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Daylight & Sunlight Assessments
Amendments to the Previously Approved Baker's Hall Student Accommodation under Reg. Ref.: ABP 31141121
Rochestown Avenue, County Dublin.

Applicant: **Baker Forge Properties Ltd**
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Prepared by
John Healy Dip. Arch Tech, P.Grad Dip. Digital Media, MSc. Environmental Design of Buildings
Ann Canning B. Arch Sc., MSc. Energy Retrofit Technologies, MRIAI

1 Rathmines Road Upper, Dublin 6, D06 Y5P5 tel 01 4965340 email mail@digitaldimensions.ie
web digitaldimensions.ie Digital Dimensions Ltd trading as Digital Dimensions.

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1. Introduction

Baker's Forge Properties Limited intend to apply for permission for a Large-Scale Residential Development comprising amendments to the permitted Strategic Housing Development Ref. ABP-311411-21 on a site of 0.483 ha at a site 'Baker's Hall', (formally known as Baker's Corner), Rochestown Avenue and Kill Avenue, Dun Laoghaire, Co. Dublin.

The proposed development comprising amendments to the permitted Strategic Housing Development consists of:

- A 4 storey over ground extension of c. 436 sqm to the rear / courtyard elevation of Block A to provide for an additional 12 no. student accommodation units.
- The reconfiguration of permitted internal circulation and communal amenity spaces to provide for 10 no. additional student accommodation units within Block A.
- The internalisation of an overhanging roof canopy on the roof terrace of Block A to provide 2 no. additional student accommodation units.
- The total number of additional student accommodation units proposed is 24 no. providing a total of 300 no. units on site. 276 units are permitted on site.

The proposed development amendment works to Block A also comprise of the :-

- Removal of the permitted building overhang at 5th floor level of Block A.
- Relocation of a switch room and substation to the north-eastern corner of Block A.
- Provision of additional window and escape door to permitted licenced premises on northern elevation.
- Amendment of the permitted entrance to provide for a recessed entrance arrangement to the permitted licenced premises in Block A.
- Omission of the roof terrace to the south of Block A, and the increase in size of the permitted roof terrace to the east of Block B from c. 60sqm to c. 95sqm.
- Minor amendment of fenestration at 1st-5th floor level on the southern elevation of Block A to accommodate proposed internal rooms.
- Additional plant space within permitted commercial units in Block A with a reduction in net internal floor space.
- Omission of louvred plant screen on roof level of Block A.
- Changes to the design treatment of the permitted elevation of Block A at Rochestown Avenue, minorly changing the total permitted floor area of Block A.

The proposed development amendment works to Block B also comprise of the:-

- Reduction in size of the screened roof-top terrace area to Block B (from 450 sqm to 150 sqm).
- Reduction in height of stair core and lift shaft to western stair core of Block B.
- Relocation of the permitted bike shelter to the east elevation of Block B. The number of bicycle parking spaces remains unchanged.
- Minor elevation alterations to eastern and western elevations of Block B to account for relocation of permitted internal building services.
- Additional plant space within permitted commercial unit in Block B with a reduction in net internal floor space

The proposed amendments to the development will also include a minor increase to the overall height of both permitted blocks (of c. 550 mm) due to building structure design; as well as minor changes to the scheme as agreed at compliance stage including inter alia the reconfiguration of the central open space area to provide for 30 no. car park spaces (unchanged from agreed compliance); and all associated elevational changes, site development and landscape treatment works necessary to facilitate the proposed development and consequent amendments proposed.

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 Meitheal Architects.

The report has been prepared by John Healy, an architectural technologist with a masters in environmental design of buildings and a post graduate diploma in digital media and Ann Canning, an architect with a masters in energy retrofit technologies and a member of the Royal Institute of Architects of Ireland.

John has been a director at Digital Dimensions for 25 years and a daylight and sunlight consultant for 15 years, following completion of a Masters of Science in Environmental Design of Buildings at Cardiff University. This masters focused on passive design strategies including daylight and sunlight optimisation. Ann is an architect with in excess of 20 year experience, she has consulted with Digital Dimensions for 7 years, on projects relating to daylight and sunlight. Together they have worked on an extensive list of projects over the years varying in scale and location from restricted city sites to rural areas, throughout Ireland.

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

Analysis demonstrated in Section 3 indicates that the relationship between the neighbouring residential buildings will not be significantly changed from that of the permitted development (Reg. Ref.: ABP 31141121). This is borne out by the shadow study (Section 7 of this report) which contrasts the permitted and proposed developments. In shadow studies, the BRE guidelines (2022) recommends examining the March equinox, for the average level of shadow over the course of the year.

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

The residential units were designed in line with the recommendations of the BRE guidelines (2022). Design iterations were conducted to improve the daylight and sunlight within the proposed development. The guidelines clearly state that the targets are recommendations only and flexibility is required when setting and interpreting the targets.

The BRE guidelines (2022) recommends assessment methods set out in BS EN 17037 for daylight provision. BS EN 17037 contains a National Annex 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 UK annex to BS EN 17037 states that the target values set out in EN 17037 Table A1 may be hard to achieve in the UK, it 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%).

The levels set out in the UK annex are used in this assessment, as the primary results to be achieved, because these are referenced in the BRE guidelines (2022), as recommended by the local authority. The BRE guidelines (2022) deals with daylight and sunlight to adjacent properties and defers to BS EN17037:2018+A1:2021 for daylight and sunlight within the proposed development and allows for a complete assessment of the proposed development and its surroundings. The BRE guidelines (2022) presents a discussion on aspects of daylight and sunlight and interpreting the results of these assessments.

IS EN17037:2018 does not set out any guidance for assessing the impact to daylight and sunlight from a proposed development on neighbouring buildings nor is there any Irish governmental guidance on interpreting results and percentages of units to achieve the target results in multi unit developments. IS EN17037:2018 does not set out room use specific targets but instead designates a Minimum and Target lux level to be achieved in all rooms regardless of use. The function of a room historically has been the key factor in informing the design of a building and the window sizes to allow adequate daylight levels for the task typical to that room to be achieved. The lack of variance in target levels for the tasks typical to a room can lead to substantially oversized windows in rooms with a lower requirement for daylight levels, for example bedrooms. The aim to achieve the minimum target lux level to all rooms in a multi unit residential building is not practical and could lead to overheating of units that have greater access to the sky and sunlight. This could also lead to higher energy usage due to oversized windows and a balance needs to be met.

The results for the Minimum and Target levels set out in Table A1 in IS EN17037:2018 are presented in the assessment as supplementary for completeness, however, conclusions can not be made due to lack of clear guidance on interpenetration of results.

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

100% of the Living, Kitchen, Studio and Bedroom spaces within the proposed development achieve the target values set out in BS EN 17037:2018+A1:2021 Table NA1. These are the minimum values, per specified use, to be achieved in habitable rooms and meets the recommendations of the BRE guidelines (2022).

1.3.2 Sunlight within the Proposed Development

This scheme is well designed for sunlight, with 78.6% of relevant habitable rooms meet 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 the public and communal amenity spaces are well oriented for sunlight. All achieve 2 hours sunlight on the 21st March over in excess of 50% of the area. The proposed development meets the recommendations for sunlight in the BRE guidelines BR209:2022 (3rd edition).

The proposed development meets the recommendations for sunlight in the BRE guidelines BR209:2022 (3rd edition).

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 100% of rooms achieving Minimum Illuminance and 76.8% 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 17037:2018. Apartment guidelines and local authorities guidelines refer to BR209 2022: "Site layout planning for daylight and sunlight" (3rd 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. Therefore the assessment against IS EN 17037:2018 is included as supplementary information only, noting there are no room specific recommendations for daylight and because of this limitation, it is considered the recommendations made in the BRE guidelines (2022) are more appropriate.

1.5 Conclusions

Overall the design team worked in response to the context to ensure the proposed development performs with regards to achieving the best possible daylight and sunlight quality. All habitable rooms meet the minimum standard for daylight provision as per BS EN 17037:2018+A1:2021 as referred to in the BRE guidelines BR209:2022 (3rd edition).

In the assessment of daylight in accordance with IS EN 17037:2018, shown for supplementary information, the vast majority of habitable rooms achieve daylight provision as set out in IS EN 17037:2018

With regard to internal daylighting, Section 3.2 of the Urban Development and Building Heights: Guidelines for Planning Authorities (2018) states:

> *"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 habitable 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 (3rd edition) and no compensatory measures are required.

2. Methodology

2.1 Standards and Guidelines

Ministerial guidance is provided in Sustainable Residential Development 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."*

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 (2022).
- BS EN 17037:2018+A1:2021 Daylight in Buildings, also referred to as the UK Annex.
- IS EN 17037:2018 Daylight in Buildings.

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

In its opening summary, the BRE guidelines (2022) states that the report "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. This is of particular importance in the context of national and local policies for the consolidation and densification of urban areas.

The BRE guidelines (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. This is broadly in line with the previous version of the BRE guidelines (2011). The metrics for assessing impact to adjacent buildings for 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.

When assessing the quality of interior spaces in proposed developments, the BRE guidelines (2022) Appendix C states; "The guidance contained in this publication is intended to be used with BS EN 17037 and its UK National Annex." The BRE guidelines (2022) also states in Section 1.7 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."

2.3 Daylight in Buildings EN 17037:2018

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 EN17037:2018 Standard deals exclusively with new developments and does not give guidance or metrics on loss of light or sunlight to existing properties.

The UK National Annex (NA) provides further recommendations for daylight provision in the UK and Channel Islands. The UK annex states that the daylight target levels in BS EN 17037:2018 Clause A.2 may be hard to achieve in buildings in the UK, in particular dwellings in urban areas with significant obstructions or tall trees outside. The UK annex sets out minimum daylight provision to be achieved in UK dwellings. Table NA.1 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 illuminance 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.

2.4 Daylight to Existing Buildings

BRE guidelines (2022) Section 2.2.2 sets out which rooms need to be assessed for daylight.

> *"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."*

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 its distance from the existing dwelling. BRE guidelines (2022) Section 2.2.4 states 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.” In this report, we refer to this as the ‘zone of influence’.

BRE guidelines (2022) Section 2.2.23 states; “If any part of a new building or extension, measured in a vertical section perpendicular to a main window wall of an existing building, from the centre of the lowest window, subtends an angle of more than 25° to the horizontal, then the diffuse daylighting 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, the window may be affected and should be assessed.

For loss of daylight the BRE guidelines (2022) recommends calculation of the Vertical Sky Component. VSC can be defined as the amount of skylight that falls on a vertical window. It 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).

2.5 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.

2.6 Sunlight to Gardens and Open Spaces

For calculations of sunlight analysis it is general practice to use March 21st. The BRE guidelines (2022) Section 3.3.17 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."*

2.7 BRE Guidelines (2022) Appendix G: 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) Section G1.2 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."*

The BRE guidelines (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.

2.8 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."*

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 95% of the existing value.
2. Negligible: A reduction in the VSC level but it retains a VSC >27% or <27% but >80% of the existing value.
3. Minor reduction: VSC below 27% but greater than 20%, or ratio greater than 65% of the existing value.
4. Moderate reduction: VSC below 20% but greater than 10%, or ratio greater that 50% of the existing value.
5. Major reduction: VSC below 10% or ratio less than 50% of the existing value.

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

2.9 Assessment Model Parameters

The BRE guidelines (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

2.10 Daylight in the Proposed Development.

The BRE guidelines (2022) Appendix C sets out interior daylight recommendations, it states; “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 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 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. In BS EN 17037:2018+A1:2021, the UK National Annex (NA) sets out additional minimum room specific Target Daylight Factor values for the UK. Clause 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.

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 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. The BRE guidelines (2022) 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. The BRE guidelines (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 E_T(lx) for half of the assessment grid	Minimum illuminance 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 D for half of the assessment grid	Minimum daylight factor 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 on UK National Annex		
Room Type	Target illuminance E_T(lx) for half of the assessment grid	Target daylight factor D from Table A.3 EN17037 $E_{v,d,med}$ 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.

2.11 Sunlight within Proposed Developments

The BRE guidelines (2022) Section 3.1.7 states “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.” In Section 3.1.8 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) Section 3.1.10 recommends that BS EN 17037 should be used to assess for interior access to direct sunlight. BS EN 17037 Table A.6 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. Potential Impact of Daylight and Sunlight in Neighbouring Buildings

3.1 Project Overview

The proposed development is alterations and additions to a previously approved student accommodation development under Reg. Ref.: ABP 31141121. Figure 1 below shows the proposed amended development, noting at location A - C show the neighbouring residential buildings and the direction of their relevant windows, assessed for daylight through a calculation of VSC in the parent application.

Regarding internal sunlight, none of the neighbouring residential buildings have relevant windows which face within 90° of due south. The sunlight these buildings receive, will be from windows that do not face towards the permitted or proposed development.

Amenity spaces which are entirely south of a development will not perceive any reduction in sunlight. There are no amenity spaces that will be perceptibly effected by the permitted or proposed development.

In issues relating to daylight and sunlight of neighbouring buildings, the majority of alterations and omissions to Blocks A & B are minor in nature; presenting no significant difference, from the permitted development to the proposed development. Of significance is a new wing proposed, (noted in a mustard colour). In terms of an impact on daylight or sunlight, this wing is remote from the neighbouring residential buildings assessed in the parent application. It is internal on the site, it is obscured from the relevant residential buildings on Rochestown Avenue, by the mass of Blocks A & B.

The relationship between the neighbouring residential buildings will not be significantly changed from that of the permitted development (Reg. Ref.: ABP 31141121). This is borne out by the shadow study (Section 7 of this report) which contrasts the permitted and proposed developments.

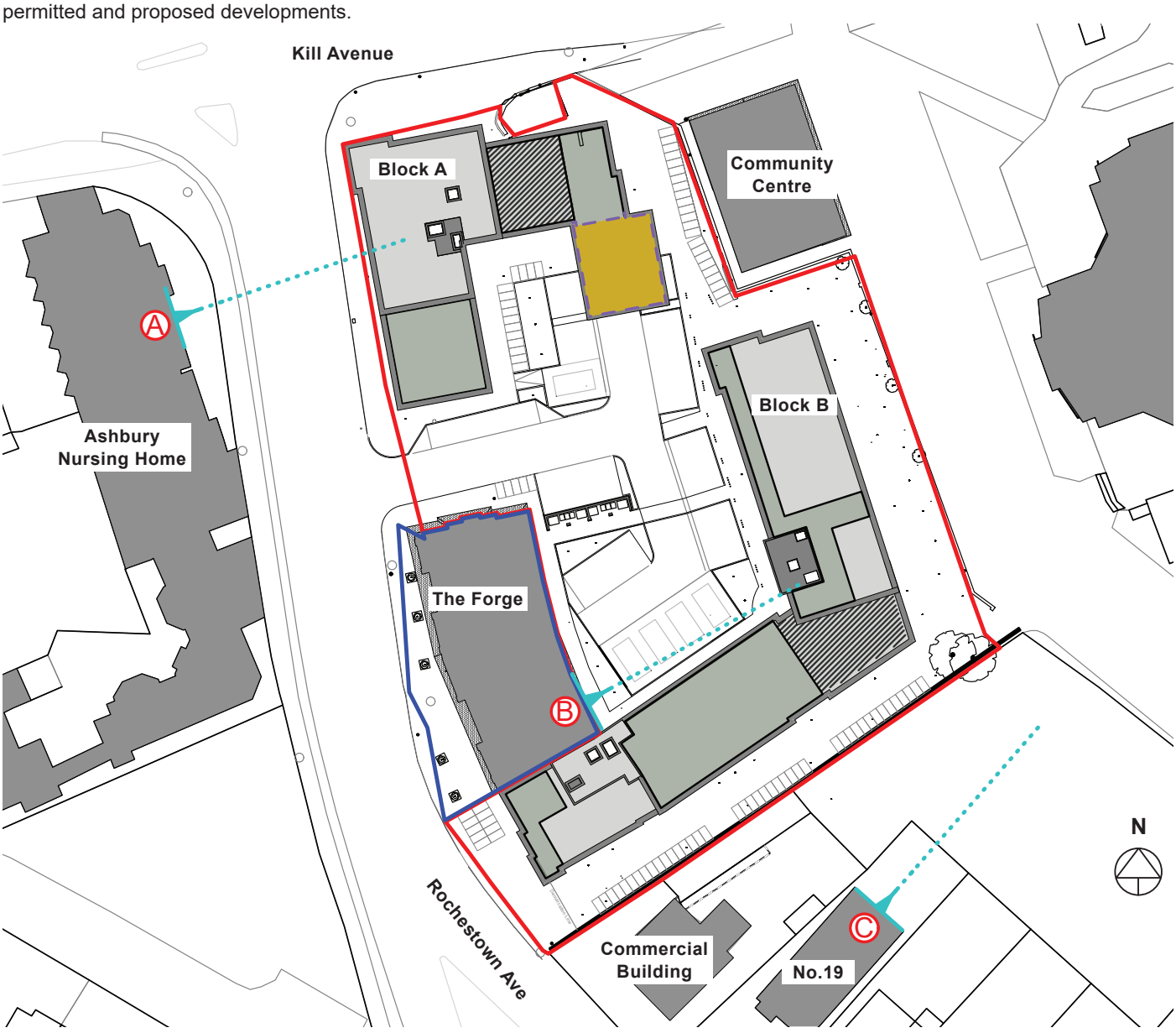


Figure 1: Proposed site plan showing the direction of the window wall of adjacent residential properties

4. Daylight within the Proposed Development

There is a permitted development of 276 student accommodation rooms on site. The newly proposed habitable rooms have been assessed for daylight provision. Also selected for assessment are the habitable rooms in the permitted Block A, which would have the potential to be impacted by the new wing in the proposed development.

