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Daylight & Sunlight Assessments of a Large-Scale Residential Development (LRD) on lands at Crowpark (1st Division), Kildalkey Road, Trim, Co. Meath.

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1. Introduction

1.1 Executive Summary

The proposed development comprises a Large-Scale Residential Development (LRD) on lands at Crowpark (1st Division), Kildalkey Road, Trim, Co. Meath.

The scheme provides a total of 183 residential units, comprising 127 houses and 56 apartments. The housing mix includes 19 no. detached 4-bedroom houses, 9 no. semi-detached/end-terrace 4-bedroom houses, 4 no. detached 3-bedroom houses, 43 no. semi-detached/end-terrace 3-bedroom houses, and 52 no. mid-terrace 3-bedroom houses, with building heights from 2 to 2 ½ storeys. The apartment element comprises 56 no. units in two blocks of up to four storeys, including 16 no. one-bedroom and 40 no. two-bedroom units.

The development also includes a crèche facility, new vehicular and pedestrian accesses from Kildalkey Road.

The proposal provides for associated infrastructure and site works, including landscaping, public and communal open space, internal streets and footpaths, car and bicycle parking, bin stores, private open space, boundary treatments, plant and waste management areas, utility infrastructure and a foul sewer connection to the existing network adjoining the OPW offices on Jonathan Swift Street, to be delivered beneath the River Boyne and Trim Pitch & Putt.

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 O'Daly 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 was 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 worked on an extensive list of projects 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

1.2.1 Daylight to Neighbouring Properties

Analysis demonstrated in Section 3 shows that there will be a negligible reduction in daylight in neighbouring properties. The proposed development meets the recommendations for daylight in the BRE guidelines BR209:2022.

1.2.2 Sunlight to Neighbouring Properties

Analysis demonstrated in Section 4 shows that there will be a negligible to imperceptible reduction in sunlight in neighbouring dwellings.

Analysis demonstrated in Section 5 shows that there will be a negligible reduction in sunlight in neighbouring amenity spaces.

1.2.3 Conclusion

There will be minimal reduction to available daylight and sunlight at the surrounding properties. The proposed development meets the recommendations for sunlight in the BRE guidelines BR209:2022.

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 BR209:2022. The guidelines clearly state that the targets are recommendations only and flexibility is required when setting and interpreting the targets.

The BRE guidelines BR209:2022 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 BR209:2022, as recommended by the local authority. The BRE guidelines BR209:2022 deals with daylight and sunlight to neighbouring 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 BR209:2022 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.

There are no existing mature trees within the vicinity of any of the proposed units that would influence the daylight levels and the assessment is carried out without any trees.

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

100% of the houses will achieve the minimum target sunlight hours to a habitable room100% 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 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

100% of the houses will achieve the minimum target sunlight hours to a habitable room. This scheme is well designed for sunlight, with 100% 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 proposed public and communal amenity spaces achieve sunlight levels that exceed 2 hours sunlight over 50% of the required amenity space on the 21st March.

The proposed development meets the recommendations for sunlight in the BRE guidelines BR209:2022.

1.4 Supplementary Information - Assessment of Daylight in Accordance with IS EN 17037:2018+A1:2021

To date there is no guidance from governmental bodies on the use or interpretation of IS EN 17037:2018+A1:2021. National policy documents and local authorities guidelines refer to the BRE guidelines BR209 2022, which in turn references BS EN 17037.

BS EN 17037:2018 is the same as IS EN 17037:2018; the difference is in the annex. The UK annex gives room specific values for dwellings. The assessment against IS EN 17037:2018+A1:2021 is included as supplementary information only; the levels 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. Due to this limitation, it is considered the recommendations made in the BRE guidelines BR209:2022 and are more appropriate.

IS EN 17037:2018+A1:2021 sets out values for target illuminance, minimum target illuminance and fractions of reference plane to be achieved. The results of this assessment indicate a high level of daylight provision, with 100% of rooms achieving Minimum Illuminance and 96.7% achieving Target Illuminance. The rooms will be bright and pleasant spaces. Table 1 in Section 1.5 below identifies the rooms which do not achieve target illuminance levels.

