.9% | Minimum | 75.0% | 39.9% | 10.6% |
| B01.2 | Bed | 9.3 | 72 | Minimum | 65.6% | 47.0% | 24.4% | Medium | 80.9% | 50.4% | 23.0% |
| B01.3 | Bed | 13.1 | 110 | Fail | 9.2% | 2.8% | 0.0% | Fail | 29.4% | 0.3% | 0.0% |
| B02.1 | LKD | 25.4 | 217 | Minimum | 51.6% | 32.5% | 9.9% | Minimum | 73.8% | 38.7% | 13.8% |
| B02.2 | Bed | 11.7 | 96 | Fail | 49.0% | 33.6% | 16.6% | Minimum | 71.9% | 39.6% | 23.0% |
| B03.1 | LKD | 30.6 | 274 | Fail | 46.9% | 25.1% | 9.2% | Minimum | 53.8% | 9.5% | 3.8% |
| B03.2 | Bed | 12.0 | 104 | Minimum | 62.3% | 44.5% | 24.8% | Minimum | 74.7% | 38.1% | 16.2% |
| B03.3 | Bed | 14.0 | 119 | Medium | 65.3% | 51.8% | 36.2% | Minimum | 77.2% | 49.0% | 26.3% |
| B04.1 | LKD | 22.4 | 195 | High | 78.7% | 67.6% | 55.6% | High | 86.7% | 71.4% | 57.2% |
| B04.2 | Bed | 9.8 | 80 | Medium | 71.9% | 56.9% | 39.5% | Medium | 84.2% | 60.2% | 39.3% |
| B05.1 | LKD | 29.9 | 275 | Medium | 66.4% | 51.8% | 35.0% | Medium | 81.1% | 56.4% | 36.8% |
| B05.2 | Bed | 11.3 | 96 | Medium | 70.1% | 53.3% | 34.9% | Medium | 83.5% | 57.4% | 35.7% |
| B05.3 | Bed | 8.9 | 72 | High | 74.7% | 62.3% | 50.3% | Medium | 84.0% | 64.0% | 48.6% |
| B06.1 | LKD | 26.7 | 236 | Minimum | 53.3% | 30.2% | 3.6% | Minimum | 73.4% | 36.0% | 2.1% |
| B06.2 | Bed | 12.0 | 100 | Medium | 64.3% | 50.1% | 37.0% | Medium | 78.1% | 51.1% | 34.8% |
| B06.3 | Bed | 10.1 | 80 | Minimum | 63.9% | 49.7% | 37.1% | Minimum | 77.2% | 49.0% | 32.8% |
| B07.1 | LKD | 27.2 | 240 | Minimum | 62.6% | 46.5% | 29.2% | Medium | 79.2% | 50.6% | 31.0% |
| B07.2 | Bed | 12.0 | 104 | Medium | 70.8% | 54.2% | 36.5% | Medium | 82.4% | 55.2% | 31.1% |
| B07.3 | Bed | 10.3 | 82 | Minimum | 60.3% | 47.1% | 34.1% | Minimum | 76.3% | 47.2% | 31.0% |
| B08.1 | LKD | 30.6 | 274 | Minimum | 52.9% | 31.9% | 15.9% | Minimum | 58.7% | 16.9% | 5.5% |
| B08.2 | Bed | 12.0 | 104 | Minimum | 61.1% | 42.1% | 18.9% | Minimum | 68.0% | 26.0% | 5.8% |
| B08.3 | Bed | 14.0 | 119 | Medium | 69.2% | 55.3% | 41.9% | Medium | 79.7% | 54.4% | 34.2% |
| B09.1 | LKD | 22.4 | 195 | High | 80.1% | 69.8% | 59.5% | High | 87.8% | 75.0% | 61.6% |
| B09.2 | Bed | 9.8 | 80 | Medium | 75.5% | 61.0% | 45.6% | Medium | 85.8% | 64.7% | 46.1% |
| B10.1 | LKD | 28.0 | 252 | Minimum | 64.9% | 49.4% | 25.8% | Medium | 80.6% | 55.4% | 31.3% |
| B10.2 | Bed | 12.6 | 111 | Medium | 67.0% | 54.2% | 40.1% | Medium | 80.2% | 56.3% | 38.3% |
| B10.3 | Bed | 9.6 | 81 | Medium | 74.3% | 61.7% | 48.9% | High | 84.8% | 65.6% | 51.6% |
| B11.1 | LKD | 29.9 | 275 | Medium | 69.0% | 56.0% | 41.7% | Medium | 83.3% | 61.4% | 45.1% |
| B11.2 | Bed | 11.3 | 96 | Medium | 71.8% | 56.4% | 39.7% | Medium | 80.4% | 50.1% | 23.8% |
| B11.3 | Bed | 10.8 | 88 | Medium | 66.4% | 54.0% | 41.6% | Medium | 79.5% | 55.0% | 38.1% |
| B12.1 | LKD | 27.4 | 255 | Minimum | 61.7% | 43.8% | 20.3% | Minimum | 79.3% | 50.0% | 25.5% |
| B12.2 | Bed | 11.9 | 100 | Minimum | 59.8% | 46.9% | 33.2% | Minimum | 75.9% | 47.8% | 33.3% |
| B12.3 | Bed | 9.9 | 80 | Medium | 69.0% | 55.6% | 44.6% | Medium | 78.9% | 53.2% | 37.2% |
| B13.1 | LKD | 30.6 | 274 | Minimum | 55.3% | 35.1% | 18.0% | Minimum | 63.3% | 23.5% | 7.4% |
| B13.2 | Bed | 12.0 | 104 | Medium | 70.1% | 54.5% | 36.5% | Minimum | 78.3% | 49.4% | 26.6% |
| B13.3 | Bed | 14.0 | 119 | Medium | 69.7% | 56.2% | 42.6% | Medium | 80.7% | 56.3% | 38.9% |
| B14.1 | LKD | 22.4 | 195 | High | 80.4% | 71.0% | 60.5% | High | 88.2% | 76.0% | 63.6% |
| B14.2 | Bed | 9.8 | 80 | Medium | 75.8% | 61.7% | 46.8% | Medium | 86.0% | 66.0% | 48.0% |
| B15.1 | LKD | 29.9 | 275 | Medium | 70.6% | 57.3% | 44.5% | Medium | 83.5% | 62.0% | 46.8% |
| B15.2 | Bed | 11.3 | 96 | Medium | 72.2% | 57.3% | 41.0% | Medium | 85.6% | 64.1% | 45.2% |
| B15.3 | Bed | 8.9 | 72 | High | 78.2% | 67.1% | 56.8% | High | 86.6% | 71.4% | 57.6% |
| B16.1 | LKD | 26.7 | 236 | Minimum | 59.1% | 40.2% | 10.6% | Minimum | 77.7% | 48.2% | 13.9% |
| B16.2 | Bed | 12.0 | 100 | Medium | 71.4% | 59.2% | 47.0% | Medium | 82.0% | 60.4% | 44.9% |
| B16.3 | Bed | 10.1 | 80 | Medium | 71.6% | 59.6% | 47.8% | Medium | 81.7% | 59.8% | 43.9% |
| B17.1 | LKD | 27.2 | 240 | Medium | 70.4% | 57.0% | 43.6% | Medium | 82.9% | 60.3% | 44.2% |
| B17.2 | Bed | 12.0 | 104 | Medium | 73.9% | 58.5% | 43.1% | Medium | 84.2% | 60.6% | 41.0% |
| B17.3 | Bed | 10.3 | 82 | High | 73.7% | 61.7% | 50.7% | Medium | 81.8% | 60.0% | 45.5% |