These habitable rooms are 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.

The BRE guidelines gives the following recommendation in relation to student accommodation in Appendix C, section C17:

> *Where a room has a shared use, the highest target should apply. For example in a bed sitting room in student accommodation, the value for a living room should be used if students would often spend time in their rooms during the day. Local authorities could use discretion here.*

The bedrooms in this development are assessed against a target illuminance of 150 lux, LKD and Studios are assessed against a target illuminance of 200 lux. 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 6 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 7 below and a complete set of room results are shown in Appendix B.

4.1 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. Ireland has a similar latitude and climate to the UK. The minimum illuminance levels are kitchens and living spaces containing a kitchen 200lux, living rooms 150lux and bedrooms 100lux. It is recommended that these target illuminance values are exceeded over at least 50% of the points on a reference plane 0.85m above the floor, for at least half of the daylight hours.

The UK committee 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 does not take into account room use or make allowance for room that have a lesser requirement for daylight.

Minimum daylight provision UK NA.1 - BS EN 17037:2018+A1:2021					
Student Accommodation	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
Block A	LKD/ Studio	27	200	27	100.0%
	Bedrooms	42	150	42	100.0%
Total		69		69	100.0%

Table 6: Summary of room for Target Illuminance compliance with BS EN 17037:2018+A1:2021. Individual room results can be viewed in Appendix A.

4.2 Conclusion

BR209:2022 recommends assessment methods set out in BS EN 17037 for daylight provision. 100% of the habitable rooms 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.

4.3 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						
Student Accommodation		Below Target	Minimum	Medium	High	Percentage of rooms achieving Target
Block A	Target Illuminance	23.2%	10.1%	26.1%	40.6%	76.8%
	Minimum Illuminance	0.0%	30.4%	26.1%	43.5%	100.0%

Table 7: 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 100% of rooms achieving Minimum Illuminance and 76.8% 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 4.2.

5. Sunlight within the Proposed Development

5.1 Sunlight Hours

The BRE guidelines BR209:2022 (3rd 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 the figure 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 2: Extract from BR209:2022 Section 3 Sun-lighting: Diagram indicating sample floor plan to maximise units with a main living space facing south.

5.2 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 acknowledge that for large developments with site constraints its not possible to achieve south facing windows to all main living spaces and that achieving sunlight hours in another habitable room meets the criteria. The BRE recommendation is based on the floor plate, as in 4 out of 5 units achieving target sunlight hours, is a desirable ratio. For this reason, we have assessed all LKD and studio units in Block A, both permitted and proposed.

Detailed results are presented in Appendix C. These indicates if the relevant habitable room has a south facing window and the number of hours it receives sunlight on the 21st March. A summary of these results are displayed in the Table 8 below.

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 Block A there are 28 no. LKD or studio rooms, of these 22 no. 78.6% achieve the minimum recommended 1.5 direct sunlight hours.

Sunlight Hours Summary Table									
Student Accom.	Total Units	Habitable room 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						
LKD/ Studios	28	14	50.0%	6	4	2	16	22	78.6%

Table 8: Summary of Results of Assessment of Sunlight Hours

5.3 Conclusion

This scheme is well designed for sunlight, with 78.6% of relevant habitable rooms meet 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

6. Sunlight to Amenity within the Proposed Development

The BRE guidelines BR209:2022 (3rd edition) indicate that for an amenity area to have good quality sunlight throughout the year, 50% of the ground, should receive in excess of 2 hours sunlight on the 21st of March. It also states that front gardens need not be assessed for sunlight.

6.1 Sunlight to Amenity within the Proposed Development

The amenity areas within this proposal have been assessed with a calculation of Sun on the Ground on the 21st March. Generated analysis is shown in Figure 3 and the results are set out in Table 9 below.

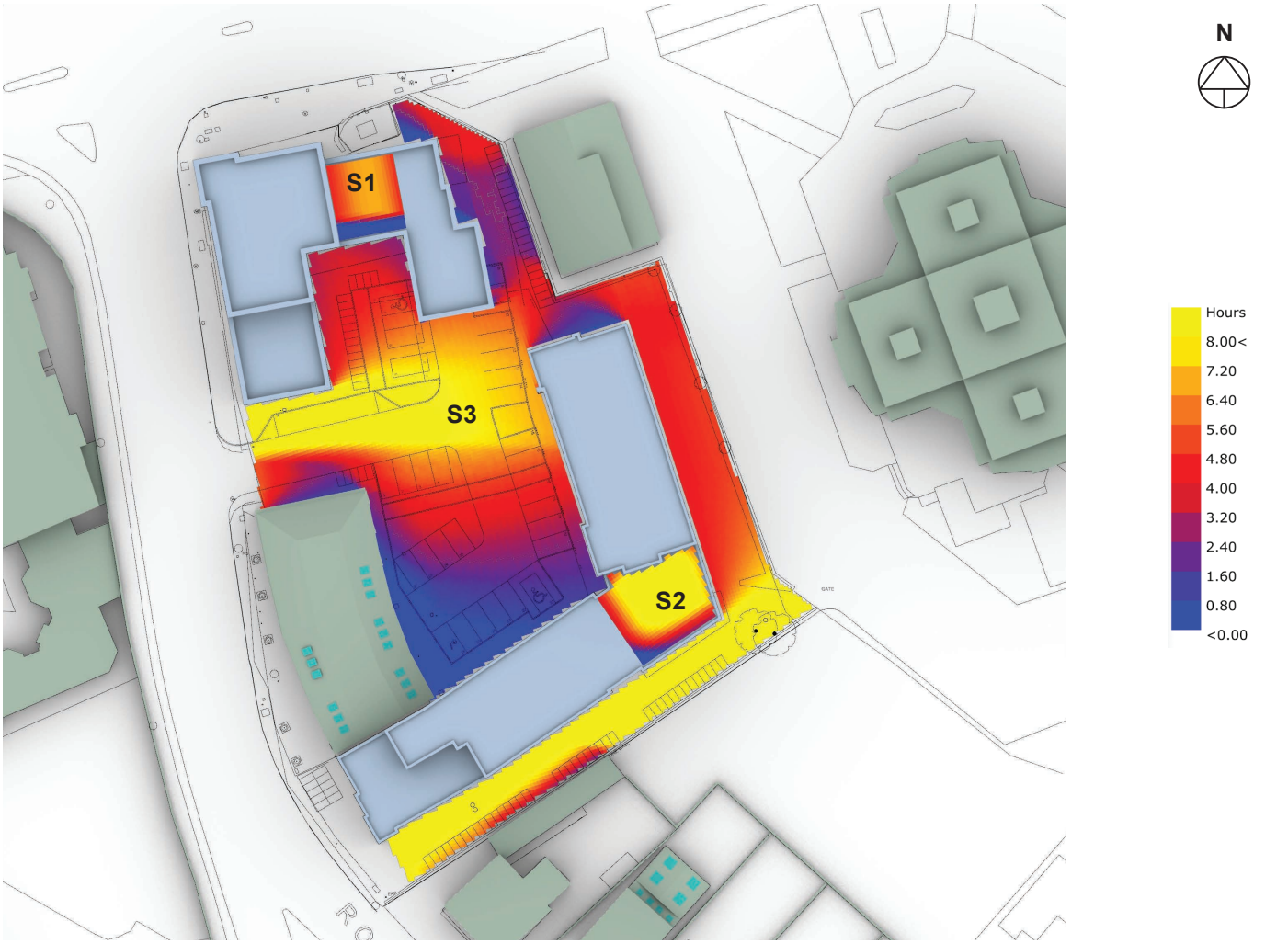


Figure 3: Radiation map of amenity within the proposed development, showing available sunlight on 21st March. The scale represents the sunlight received from 0 - 8 hours.

Sunlight on the Ground - Public & Communal Amenity			
ID No.	Details	% Area receiving 2 hours sunlight on 21st March	Meets criteria if >50% area receiving 2 hours sunlight on 21st March
S1	Block A Roof Terrace Amenity	80.2%	Y
S2	Block B Roof Terrace Amenity	94.3%	Y
S3	Ground Level Public Open Space	78.2%	Y

Table 9: Calculation of Sun on the Ground to Amenity Areas within the Proposed Development

6.2 Conclusion

All the public and communal amenity spaces are well oriented for sunlight. All achieve 2 hours sunlight on the 21st March over in excess of 50% of the area. The proposed development meets the recommendations for sunlight in the BRE guidelines BR209:2022 (3rd edition).

7. Shadow Study

7.1 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 are included here with the Daylight Saving Time (UTC+1) applied. In Winter even low buildings will cast long shadows, when sun barely rises above an altitude of 10° during the course of the day. It is common for large areas of the ground to be in shadow throughout the day, especially in a built-up area. The guidelines recommend that sunlight at an altitude of 10° or less does not count. Below are the times for the Equinox and Solstice, when 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

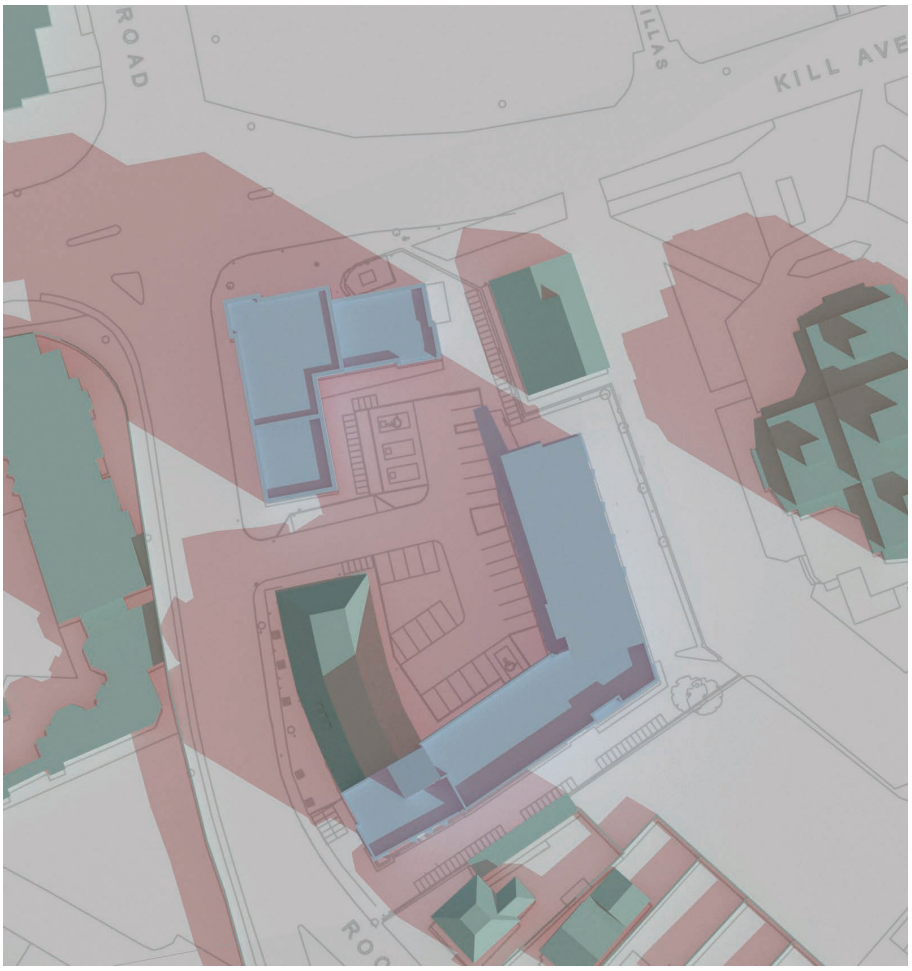
Shadow diagrams are a visual aid to understand where possible shading may occur. The use of shadow diagrams as an assessment method should be taken over the course of the day and not a specific time due to the transient nature of the sun and the shade caused by obstructions.

The proposed development is alterations and additions to a previously approved student accommodation development under Reg. Ref.: ABP 31141121, the shadow study contrasts the permitted development against the proposed development. While there are some minor changes proposed in both Block A & Block B, for clarity the significant new massing is contrasted in a mustard colour.

Section 7.2 shows the permitted and proposed shadow diagrams for the Equinox on the 21st March at 2 hourly intervals during the day between 09:00 and 17:00.
Section 7.3 shows the permitted and proposed shadow diagrams for the Summer Solstice on the 21st June at 2 hourly intervals during the day between 09:00 and 19:00.
Section 7.4 shows the permitted and proposed shadow diagrams for the Winter Solstice on the 21st December at 2 hourly intervals during the day between 09:00 and 15:00.