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.

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 and no compensatory measures are required.

In the assessment of daylight in accordance with IS EN 17037:2018+A1:2021, shown for supplementary information, the vast majority of habitable rooms achieve daylight provision as set out in IS EN 17037:2018+A1:2021. In the 152 no. habitable rooms assessed for daylight provision, all meet minimum Illuminance. There are 5 no. rooms which fall marginally below the values for Target Illuminance. They are listed in Table 1 below.

These rooms are all bedrooms. In a room predominately used at night time, the need for high levels of daylight is less than that of a living-space. The values highlighted below are between 47.6% - 49.8%, these are marginally below the target value of 50%.

IS EN 17037:2018+A1:2021 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
A135.2	Bed	9.9	72	Fail	49.5%	23.7%	9.7%	Minimum	70.8%	27.1%	8.0%
A155.2	Bed	11.2	88	Fail	49.8%	31.6%	15.1%	Minimum	72.0%	39.4%	16.9%
A156.2	Bed	11.2	88	Fail	47.6%	29.4%	12.3%	Minimum	68.6%	34.7%	11.4%
A159.2	Bed	9.9	72	Fail	49.2%	22.7%	7.7%	Minimum	72.2%	30.7%	7.7%
B182.2	Bed	11.2	88	Fail	48.3%	31.3%	13.4%	Minimum	71.1%	36.6%	14.0%

Table 1: Daylight provision individual values for all habitable rooms to IS EN 17037:2018+A1:2021

The proposed development is low rise and spacious. There are high levels of sunlight to amenity spaces. Across all metrics, the proposed development meets the recommendation of the BRE guidelines BR209:2022.

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 (third 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+A1:2021 Daylight in Buildings.

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

In its opening summary, the BRE guidelines BR209:2022 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 BR209:2022 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 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. This is broadly in line with the previous version of the BRE guidelines (2011). The metrics for assessing impact to neighbouring buildings for Daylight is the Vertical Sky Component (VSC) and Sunlight is the Annual Probable Sunlight Hours (APSH). Sunlight to neighbouring 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 BR209:2022 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 BR209:2022 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 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 annex states that the daylight target levels in 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 BR209:2022 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 BR209:2022 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 BR209:2022 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 BR209:2022 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; the ratio is usually expressed as a percentage. The maximum value is just under 40% for a completely unobstructed vertical wall. The VSC of a window is a good measure of the amount of daylight entering it.

The BRE guidelines BR209:2022 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 BR209:2022 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 BR209:2022.

2.5 Sunlight to Existing Buildings

The BRE guidelines BR209:2022 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 2 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 2: Average monthly sunlight hours recorded at Dublin Airport - Data set 1991-2020

The BRE guidelines BR209:2022 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% WPSH. 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 BR209:2022 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."

2.7 BRE guidelines BR209:2022 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 BR209:2022 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 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.

2.8 BRE guidelines BR209:2022 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:

Imperceptible:	There is no reduction in the VSC levels or where the levels are 95% of the existing value.
Negligible:	A reduction in the VSC level but it retains a VSC >27% or <27% but >80% of the existing value.
Minor reduction:	VSC below 27% but greater than 20%, or ratio greater than 65% of the existing value.
Moderate reduction:	VSC below 20% but greater than 10%, or ratio greater that 50% of the existing value.
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 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 3 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 3: Surface reflectance parameters and input values for model calculations

2.10 Daylight in the Proposed Development.

The BRE guidelines BR209:2022 Appendix C sets out interior daylight recommendations, it states; “BS EN 17037 supersedes BS8206 Part 2 ‘Code of practice for daylighting’.