**Table 19: Block B - Daylight Provision individual values for all habitable rooms to EN 17037 Table A.1.**

# Appendix C - Sunlight Hours to living spaces within the Proposed Development

| Block A - Sunlight Hours | | | |
|---|---|---|---|
| Unit ID | LKD window within 90° South | No. sunlight hours on 21st March | BRE Recommendation |
| A01.1 | Yes | 7.5 | High |
| A02.1 | Yes | 7.5 | High |
| A03.1 | Yes | 7.5 | High |
| A04.1 | Yes | 7.5 | High |
| A05.1 | Yes | 7.5 | High |
| A06.1 | Yes | 7.5 | High |
| A07.1 | No | 1.3 | Below criteria |
| A08.1 | Yes | 7.5 | High |
| A09.1 | Yes | 7.5 | High |
| A10.1 | Yes | 0.3 | Below criteria |
| A11.1 | Yes | 7.5 | High |
| A12.1 | Yes | 0.3 | Below criteria |
| A13.1 | Yes | 7.5 | High |
| A14.1 | No | 1.8 | Minimum |
| A15.1 | Yes | 7.5 | High |
| A16.1 | Yes | 0.1 | Below criteria |
| A17.1 | Yes | 7.5 | High |
| A18.1 | Yes | 0.1 | Below criteria |
| A19.1 | Yes | 7.5 | High |
| A20.1 | Yes | 0.0 | Below criteria |
| A21.1 | No | 1.8 | Minimum |
| A22.1 | Yes | 7.5 | High |
| A23.1 | Yes | 7.5 | High |
| A24.1 | Yes | 0.3 | Below criteria |
| A25.1 | Yes | 7.5 | High |
| A26.1 | Yes | 0.3 | Below criteria |
| A27.1 | Yes | 7.5 | High |
| A28.1 | No | 1.8 | Minimum |
| A29.1 | Yes | 7.5 | High |
| A30.1 | Yes | 0.1 | Below criteria |
| A31.1 | Yes | 7.5 | High |
| A32.1 | Yes | 0.1 | Below criteria |
| A33.1 | Yes | 7.5 | High |
| A34.1 | No | 0.3 | Below criteria |
| A35.1 | No | 0.3 | Below criteria |

**Table 20: Sunlight hours to living spaces**

| Block B - Sunlight Hours | | | |
|---|---|---|---|
| Unit ID | LKD window within 90° South | No. sunlight hours on 21st March | BRE Recommendation |
| B01.1 | Yes | 3.1 | Medium |
| B02.1 | Yes | 2.3 | Minimum |
| B03.1 | Yes | 6.7 | High |
| B04.1 | Yes | 6.1 | High |
| B05.1 | Yes | 3.7 | Medium |
| B06.1 | Yes | 0.0 | Below criteria |
| B07.1 | Yes | 3.7 | Medium |
| B08.1 | Yes | 6.7 | High |
| B09.1 | Yes | 6.5 | High |
| B10.1 | Yes | 0.0 | Below criteria |
| B11.1 | Yes | 4.2 | High |
| B12.1 | Yes | 0.0 | Below criteria |
| B13.1 | Yes | 6.7 | High |
| B14.1 | Yes | 6.7 | High |
| B15.1 | Yes | 5.1 | High |
| B16.1 | Yes | 0.5 | Below criteria |
| B17.1 | Yes | 5.1 | High |

**Table 21: Sunlight hours to living spaces**