7.2 Shadow Casting diagrams March Equinox

Permitted



N

Proposed

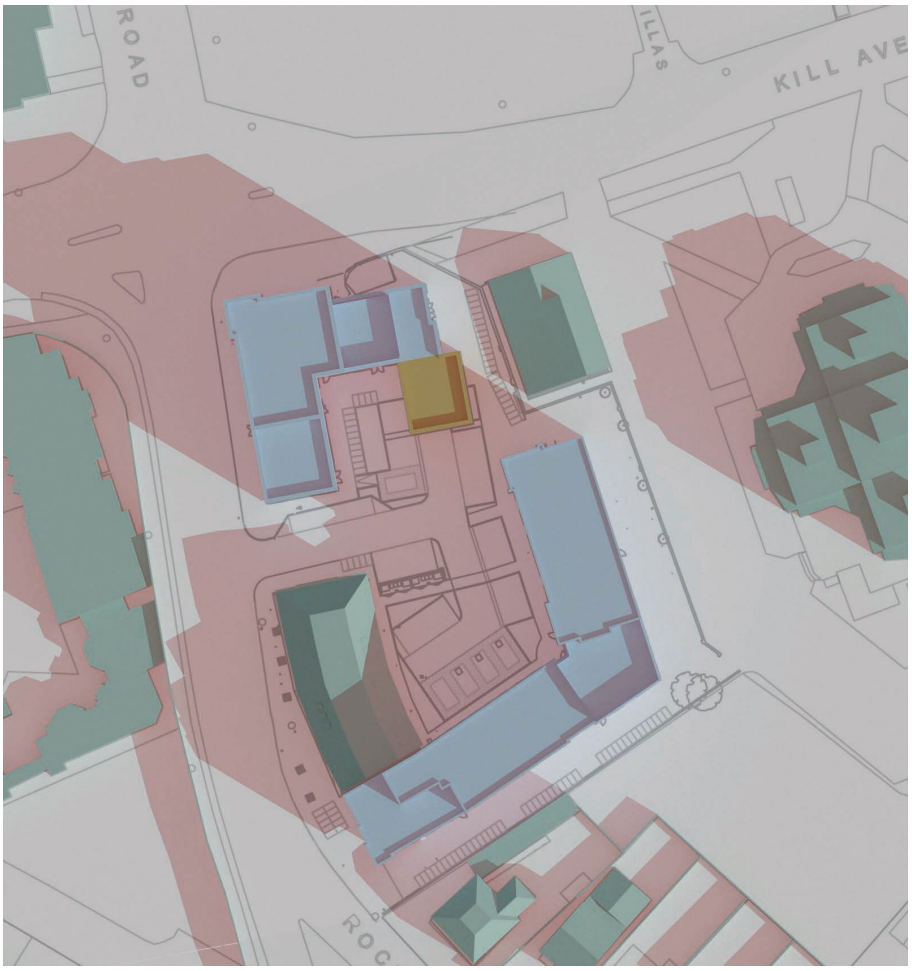
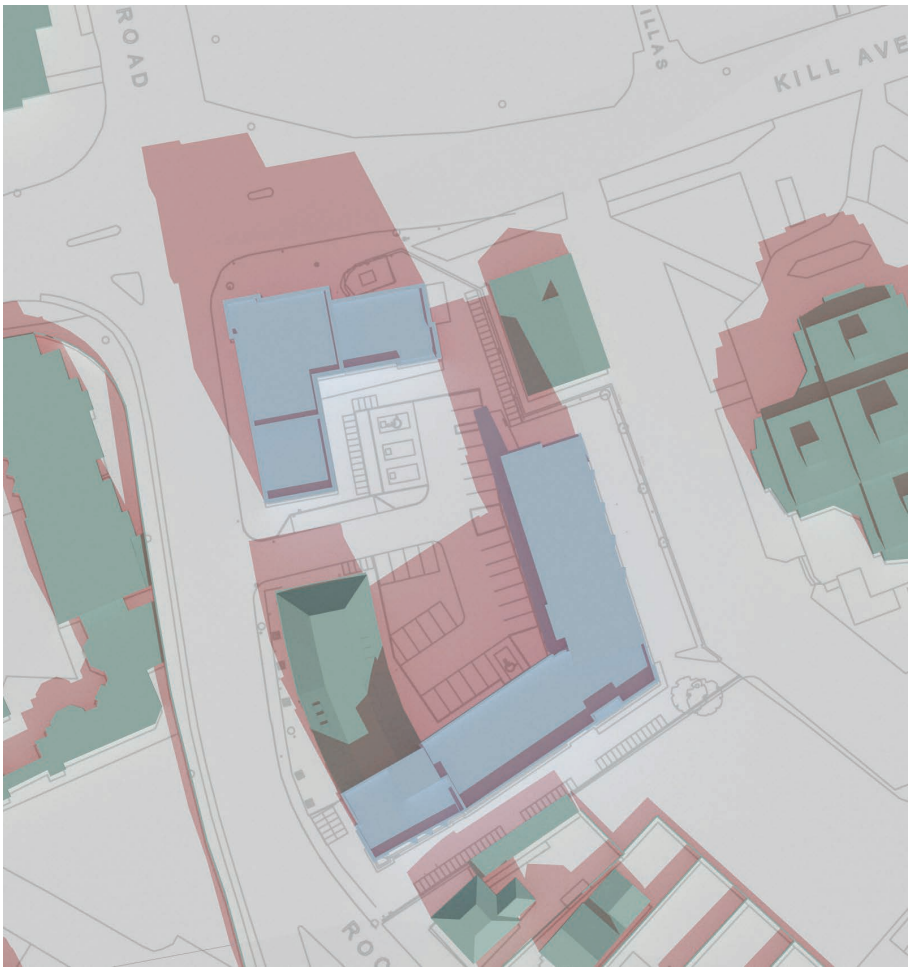


Figure 4: Shadow diagrams 21 March 09:00 UTC

Permitted



N

Proposed

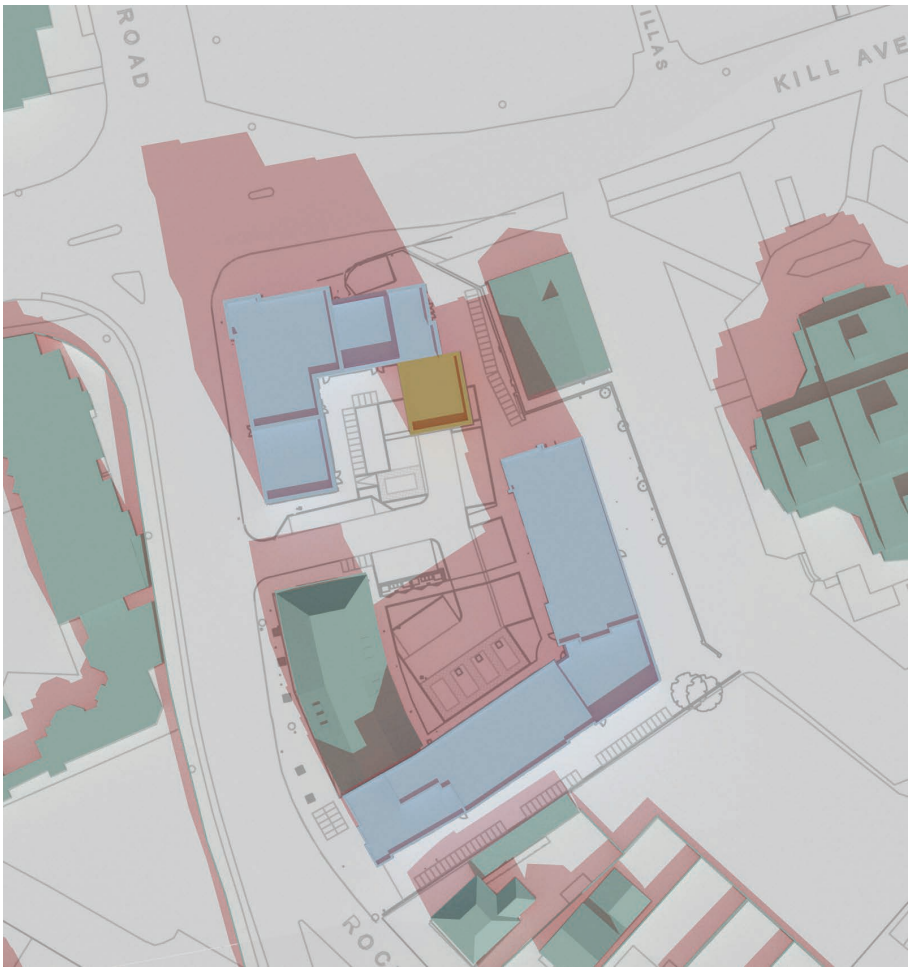
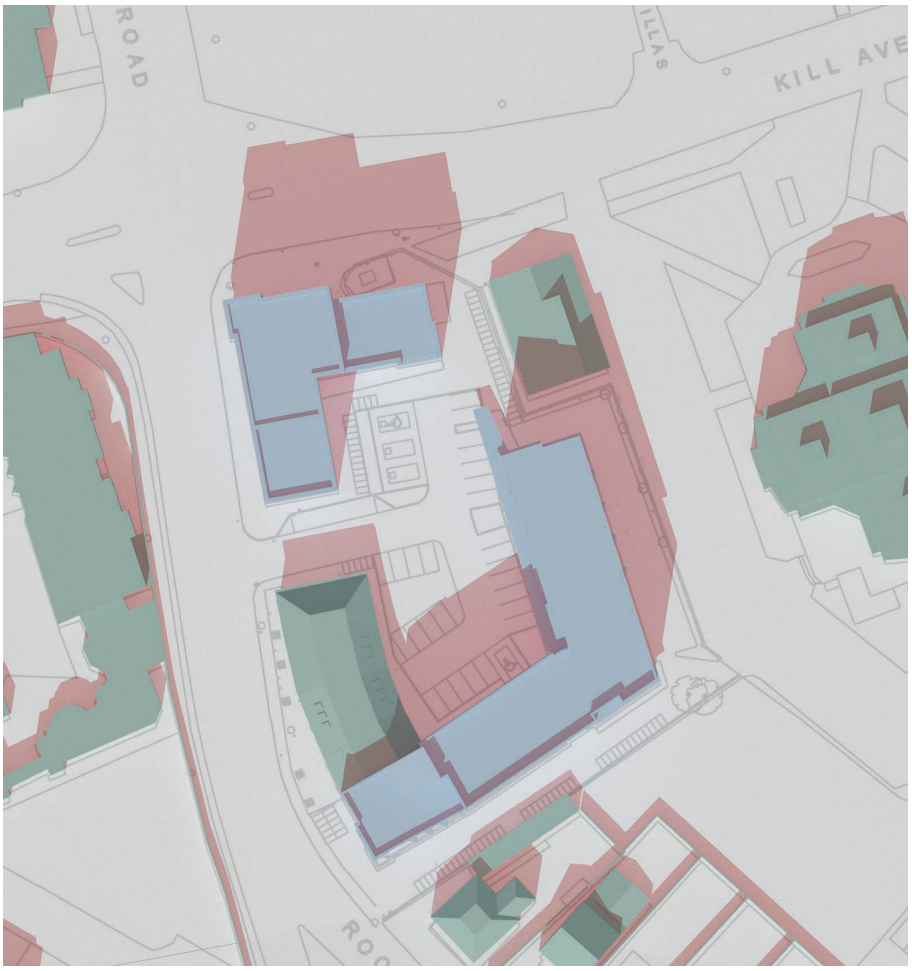


Figure 5: Shadow diagrams 21 March 11:00 UTC

Permitted

N



Proposed

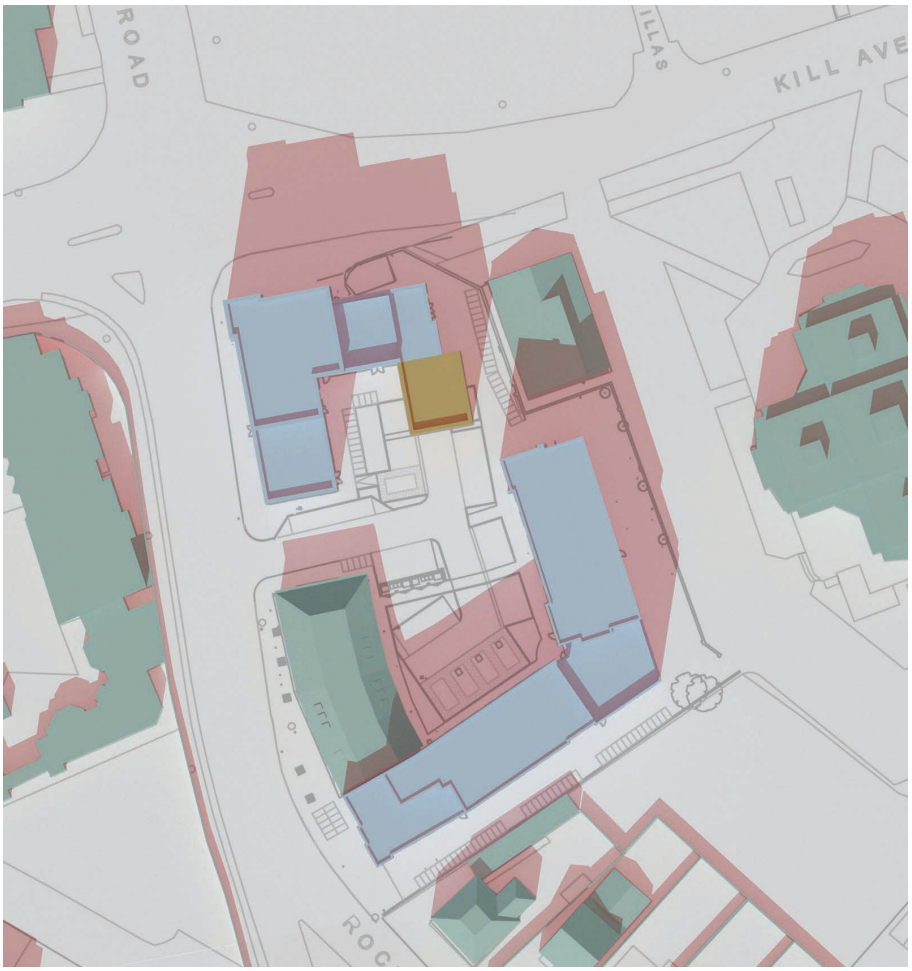
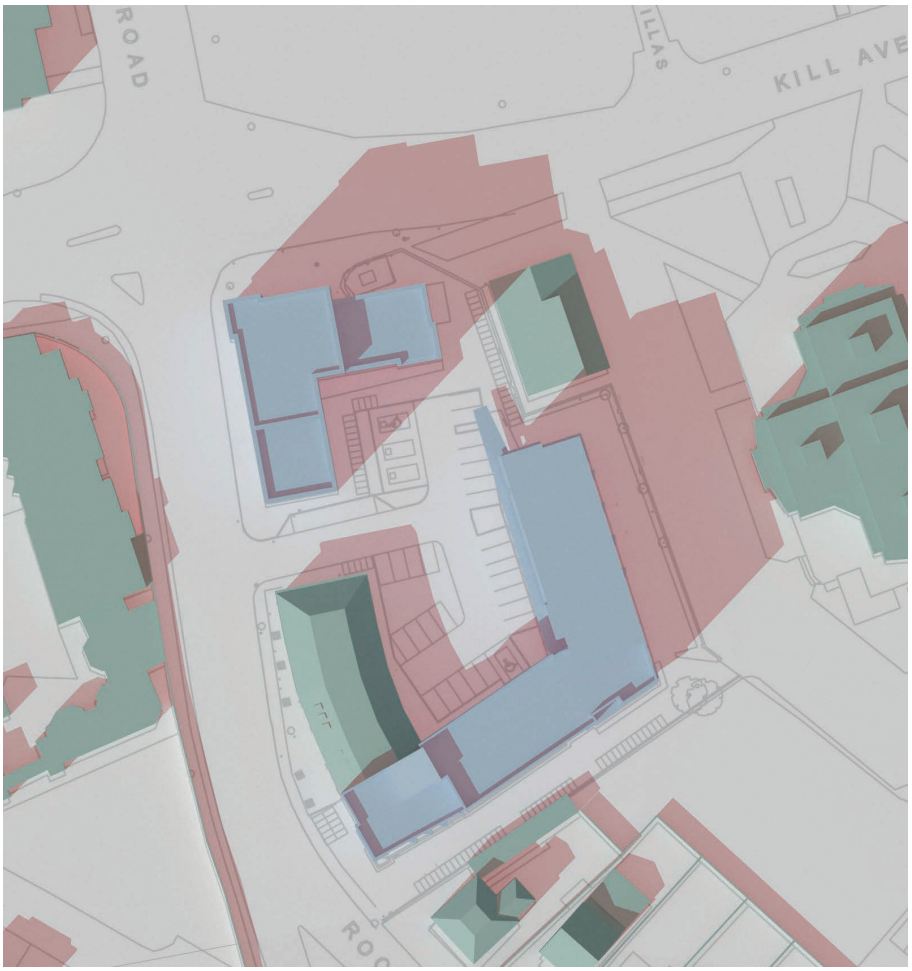