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 BR209:2022 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 BR209:2022 (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 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 4: EN 17037:2018 (both IS & BS) Target Illuminance over at least half the daylight hours

Target Daylight Factor 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 5: EN 17037:2018 (both IS & BS) Target Daylight Factor (D) for Dublin

Target Minimum Daylight Factor 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 6: BS EN 17037:2018+A1:2021 Target Illuminance levels and Daylight Factor for Dublin

2.11 Sunlight within Proposed Developments

The BRE guidelines BR209:2022 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."*

The BRE guidelines BR209:2022 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 BR209:2022 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. Daylight in Neighbouring Buildings

3.1 Site Overview

The development land is a green field site currently in use for agriculture with no existing structures on site. There site extends from Kildalkey Road to the north falling to the south with the Boyne Rive at the southern boundary. There are one and two storey detached houses to the north across the Kildalkey Road. To the east are houses on Kildalkey Road to the northern end of the site and houses at Elder Grove a housing estate to the southern end. To the west are fields in agricultural use. To the south is the Boyne river with land in amenity and agricultural use on the southern side of the river.

Figure 1: Indicative view of the site, taken from Google Maps. Please refer to architectural drawings for statutory boundaries.

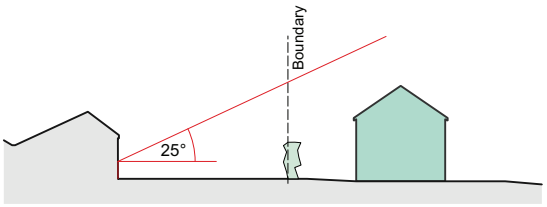
3.2 Preliminary Assessment of Neighbouring Buildings

The BRE guidelines BR209:2022 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. This area referred to as the zone of influence is plotted in Figure 2 in yellow.

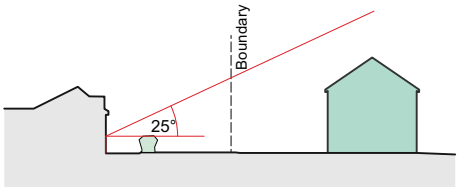
Planes perpendicular to the walls with windows in the relevant neighbouring properties are indicated in blue in Figure 2. The planes at locations A - I extend and if they intersect the proposed development, they are plotted for sectional analysis in Figure 3 below.

The BRE guidelines gives guidance on sectional analysis, stating 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 2: Proposed site plan showing the zone of influence from the proposed building and direction of the window wall of neighbouring residential properties.

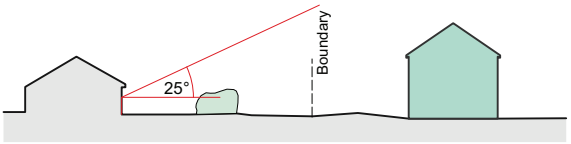


Section through window wall at location A

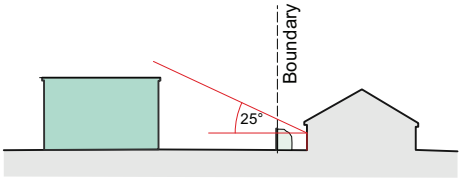


Section through window wall at location B

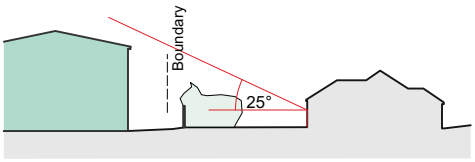
Section through window wall at location C



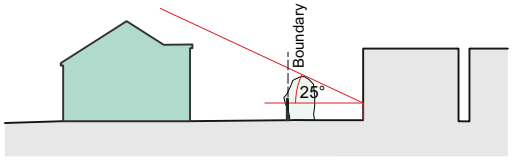
Section through window wall at location D



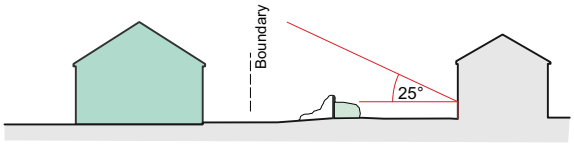
Section through window wall at location E



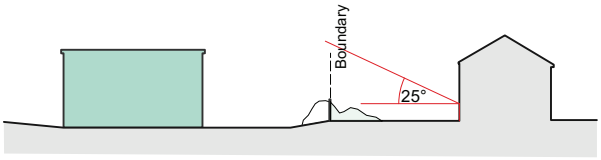
Section through window wall at location F



Section through window wall at location G



Section through window wall at location H



Section through window wall at location I

Figure 3: Sections perpendicular to window wall at locations indicated in Figure 2.

Locations A-D: The zone of influence three times the height of the proposed development does not extend to the window wall of the neighbouring properties and the proposed development does not subtend the 25° line indicating there will be minimal reduction in available daylight or sunlight to the neighbouring buildings and a detailed assessment is not required.

Locations E-G: The zone of influence three times the height of the proposed development extends to the window wall of the neighbouring property. The proposed development does not subtend the 25° line indicating there will be minimal reduction in available daylight or sunlight to the neighbouring buildings and a detailed assessment is not required.

Location: H-I: The zone of influence three times the height of the proposed development does not extend to the window wall of the neighbouring properties and the proposed development does not subtend the 25° line indicating there will be minimal reduction in available daylight or sunlight to the neighbouring buildings and a detailed assessment is not required.

3.3 Conclusion

The proposed development does not subtend the 25° line perpendicular to any of the neighbouring window walls indicating any loss of daylight or sunlight will be minimal and a detailed assessment of the VSC and APSH is not required. The proposed development meets the recommendations of the BRE guidelines, BR209:2022.

4. Sunlight to Amenity in Neighbouring Properties

The BRE guidelines BR209:2022 indicates that for an amenity area to have good quality sunlight throughout the year, 50% of the space 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 will not perceive any reduction in sunlight. The amenity space is assessed for the amount of direct sunlight received by the space in 5 minute intervals between 8am and 6pm on the 21st March over an analysis grid with a 300mm grid size and the average is calculated.

4.1 Amenity Space to Neighbouring Properties

The neighbouring amenity spaces were assessed for a potential impact on their sun on the ground. Existing and proposed generated analysis are shown in Figure 4, the results are shown in Table 7 below.

Figure 4: Existing & Proposed radiation map of amenity areas, showing available sunlight on 21st March. The scale represents the sunlight received from 0 - 8 hours.

Sunlight on the Ground - Neighbouring Properties					
No.		% Area receiving 2 hours sunlight on 21st March		Ratio	Meets criteria of >50% area Or if <50% then target >80% existing value
	Location	Existing	Proposed	Proposed: Existing	
L1	Crowpark	98.1%	98.1%	100.0%	Y
L2	7 Elder Grove	92.1%	92.1%	100.0%	Y
L3	6 Elder Grove	100.0%	100.0%	100.0%	Y
L4	Benergy Clinic	95.5%	95.5%	100.0%	Y
L5	51 Elder Grove	90.8%	90.8%	100.0%	Y
L6	50 Elder Grove	89.0%	89.0%	100.0%	Y
L7	49 Elder Grove	87.20%	87.20%	100.0%	Y
L8	48 Elder Grove	87.00%	87.00%	100.0%	Y
L9	47 Elder Grove	87.20%	87.20%	100.0%	Y
L10	46 Elder Grove	87.70%	87.70%	100.0%	Y
L11	45 Elder Grove	64.20%	64.20%	100.0%	Y

Table 7: Calculation of Sun on the Ground to Neighbouring Amenity Areas

4.2 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 for sunlight in the BRE guidelines BR209:2022.

5. Daylight within the Proposed Development

Ministerial guidance on daylight is provided in Sustainable Residential Development and Compact Settlements: Guidelines for Planning Authorities (2024) Section 5.3.7(a).

The provision of acceptable levels of daylight in new residential developments is an important planning consideration, in the interests of ensuring a high quality living environment for future residents....