Figure 6: Shadow diagrams 21 March 13:00 UTC

Permitted



N

Proposed

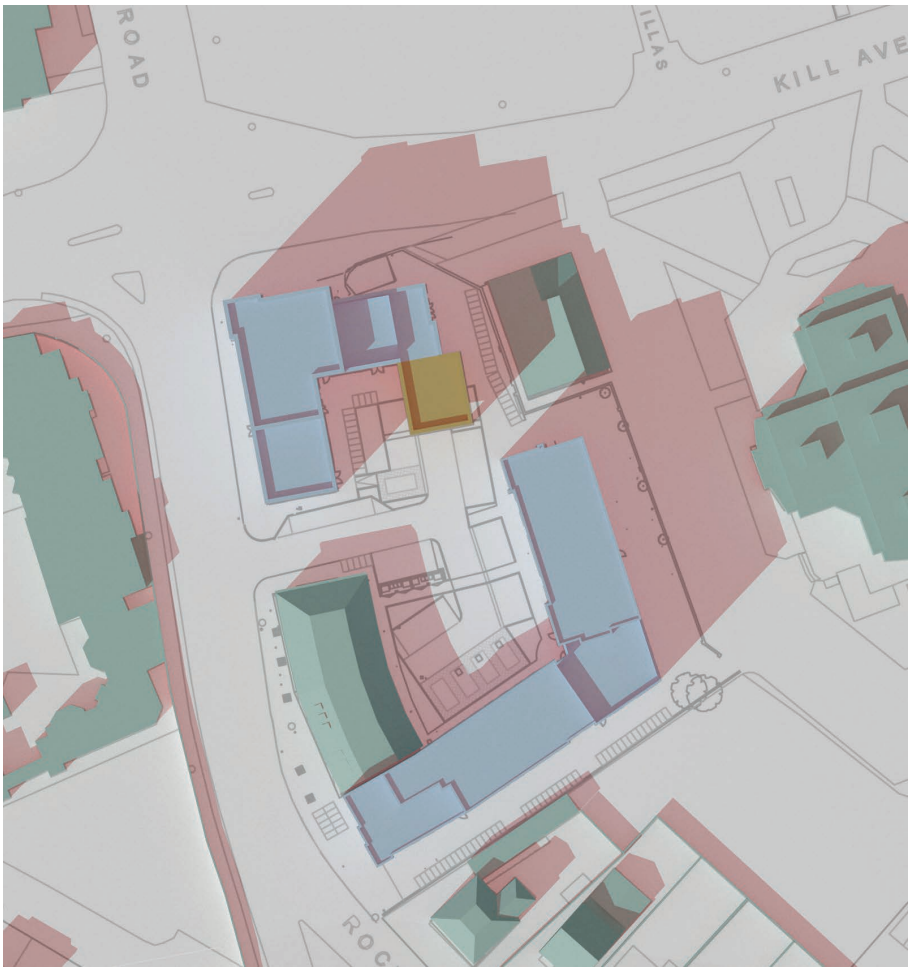
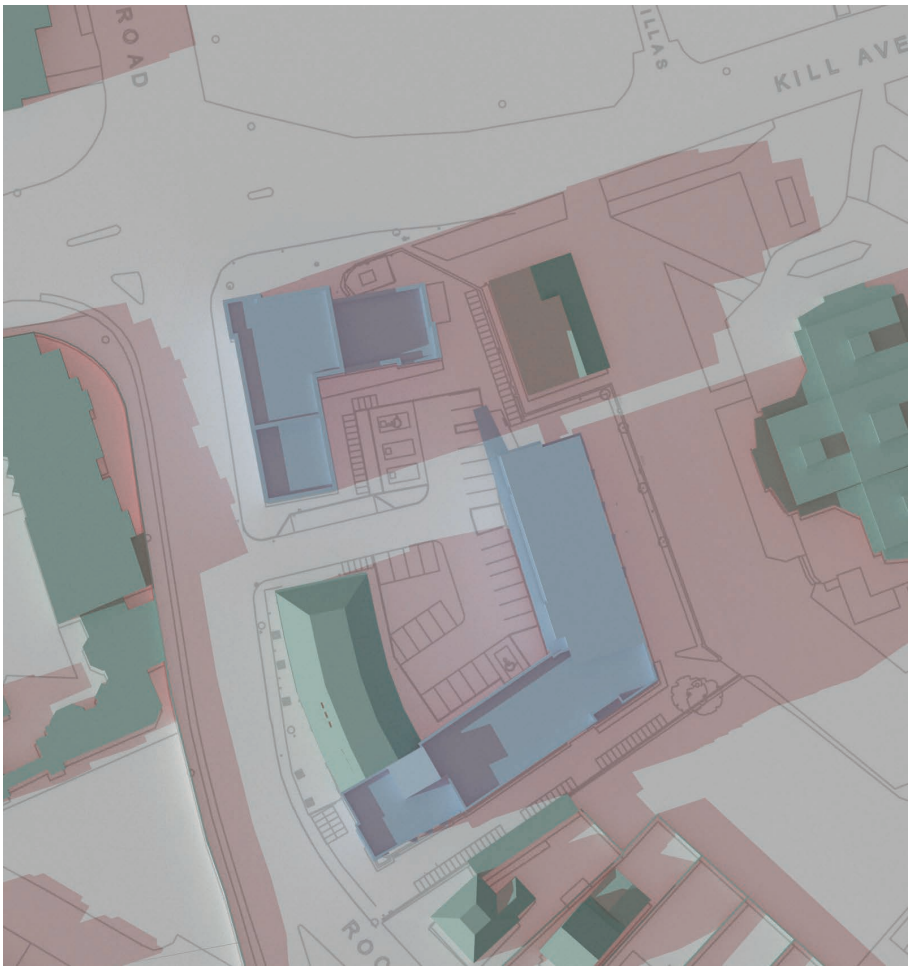


Figure 7: Shadow diagrams 21 March 15:00 UTC

Permitted



N

Proposed

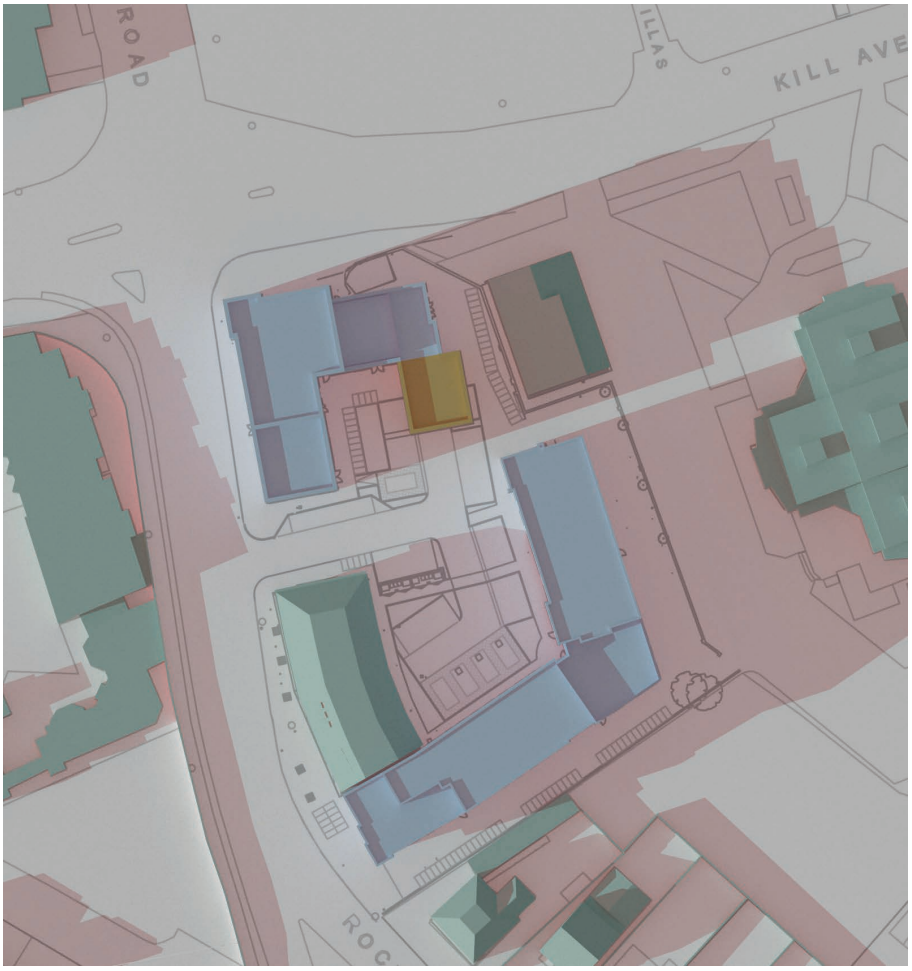
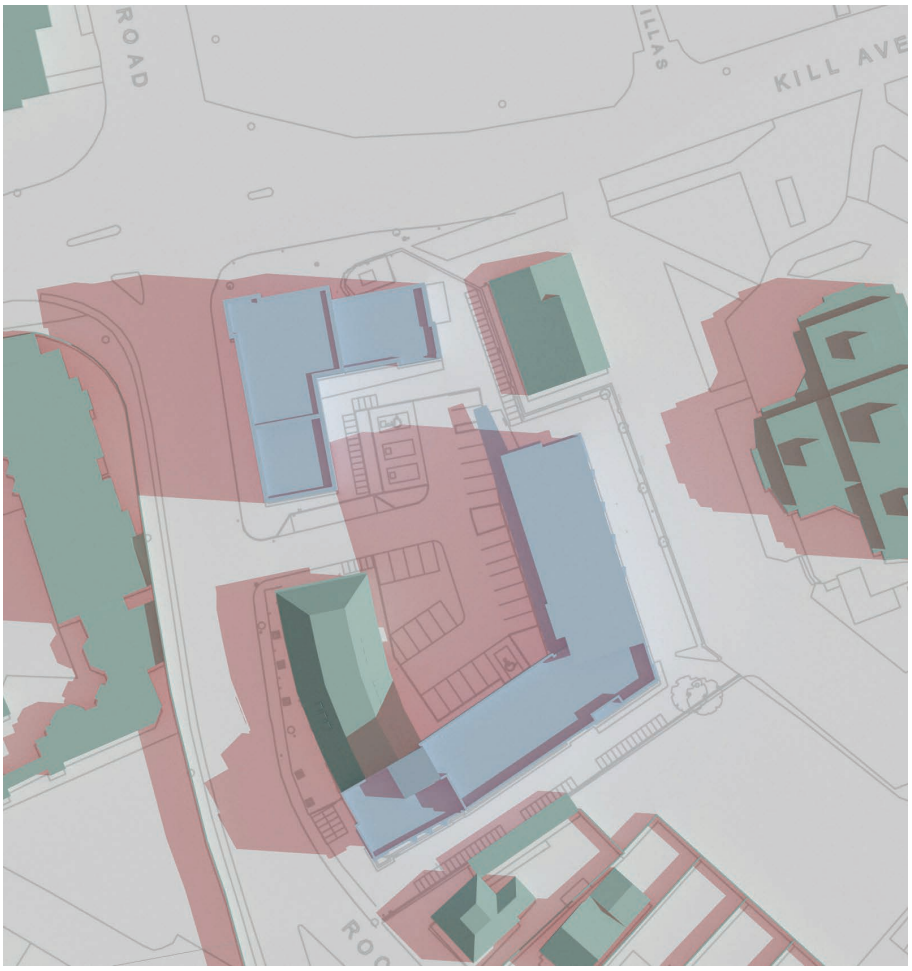


Figure 8: Shadow diagrams 21 March 17:00 UTC

7.3 Shadow Casting diagrams June Solstice

Permitted



N

Proposed

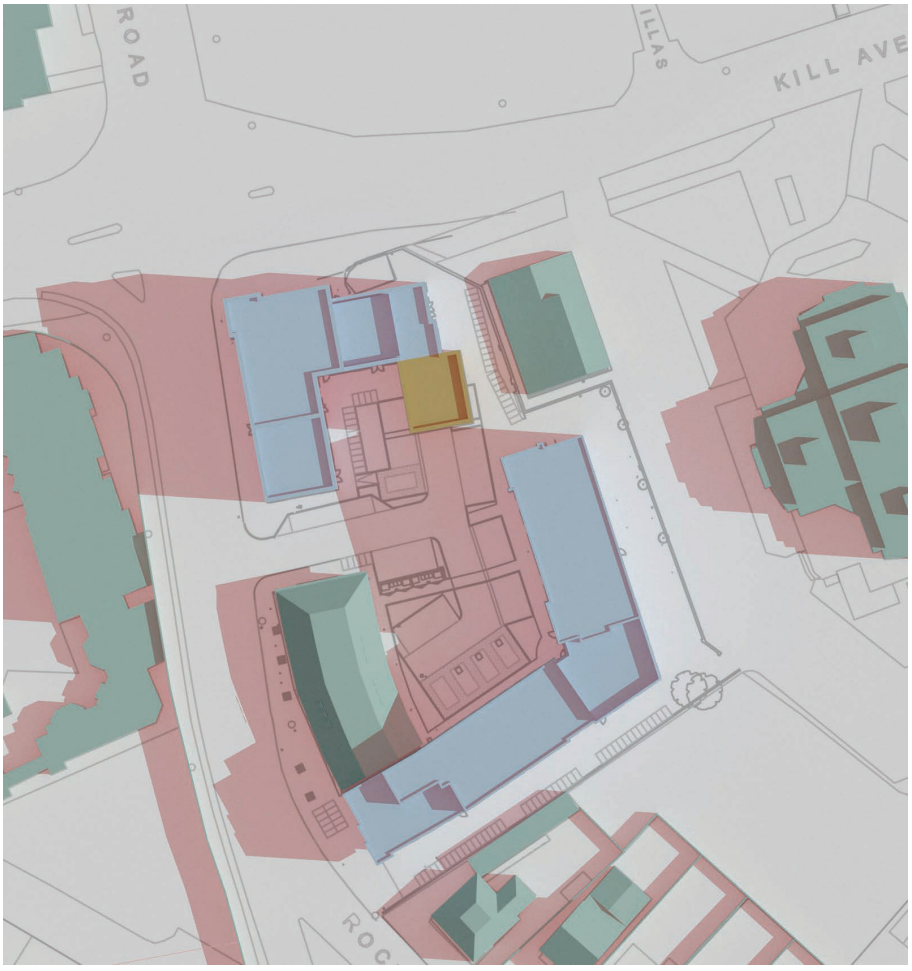
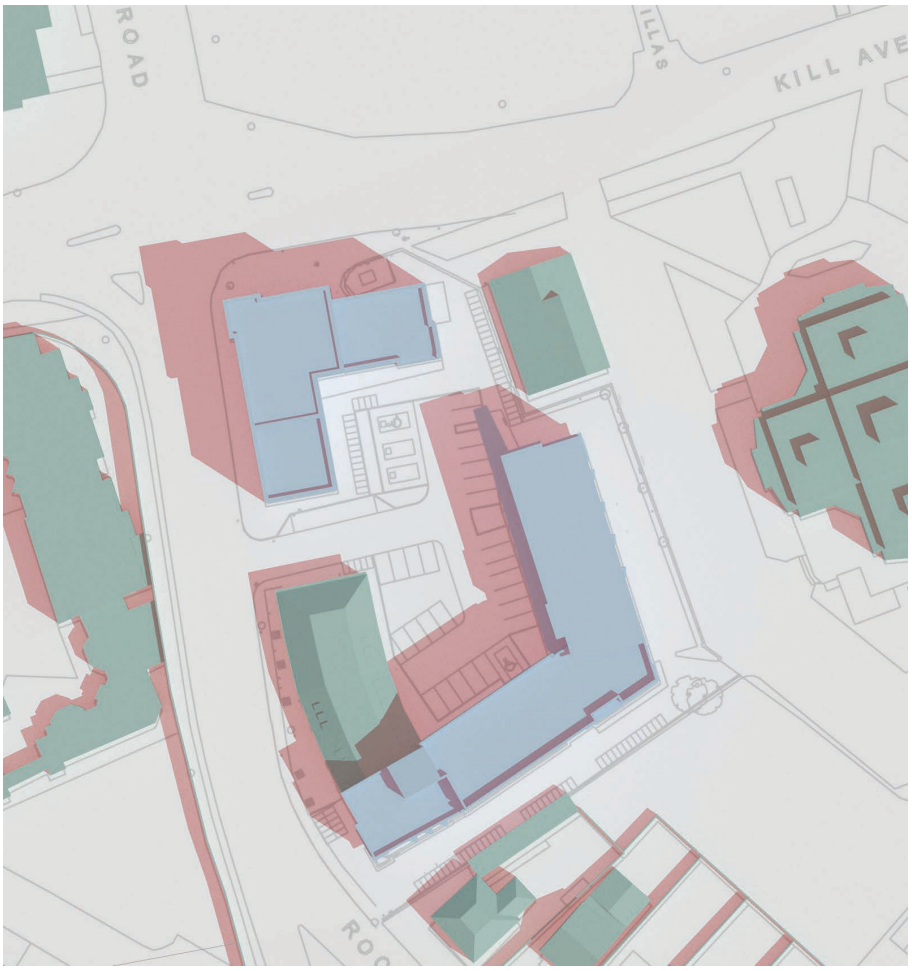


Figure 9: Shadow diagrams 21 June 09.00 UTC +1

Permitted



N

Proposed

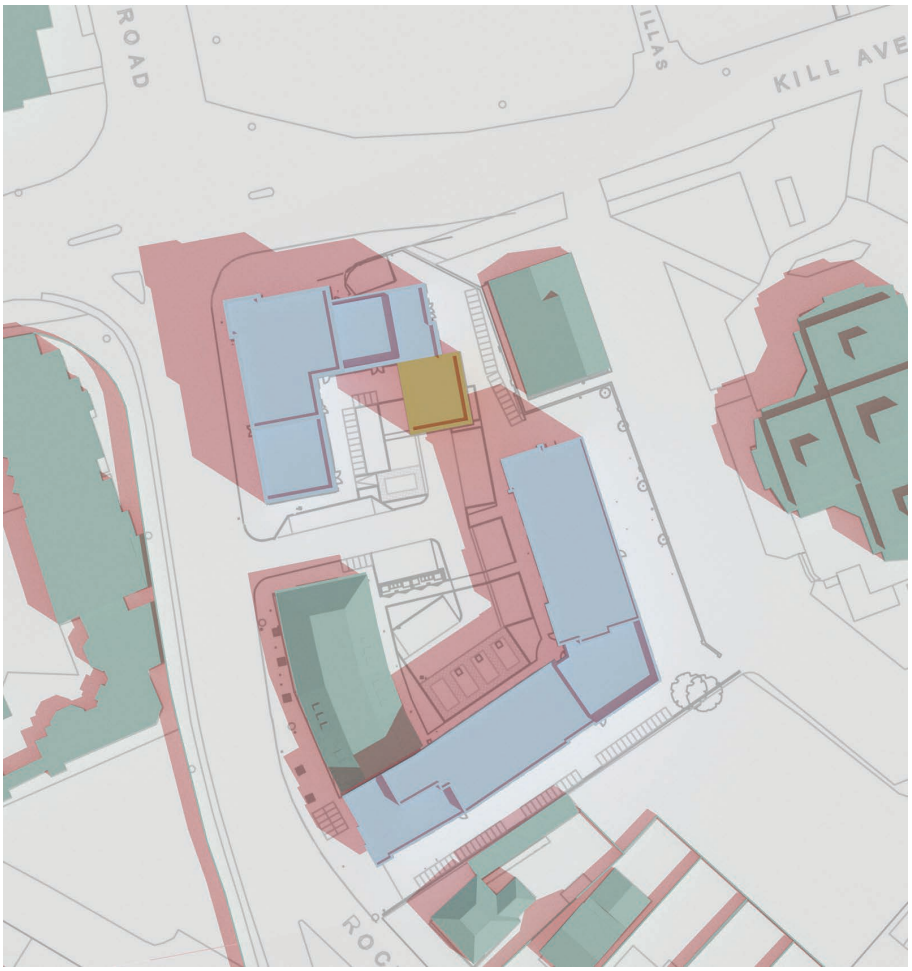


Figure 10: Shadow diagrams 21 June 11:00 UTC +1

Permitted



N

Proposed



Figure 11: Shadow diagrams 21 June 13:00 UTC +1

Permitted



N

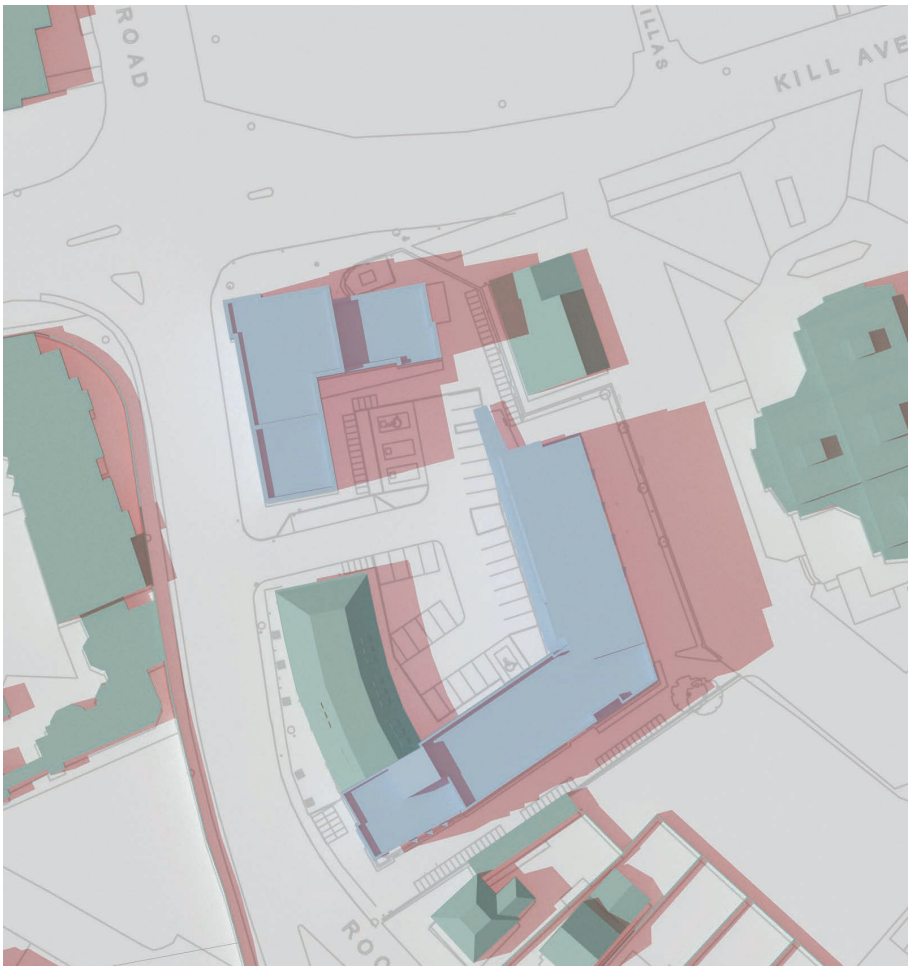
Proposed



Figure 12: Shadow diagrams 21 June 15:00 UTC +1

Permitted

N



Proposed

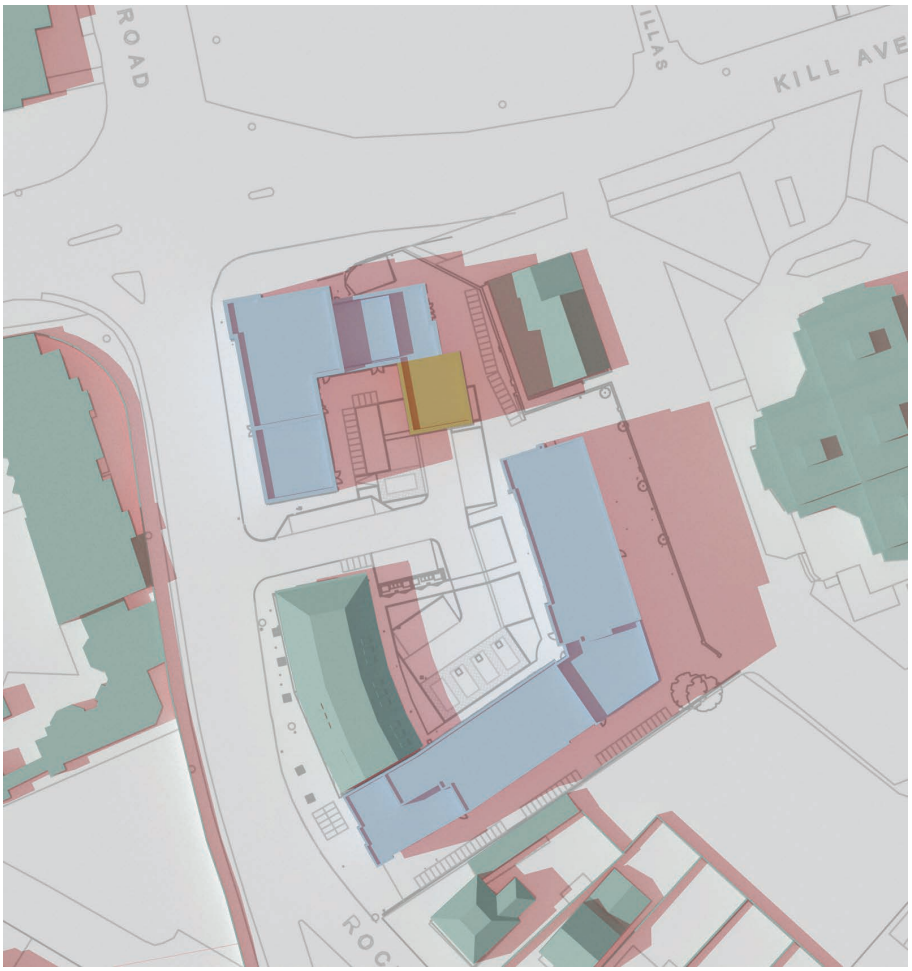
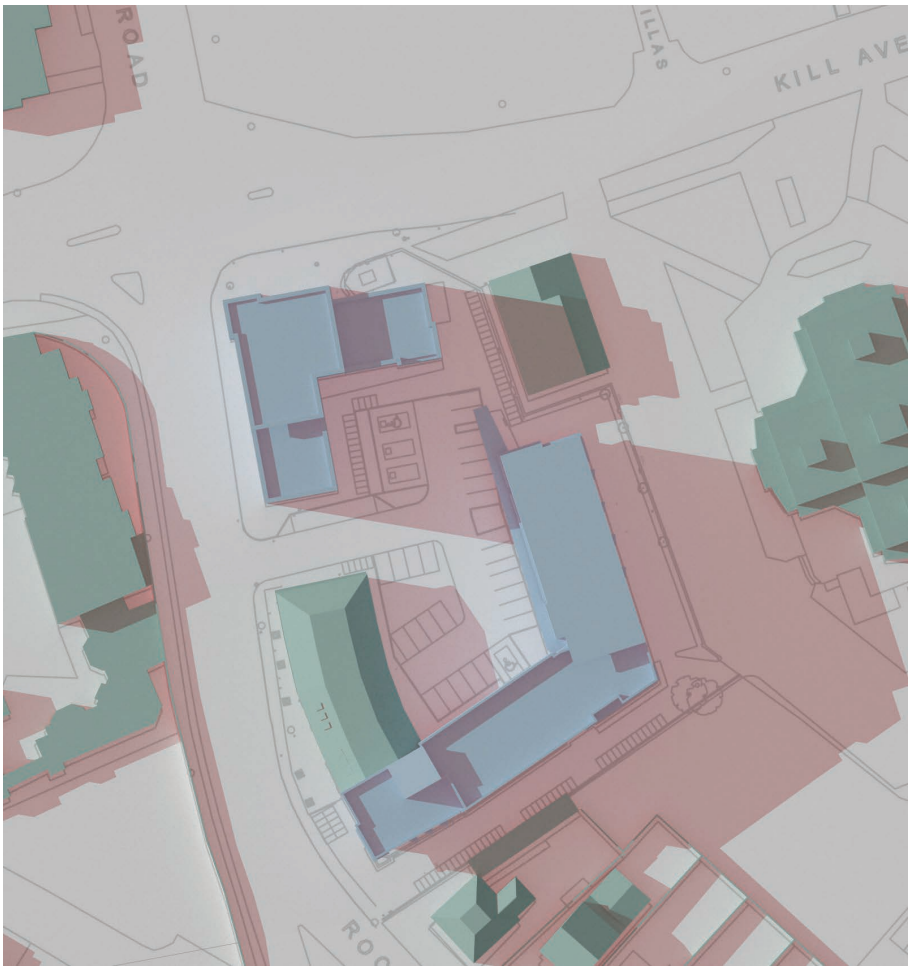


Figure 13: Shadow diagrams 21 June 17:00 UTC +1

Permitted



N

Proposed

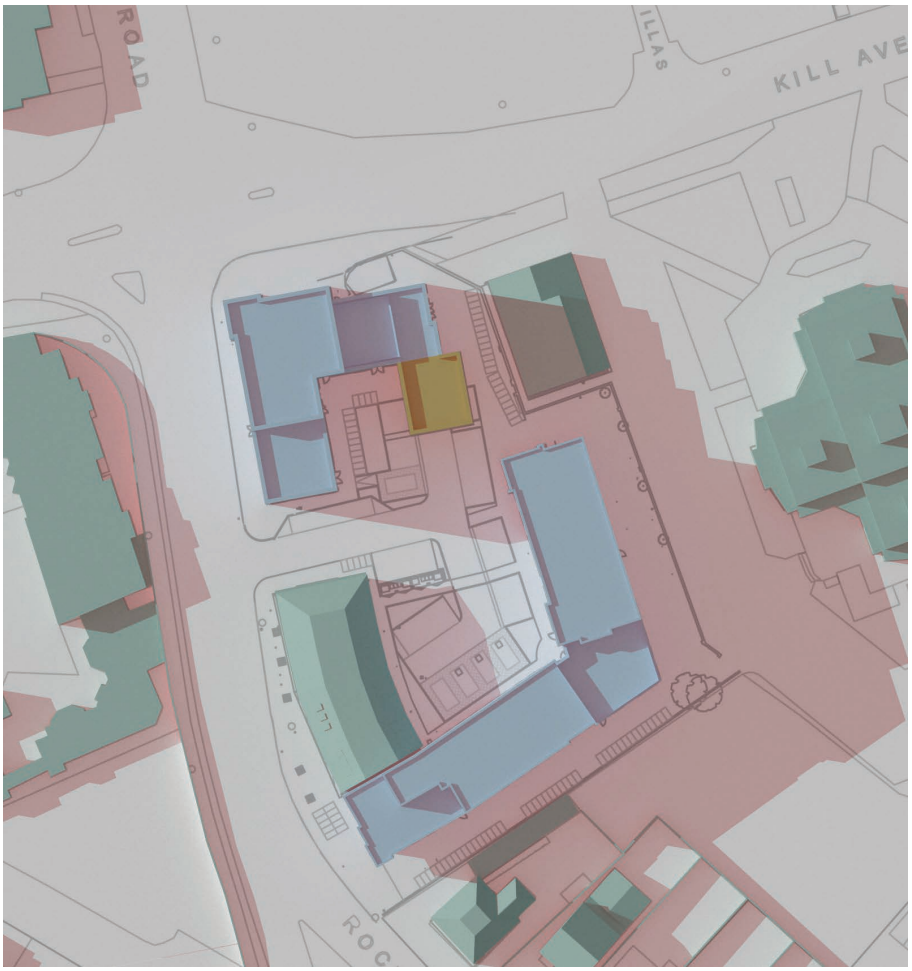
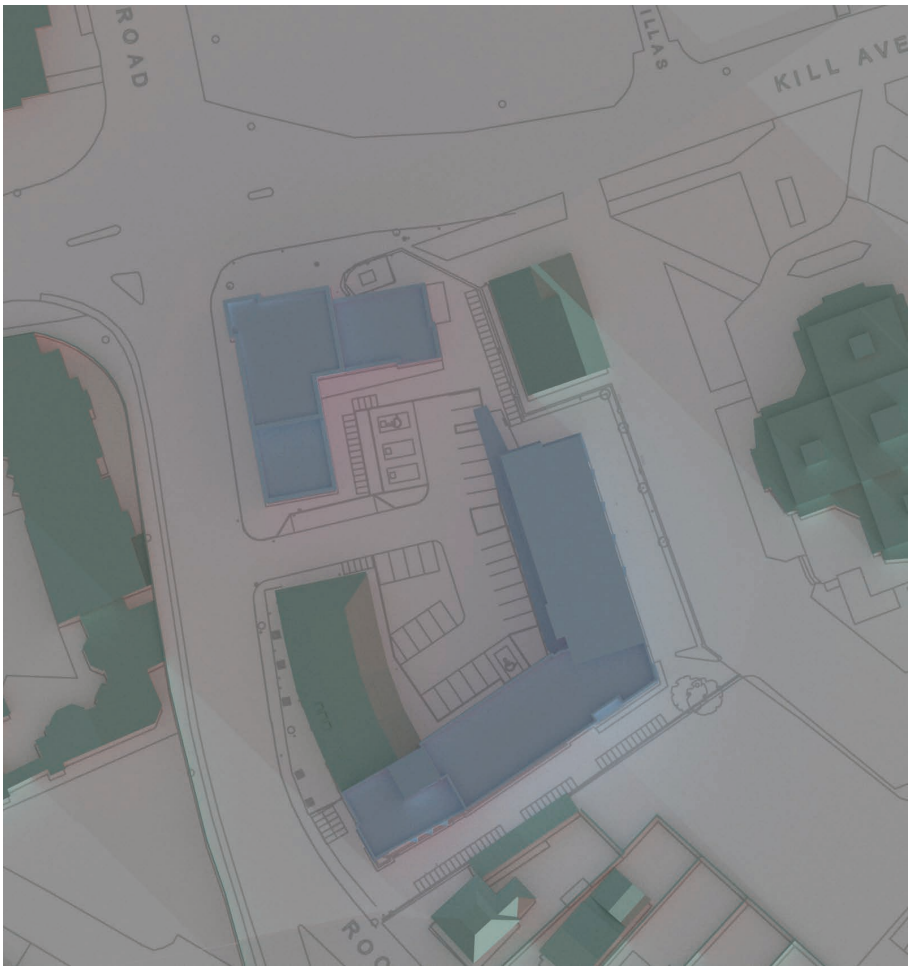