> *(a) The potential for poor daylight performance in a proposed development ... will generally arise in cases where the buildings are close together, where higher buildings are involved, or where there are other obstructions to daylight. Planning authorities do not need to undertake a detailed technical assessment in relation to daylight performance in all cases. It should be clear from the assessment of architectural drawings (including sections) in the case of low-rise housing with good separation from existing and proposed buildings that undue impact would not arise, and planning authorities may apply a level of discretion in this regard.*

The proposed low rise housing do not require assessment for daylight provision. All habitable rooms within the apartments 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 8 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 9 below and a complete set of room results are shown in Appendix B.

5.1 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					
	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	56	200	56	100.0%
	Bedrooms	96	100	96	100.0%
Total		152		152	100.0%

Table 8: Summary of room for Target Illuminance compliance with BS EN 17037:2018+A1:2021. Individual room results can be viewed in Appendix A.

5.2 Conclusion

BR209:2022 recommends assessment methods set out in BS EN 17037 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.

5.3 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+A1:2021						
		Below Target	Minimum	Medium	High	Percentage of rooms achieving Target
Apartments	Target Illuminance	3.3%	55.9%	19.7%	21.1%	96.7%
	Minimum Illuminance	0.0%	48.7%	29.6%	21.7%	100.0%

Table 9: Percentage of rooms at each level to IS EN 17037:2018+A1:2021. 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 96.7% 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 6.2.

6. Sunlight within the Proposed Development

6.1 Sunlight Hours

The BRE guidelines BR209:2022 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 5: Extract from BR209:2022 Section 3 Sun-lighting: Diagram indicating sample floor plan to maximise units with a main living space facing south.

All the houses have a window wall within 90° due south and will achieve the minimum target sunlight hours to a room. The apartments are assessed for sunlight, in accordance with EN 17037 (both IS & BS). In the test, preference is given to living spaces, and to southerly facing rooms. However the recommendations of the BRE guidelines are met if minimum sunlight hours are achieved in any habitable room within a dwelling.

Detailed results are presented in Appendix C. It indicates if the relevant habitable room has a south facing window, together with the number of hours it receives sunlight, on the 21st March. A summary of these results are displayed in the table below.

Sunlight Hours Summary Table									
Apartments Units	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						
Apartments	56	48	85.7%	0	12	6	38	56	100.0%

Table 10: Summary of Results of Assessment of Sunlight Hours

6.2 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. 48no. of the 56no. units (85.7%) have window to a habitable room which faces within 90° south. 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 the 56 no. apartment units all (100%) have a habitable room which achieves the minimum recommended 1.5 direct sunlight hours.

6.3 Conclusion

This scheme is well designed for sunlight, with 100% of units meeting the minimum recommended 1.5 direct sunlight hours. This exceeds the BRE guideline example for an apartment layout where 4 in 5 (i.e. 80%) achieves the target sunlight hours

7. Sunlight to Amenity within the Proposed Development

The BRE guidelines BR209:2022 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.

7.1 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 6 and the results are set out in Table 11 below.

Figure 6: 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	Public Open Space	100.0%	Y
S2	Public Open Space	100.0%	Y
S3	Public Open Space	100.0%	Y
S4	Communal Open Space	100.0%	Y
S5	Communal Open Space	100.0%	Y
S6	Creche	92.7%	Y

Table 11: Calculation of Sun on the Ground to Amenity Areas within the Proposed Development

7.2 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.

8. Shadow Study

8.1 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

Section 8.2 shows the existing 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 8.3 shows the existing 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 8.4 shows the existing 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.

The site is a greenfield site, there is no shadow cast from any structures in the existing condition. 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.