Figure 14: Shadow diagrams 21 June 19:00 UTC +1

7.4 Shadow Casting diagrams December Solstice

Permitted



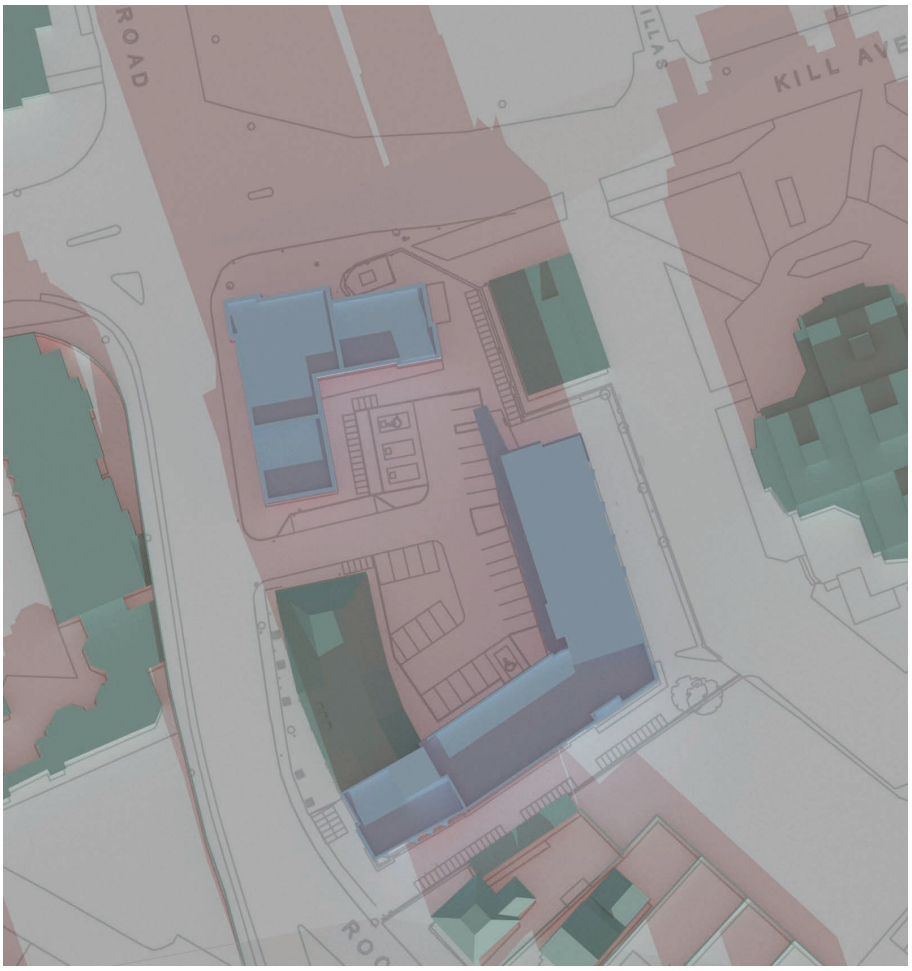
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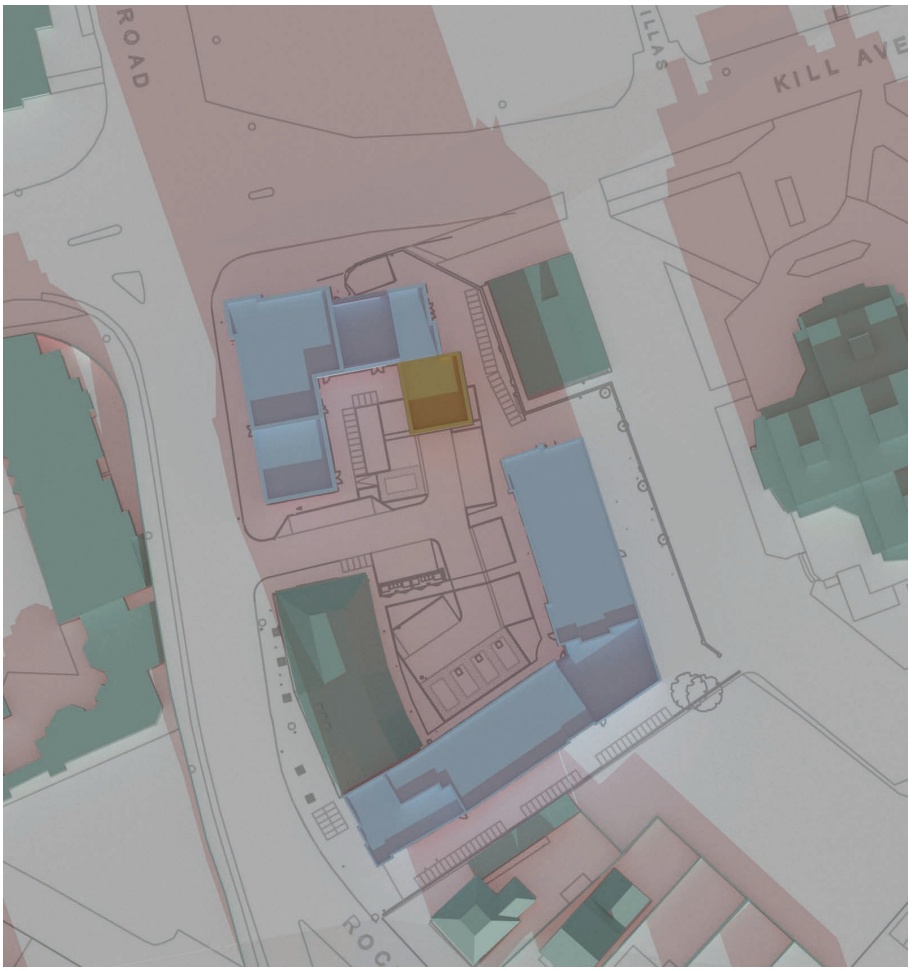


Figure 15: Shadow diagrams 21 December 09:00 UTC

Permitted



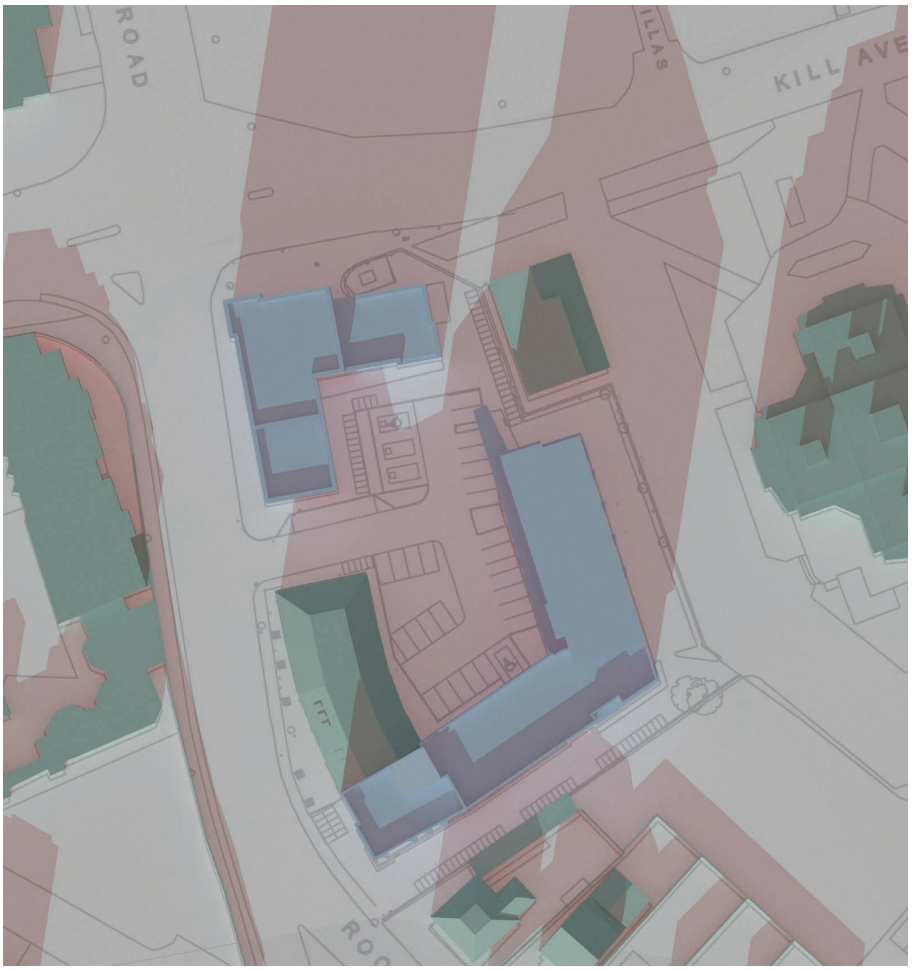
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Proposed

Figure 16: Shadow diagrams 21 December 11:00 UTC

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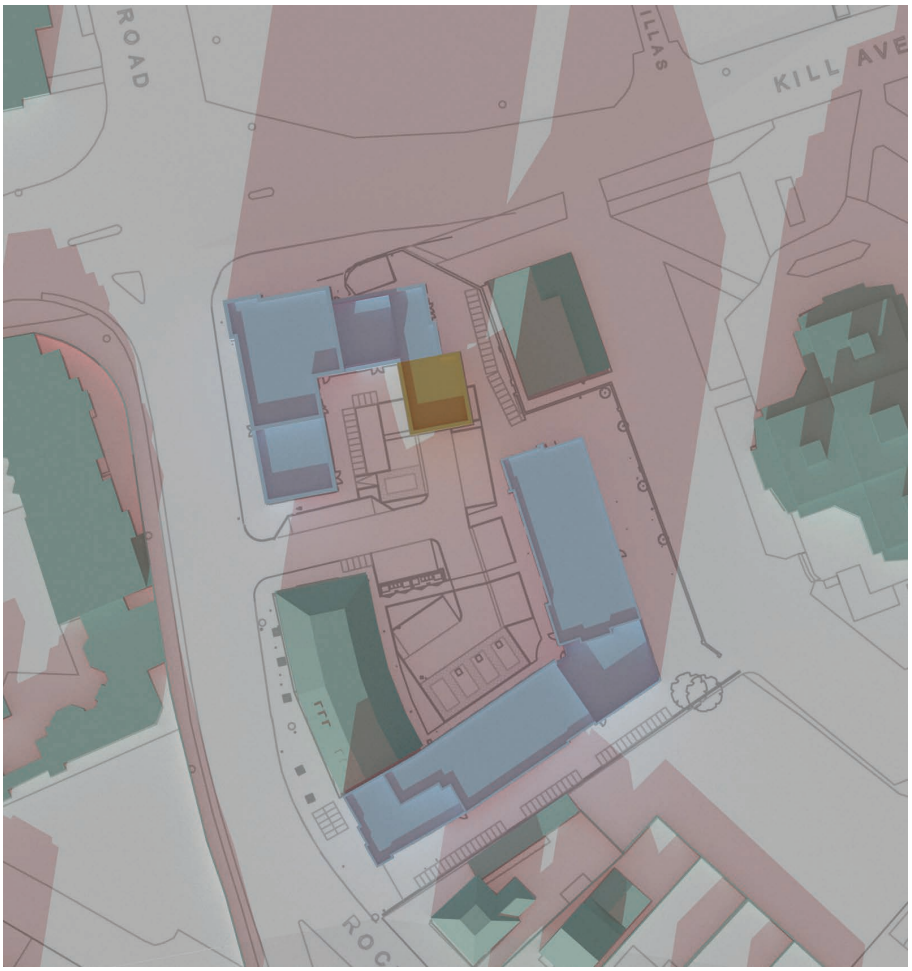
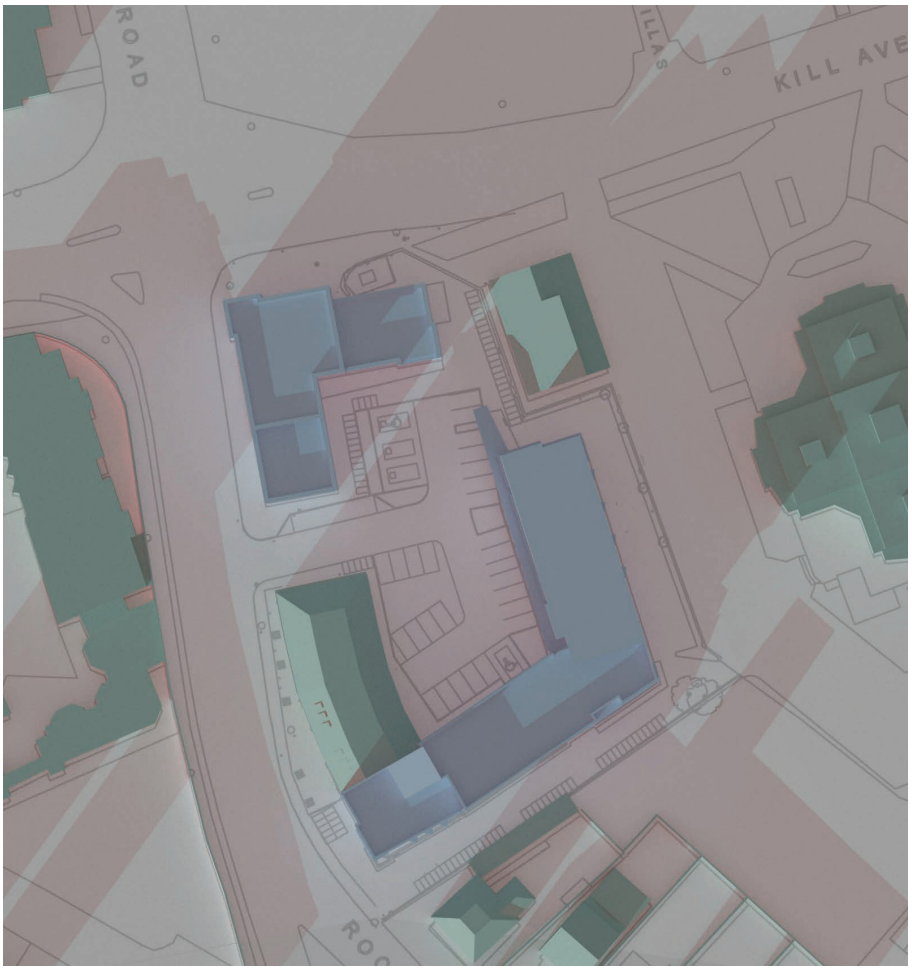


Figure 17: Shadow diagrams 21 December 13:00 UTC

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Proposed

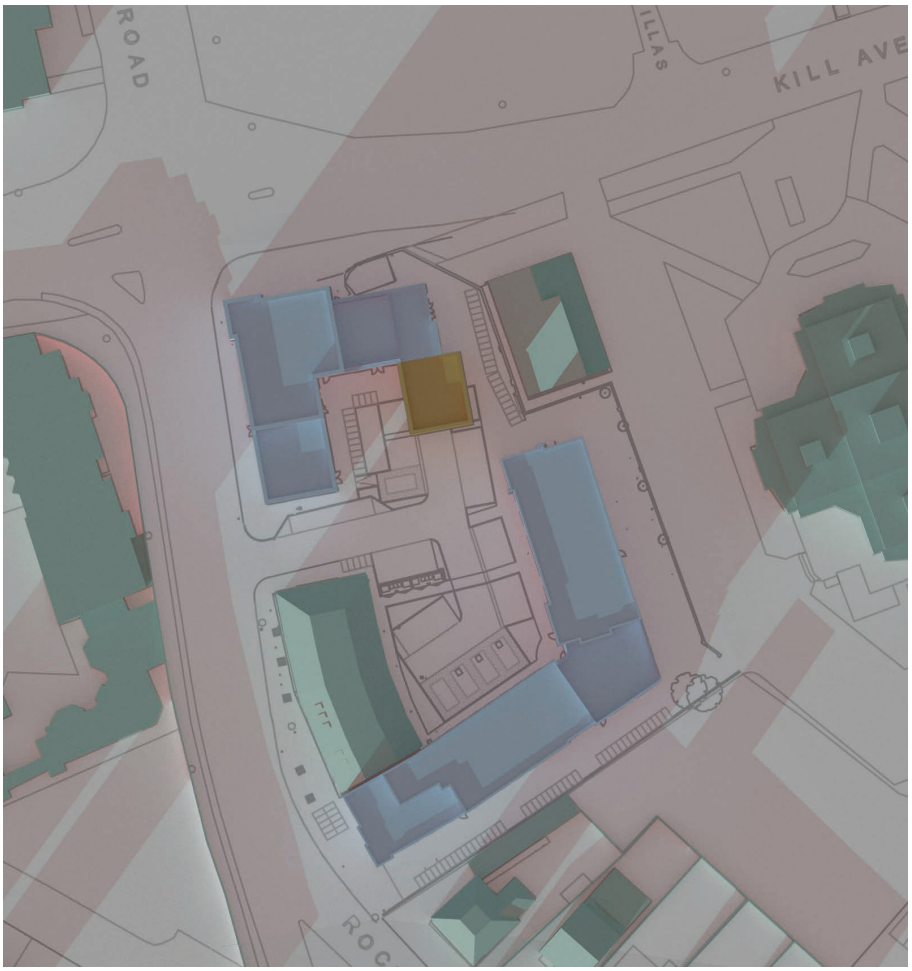


Figure 18: Shadow diagrams 21 December 15:00 UTC

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



First Floor



Second Floor

Figure 19: Block A - Floor plans indicating Daylight Provision to BS EN17037:2021+A1 Table NA.1

Third Floor



Fourth Floor



Figure 20: Block A - Floor plans indicating Daylight Provision to BS EN17037:2021+A1 Table NA.1

Fifth Floor



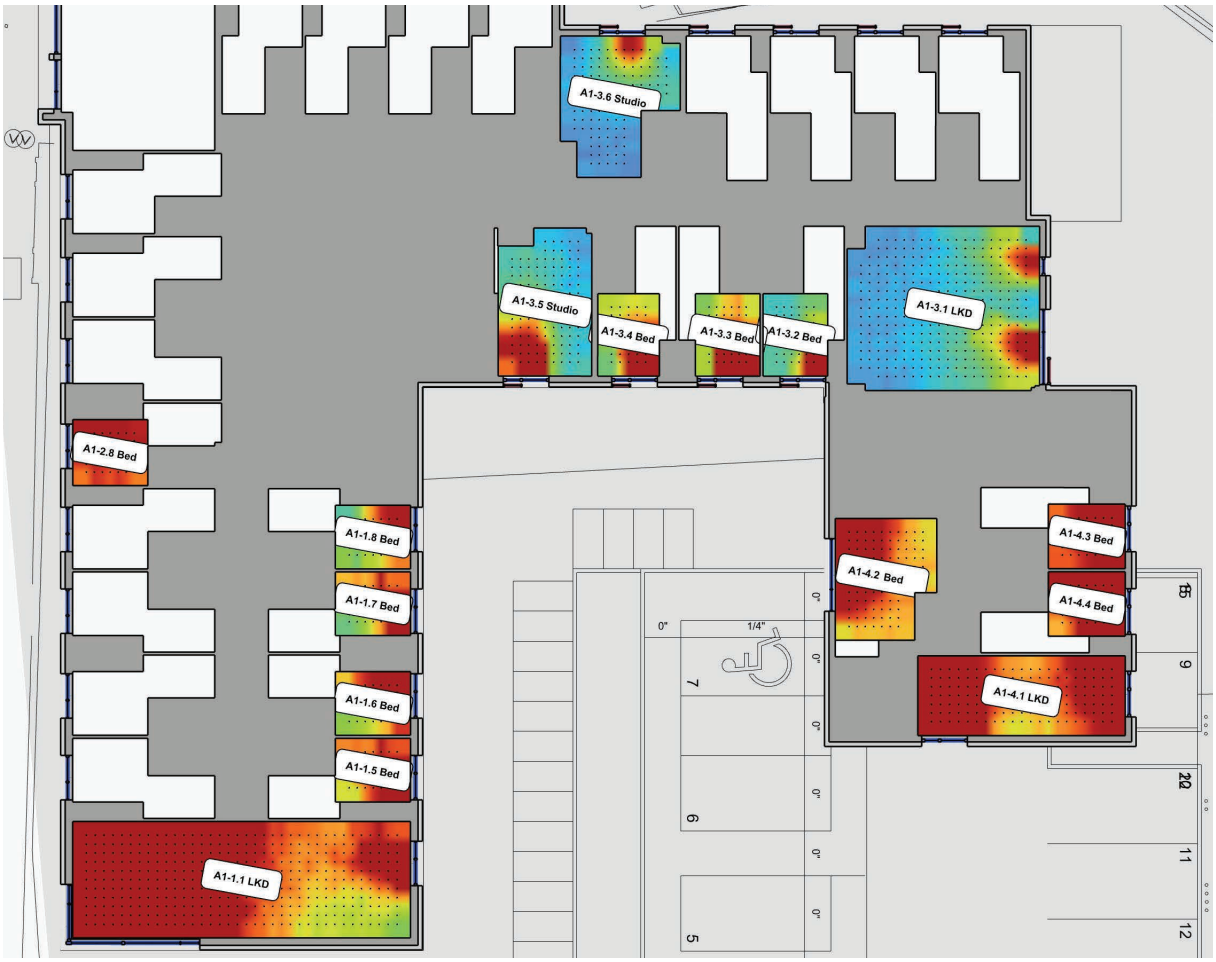
Figure 21: Block A - Floor plans indicating Daylight Provision to BS EN17037:2021+A1 Table NA.1

Block A - Minimum Illuminance Levels to 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
A1-1.1	LKD	43.6	396	200	2262	100.0%	Y
A1-1.5	Bed	5.3	42	150	1198	100.0%	Y
A1-1.6	Bed	5.3	42	150	1034	100.0%	Y
A1-1.7	Bed	5.3	42	150	996	100.0%	Y
A1-1.8	Bed	5.3	42	150	783	100.0%	Y
A1-2.8	Bed	5.5	42	150	1357	100.0%	Y
A1-3.1	LKD	34.4	333	200	355	65.5%	Y
A1-3.2	Bed	5.9	48	150	639	97.9%	Y
A1-3.3	Bed	5.9	48	150	1277	100.0%	Y
A1-3.4	Bed	5.6	40	150	1220	100.0%	Y
A1-3.5	Studio	14.6	127	200	622	78.0%	Y
A1-3.6	Studio	15.1	119	200	321	79.0%	Y
A1-4.1	LKD	18.4	147	200	1447	100.0%	Y
A1-4.2	Bed	12.5	103	150	1342	100.0%	Y
A1-4.3	Bed	5.5	42	150	1514	100.0%	Y
A1-4.4	Bed	5.5	42	150	1673	100.0%	Y
A2-1.1	LKD	43.6	396	200	2349	100.0%	Y
A2-1.5	Bed	5.3	42	150	1250	100.0%	Y
A2-1.6	Bed	5.3	42	150	1124	100.0%	Y
A2-1.7	Bed	5.3	42	150	1079	100.0%	Y
A2-1.8	Bed	5.3	42	150	944	100.0%	Y
A2-2.8	Bed	5.5	42	150	1381	100.0%	Y
A2-3.1	LKD	34.4	333	200	389	89.8%	Y
A2-3.2	Bed	5.9	48	150	693	100.0%	Y
A2-3.3	Bed	5.9	48	150	1348	100.0%	Y
A2-3.4	Bed	5.6	40	150	1327	100.0%	Y
A2-3.5	Studio	14.6	127	200	661	89.0%	Y
A2-3.6	Studio	15.1	119	200	318	68.9%	Y
A2-4.1	LKD	18.4	147	200	1698	100.0%	Y
A2-4.2	Bed	12.5	103	150	1654	100.0%	Y

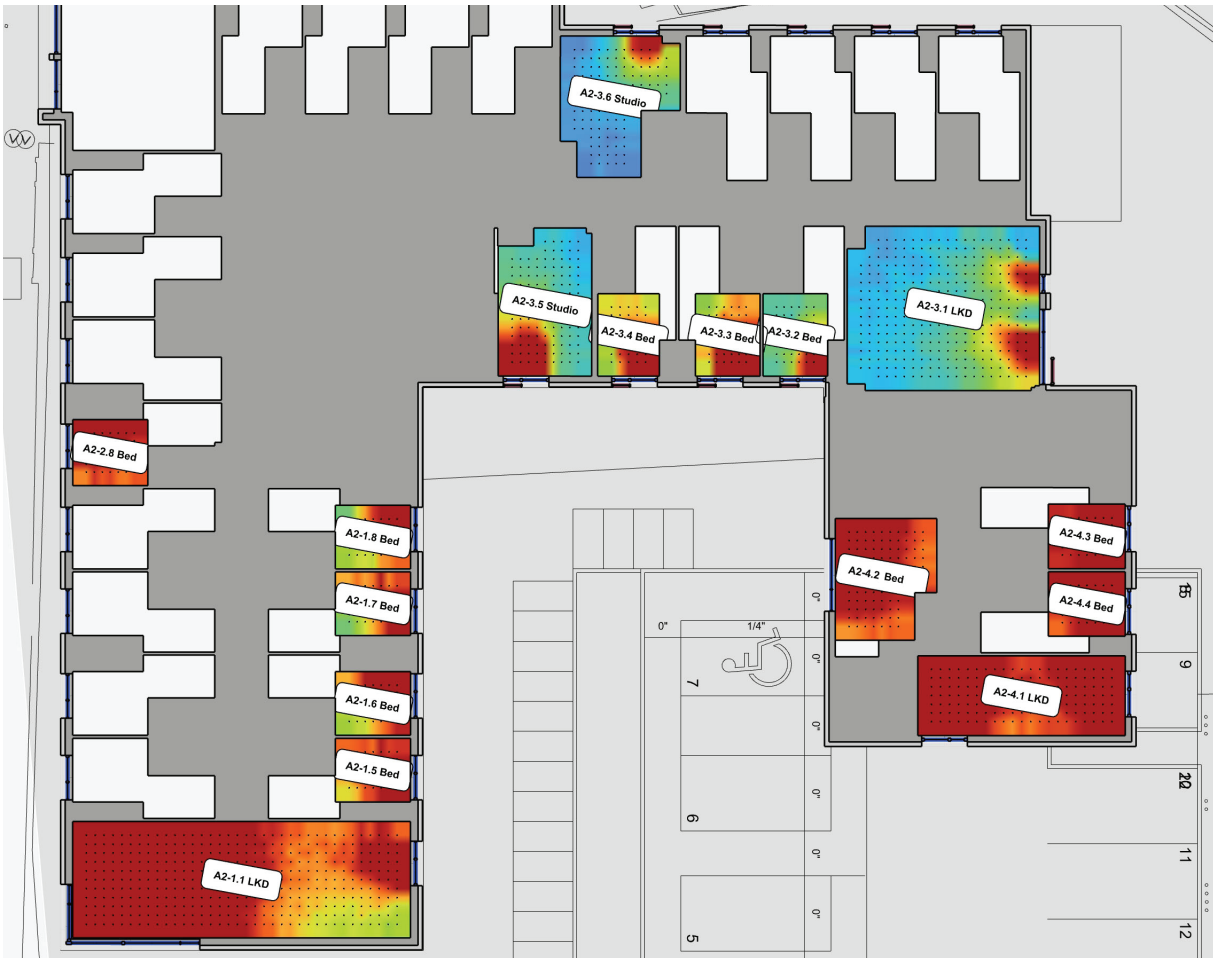
Block A - Minimum Illuminance Levels to BS EN17037:2018+A1:2021 - Table NA.1							
Space ID	Use	Area m2	Sensor Count	Target Lux	Mean Lux	% of grid target exceeded - Minimum 50% of Grid	Meets Criteria
A2-4.3	Bed	5.5	42	150	1584	100.0%	Y
A2-4.4	Bed	5.5	42	150	1734	100.0%	Y
A3-1.1	LKD	43.6	396	200	2383	100.0%	Y
A3-1.5	Bed	5.3	42	150	1285	100.0%	Y
A3-1.6	Bed	5.3	42	150	1204	100.0%	Y
A3-1.7	Bed	5.3	42	150	1207	100.0%	Y
A3-1.8	Bed	5.3	42	150	1142	100.0%	Y
A3-2.8	Bed	5.5	42	150	1396	100.0%	Y
A3-3.1	LKD	34.4	333	200	393	90.1%	Y
A3-3.2	Bed	5.9	48	150	760	100.0%	Y
A3-3.3	Bed	5.9	48	150	1499	100.0%	Y
A3-3.4	Bed	5.6	40	150	1460	100.0%	Y
A3-3.5	Studio	14.6	127	200	722	96.9%	Y
A3-3.6	Studio	15.1	119	200	339	87.4%	Y
A3-4.1	LKD	18.4	147	200	1719	100.0%	Y
A3-4.2	Bed	12.5	103	150	2073	100.0%	Y
A3-4.3	Bed	5.5	42	150	1619	100.0%	Y
A3-4.4	Bed	5.5	42	150	1761	100.0%	Y
A4-1.1	LKD	43.6	396	200	2412	100.0%	Y
A4-1.5	Bed	5.3	42	150	1347	100.0%	Y
A4-1.6	Bed	5.3	42	150	1282	100.0%	Y
A4-1.7	Bed	5.3	42	150	1291	100.0%	Y
A4-1.8	Bed	5.3	42	150	1252	100.0%	Y
A4-2.8	Bed	5.5	42	150	1393	100.0%	Y
A4-3.1	LKD	34.4	333	200	418	94.6%	Y
A4-3.2	Bed	5.9	48	150	907	100.0%	Y
A4-3.3	Bed	5.9	48	150	1697	100.0%	Y
A4-3.4	Bed	5.6	40	150	1605	100.0%	Y
A4-3.5	Studio	14.6	127	200	811	100.0%	Y
A4-3.6	Studio	15.1	119	200	328	71.4%	Y
A4-4.1	LKD	18.4	147	200	1728	100.0%	Y
A4-4.2	Bed	12.5	103	150	2404	100.0%	Y
A4-4.3	Bed	5.5	42	150	1636	100.0%	Y
A4-4.4	Bed	5.5	42	150	1749	100.0%	Y
A5-1.6	Bed	6.4	48	150	1574	100.0%	Y
A5-1.7	Bed	6.4	48	150	1371	100.0%	Y
A5-1.8	Studio	12.4	91	200	819	83.5%	Y
A5-1.9	Studio	11.7	94	200	349	79.8%	Y
A5-1.10	Studio	5.2	35	200	575	100.0%	Y

Table 10: Minimum Daylight Provision Compliance for Habitable Rooms to BS EN17037:2018+A1:2021