8.2 Shadow Casting diagrams March Equinox

Existing

N

Proposed

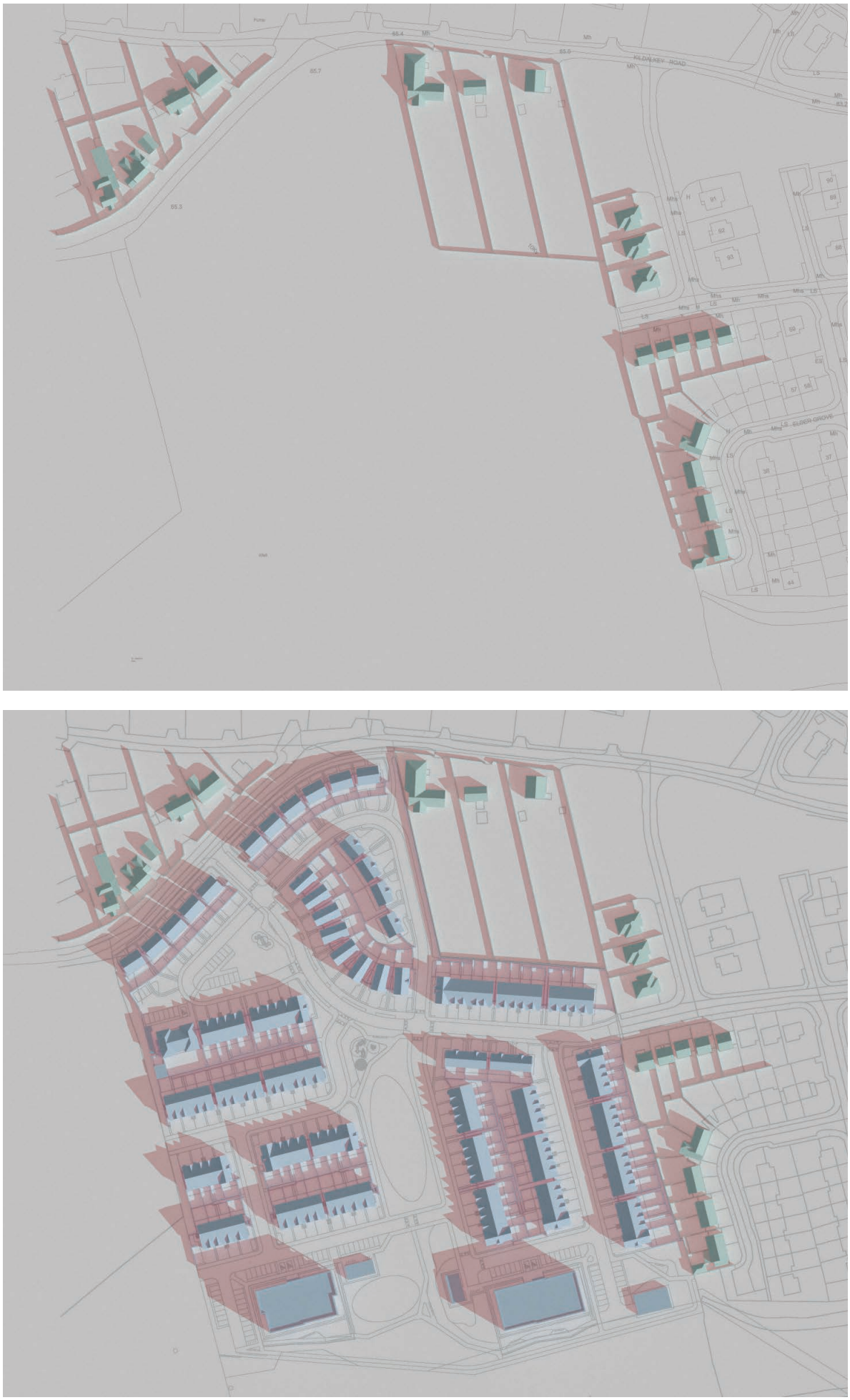


Figure 7: Shadow diagrams 21 March 09:00 UTC

Existing

N

Proposed