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

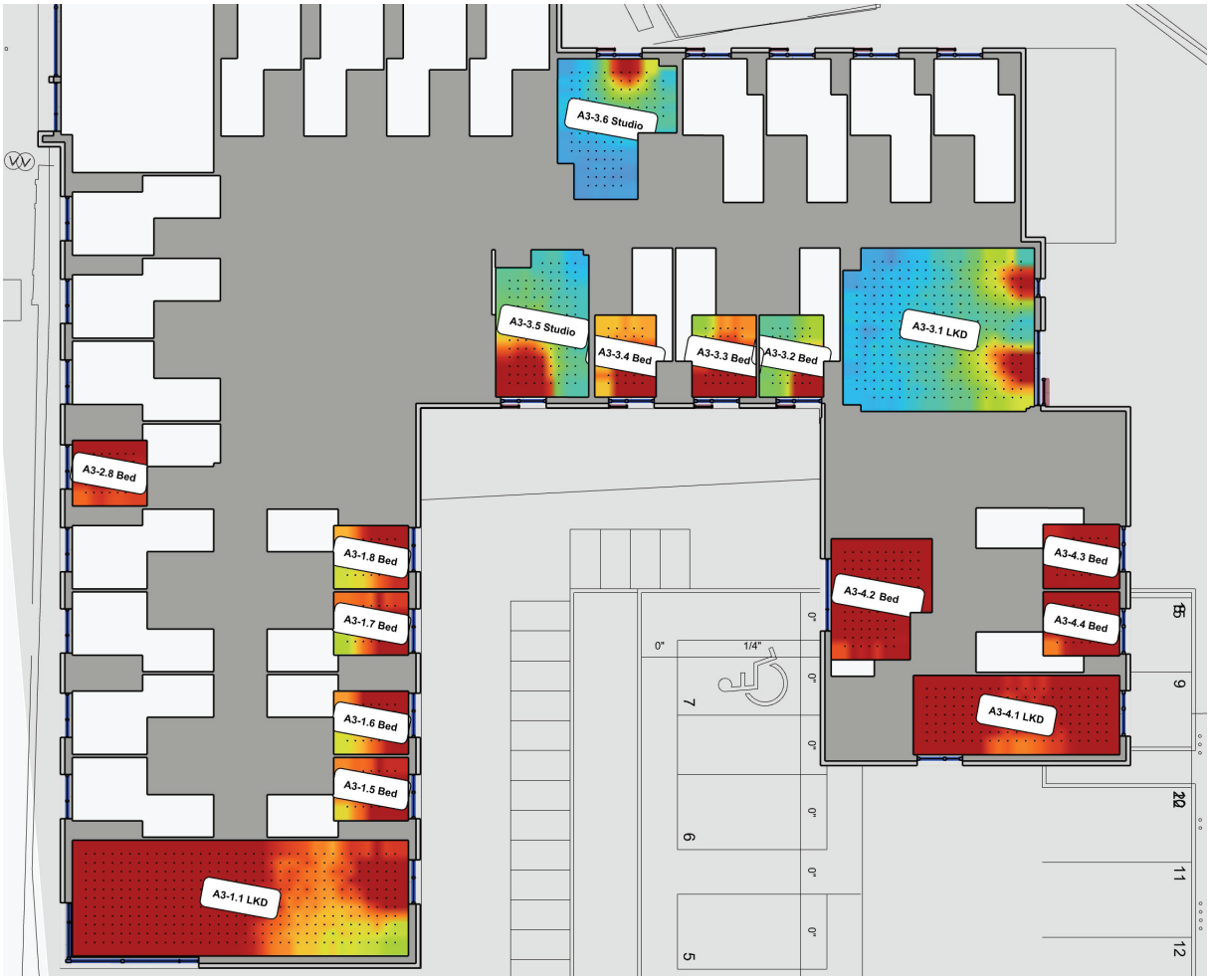


First Floor

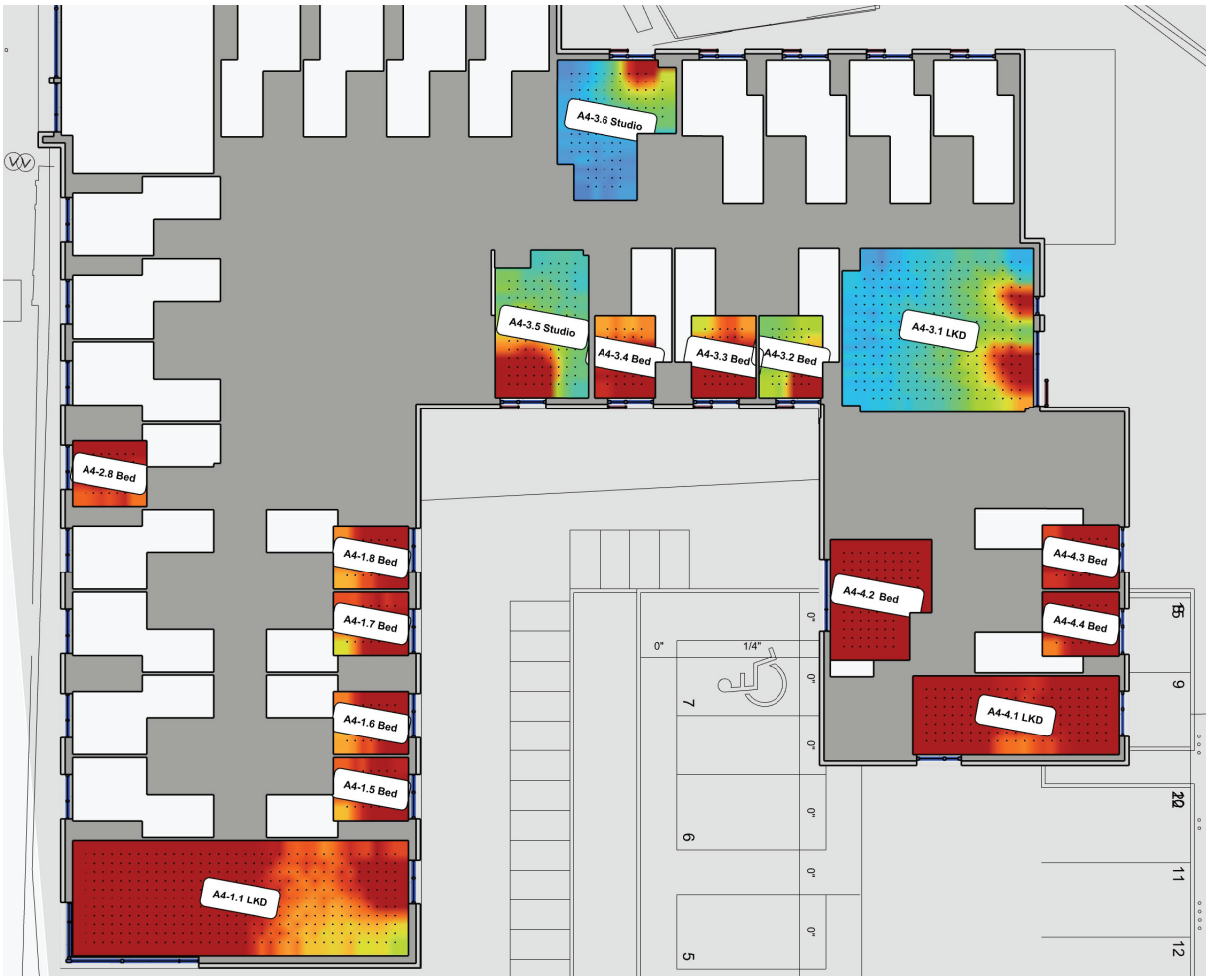


Second Floor

Figure 22: Block A - Daylight Provision and Annual Average Illuminance to all Habitable Rooms



Third Floor



Fourth Floor

Figure 23: Block A - Daylight Provision and Annual Average Illuminance to all Habitable Rooms



Fifth Floor

Figure 24: 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
A1-1.1	LKD	43.6	396	High	78.4%	67.3%	58.7%	High	83.0%	63.2%	50.7%
A1-1.5	Bed	5.3	42	Medium	73.4%	58.5%	43.0%	Medium	83.9%	62.4%	44.8%
A1-1.6	Bed	5.3	42	Medium	69.2%	54.6%	40.3%	Medium	80.2%	55.3%	36.9%
A1-1.7	Bed	5.3	42	Medium	65.7%	52.0%	34.7%	Medium	78.7%	52.3%	32.9%
A1-1.8	Bed	5.3	42	Minimum	62.4%	48.2%	31.8%	Minimum	76.5%	47.5%	26.2%
A1-2.8	Bed	5.5	42	High	77.0%	64.5%	51.2%	High	87.3%	72.3%	57.3%
A1-3.1	LKD	34.4	333	Fail	32.4%	6.9%	2.9%	Minimum	61.6%	9.7%	2.2%
A1-3.2	Bed	5.9	48	Fail	40.7%	24.5%	11.4%	Minimum	63.3%	29.3%	12.1%
A1-3.3	Bed	5.9	48	Minimum	65.3%	50.0%	36.8%	Minimum	76.8%	47.0%	31.6%
A1-3.4	Bed	5.6	40	Minimum	60.2%	43.9%	30.9%	Minimum	74.6%	44.9%	27.6%
A1-3.5	Studio	14.6	127	Fail	35.2%	17.4%	8.5%	Minimum	56.7%	19.5%	6.9%
A1-3.6	Studio	15.1	119	Fail	37.2%	3.3%	0.0%	Minimum	65.0%	3.6%	0.0%
A1-4.1	LKD	18.4	147	High	76.1%	63.5%	52.2%	High	84.9%	66.6%	52.2%
A1-4.2	Bed	12.5	103	Medium	70.4%	58.1%	47.4%	Medium	83.4%	62.1%	48.4%
A1-4.3	Bed	5.5	42	High	81.5%	72.0%	59.7%	High	88.2%	74.9%	60.3%
A1-4.4	Bed	5.5	42	High	80.9%	70.9%	59.0%	High	88.0%	74.0%	59.2%
A2-1.1	LKD	43.6	396	High	79.0%	68.2%	60.0%	High	84.0%	64.8%	52.5%
A2-1.5	Bed	5.3	42	Medium	73.9%	60.0%	45.3%	Medium	85.5%	66.8%	49.8%
A2-1.6	Bed	5.3	42	Medium	74.4%	60.7%	46.3%	Medium	83.4%	61.1%	44.1%
A2-1.7	Bed	5.3	42	Medium	69.5%	55.0%	40.1%	Medium	81.6%	57.7%	38.9%
A2-1.8	Bed	5.3	42	Medium	68.1%	54.1%	39.7%	Medium	80.5%	55.4%	37.2%
A2-2.8	Bed	5.5	42	High	77.1%	65.0%	52.1%	High	87.4%	72.4%	57.4%
A2-3.1	LKD	34.4	333	Fail	38.7%	12.1%	3.2%	Minimum	65.6%	16.7%	2.7%
A2-3.2	Bed	5.9	48	Fail	46.4%	29.4%	14.5%	Minimum	66.6%	34.1%	15.8%
A2-3.3	Bed	5.9	48	Medium	67.0%	52.5%	39.5%	Medium	78.4%	51.3%	35.8%
A2-3.4	Bed	5.6	40	Minimum	63.4%	48.5%	35.9%	Medium	78.2%	51.0%	34.4%
A2-3.5	Studio	14.6	127	Fail	40.3%	23.9%	8.9%	Minimum	60.3%	24.5%	8.1%
A2-3.6	Studio	15.1	119	Fail	27.7%	0.0%	0.0%	Minimum	62.1%	2.3%	0.0%

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
A2-4.1	LKD	18.4	147	High	78.4%	68.2%	57.5%	High	86.9%	72.7%	59.5%
A2-4.2	Bed	12.5	103	High	76.1%	63.9%	54.8%	High	85.9%	67.6%	55.4%
A2-4.3	Bed	5.5	42	High	81.8%	72.8%	61.2%	High	88.3%	75.4%	62.1%
A2-4.4	Bed	5.5	42	High	82.1%	73.5%	62.1%	High	88.4%	75.6%	62.3%
A3-1.1	LKD	43.6	396	High	79.5%	69.1%	60.6%	High	84.7%	66.9%	54.6%
A3-1.5	Bed	5.3	42	Medium	75.0%	61.5%	46.9%	High	86.0%	68.4%	51.1%
A3-1.6	Bed	5.3	42	Medium	76.4%	63.7%	49.1%	Medium	85.3%	66.4%	49.3%
A3-1.7	Bed	5.3	42	Medium	72.6%	58.4%	44.7%	Medium	84.5%	63.8%	46.8%
A3-1.8	Bed	5.3	42	Medium	75.0%	61.4%	47.3%	Medium	84.3%	64.0%	47.7%
A3-2.8	Bed	5.5	42	High	77.8%	66.3%	53.2%	High	87.6%	73.4%	58.7%
A3-3.1	LKD	34.4	333	Fail	41.4%	13.8%	3.3%	Minimum	66.2%	17.2%	2.7%
A3-3.2	Bed	5.9	48	Minimum	50.1%	34.8%	18.1%	Minimum	70.2%	37.8%	20.1%
A3-3.3	Bed	5.9	48	Medium	69.9%	56.4%	43.5%	Medium	80.5%	55.4%	39.0%
A3-3.4	Bed	5.6	40	Medium	67.0%	52.6%	39.8%	Medium	81.4%	58.3%	41.9%
A3-3.5	Studio	14.6	127	Fail	43.7%	27.6%	12.5%	Minimum	64.7%	29.7%	9.6%
A3-3.6	Studio	15.1	119	Fail	39.4%	4.5%	0.0%	Minimum	67.7%	7.9%	0.0%
A3-4.1	LKD	18.4	147	High	78.7%	68.8%	58.1%	High	86.8%	72.6%	59.9%
A3-4.2	Bed	12.5	103	High	80.3%	70.8%	61.3%	High	87.6%	74.4%	62.1%
A3-4.3	Bed	5.5	42	High	82.1%	73.3%	62.3%	High	88.7%	76.3%	63.7%
A3-4.4	Bed	5.5	42	High	82.0%	73.3%	62.1%	High	88.7%	76.2%	63.3%
A4-1.1	LKD	43.6	396	High	79.9%	70.2%	61.1%	High	85.6%	68.6%	56.0%
A4-1.5	Bed	5.3	42	High	76.7%	63.7%	50.0%	High	86.6%	70.7%	54.5%
A4-1.6	Bed	5.3	42	High	78.5%	67.1%	53.5%	High	86.6%	69.9%	54.9%
A4-1.7	Bed	5.3	42	Medium	75.2%	61.9%	47.9%	High	86.3%	69.2%	52.7%
A4-1.8	Bed	5.3	42	High	77.5%	65.4%	52.1%	High	86.4%	69.4%	54.3%
A4-2.8	Bed	5.5	42	High	77.7%	66.0%	53.1%	High	87.7%	73.5%	59.2%
A4-3.1	LKD	34.4	333	Fail	43.1%	16.6%	3.9%	Minimum	66.8%	18.7%	2.9%
A4-3.2	Bed	5.9	48	Minimum	54.3%	40.3%	25.8%	Minimum	74.7%	45.9%	28.6%
A4-3.3	Bed	5.9	48	Medium	73.2%	60.2%	48.4%	Medium	82.6%	61.5%	45.7%
A4-3.4	Bed	5.6	40	Medium	70.1%	57.3%	45.6%	Medium	82.8%	61.8%	45.1%
A4-3.5	Studio	14.6	127	Fail	48.9%	32.5%	18.6%	Minimum	68.7%	34.6%	15.7%
A4-3.6	Studio	15.1	119	Fail	31.8%	0.2%	0.0%	Minimum	63.2%	3.5%	0.0%
A4-4.1	LKD	18.4	147	High	79.2%	69.1%	58.8%	High	87.1%	73.4%	60.6%
A4-4.2	Bed	12.5	103	High	83.1%	76.5%	67.1%	High	89.6%	79.2%	68.7%
A4-4.3	Bed	5.5	42	High	82.3%	73.5%	62.1%	High	89.2%	77.4%	64.6%
A4-4.4	Bed	5.5	42	High	81.8%	72.8%	61.6%	High	89.0%	76.9%	64.4%
A5-1.6	Bed	6.4	48	High	78.8%	67.9%	54.9%	High	87.2%	71.0%	55.8%
A5-1.7	Bed	6.4	48	High	78.9%	67.6%	54.4%	High	86.5%	69.1%	53.2%
A5-1.8	Studio	12.4	91	Fail	48.9%	32.6%	16.8%	Minimum	57.8%	18.3%	3.8%
A5-1.9	Studio	11.7	94	Fail	45.1%	8.5%	0.0%	Minimum	65.9%	5.1%	0.0%
A5-1.10	Studio	5.2	35	Minimum	64.5%	44.4%	16.9%	Medium	81.7%	53.1%	21.6%

Table 11: Daylight Provision individual values for all habitable rooms to EN 17037 Table A.1.

Appendix C - Sunlight Hours to Habitable Rooms Within the Proposed Development

Sunlight Hours Apartments Block A				
Unit ID	Room Use	Habitable room window within 90° south	No. sunlight hours on 21st March	EN17037:2018 Level of exposure to sunlight
A1-1.1	LKD	Yes	9.3	High
A1-2.1	LKD	Yes	6.0	High
A1-3.1	LKD	No	1.8	Minimum
A1-3.5	Studio	Yes	3.0	Medium
A1-3.6	Studio	No	0.0	Below criteria
A1-4.1	LKD	No	5.8	High
A2-1.1	LKD	Yes	9.6	High
A2-2.1	LKD	Yes	6.0	High
A2-3.1	LKD	No	2.5	Minimum
A2-3.5	Studio	Yes	3.3	Medium
A2-3.6	Studio	No	0.0	Below criteria
A2-4.1	LKD	No	6.0	High
A3-1.1	LKD	Yes	9.9	High
A3-2.1	LKD	Yes	6.0	High
A3-3.1	LKD	No	2.8	Minimum
A3-3.5	Studio	Yes	4.3	High
A3-3.6	Studio	No	0.0	Below criteria
A3-4.1	LKD	No	6.6	High
A4-1.1	LKD	Yes	10.3	High
A4-2.1	LKD	Yes	6.0	High
A4-3.1	LKD	No	2.9	Minimum
A4-3.5	Studio	Yes	5.3	High
A4-3.6	Studio	No	0.0	Below criteria
A4-4.1	LKD	No	7.3	High
A5-1.1	LKD	Yes	8.0	High
A5-1.8	Studio	Yes	5.7	High
A5-1.9	Studio	No	0.0	Below criteria
A5-1.10	Studio	No	0.0	Below criteria

Table 12: Sunlight Hours