Figure 8: Shadow diagrams 21 March 11:00 UTC

Existing

N

Proposed

Figure 9: Shadow diagrams 21 March 13:00 UTC

Existing

N

Proposed

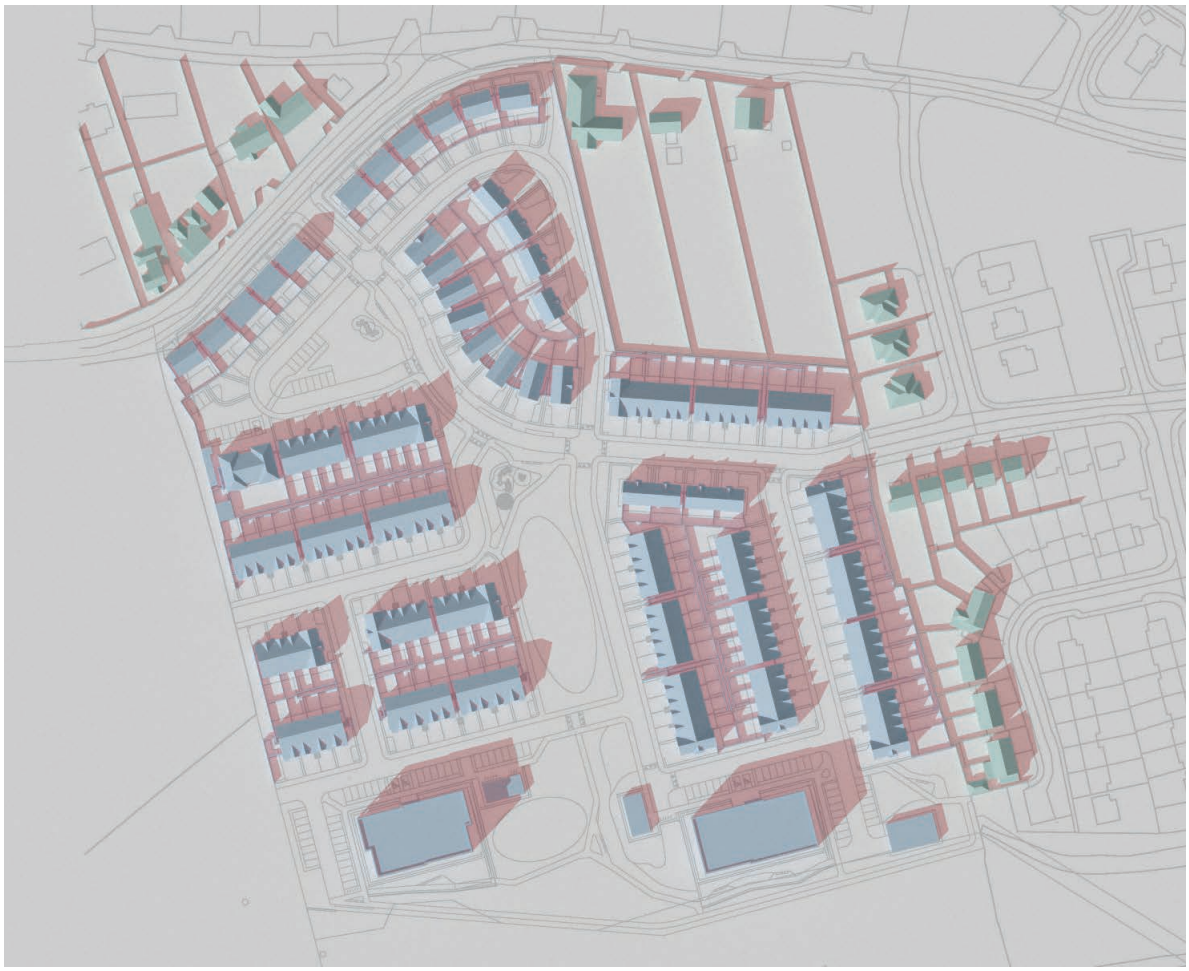


Figure 10: Shadow diagrams 21 March 15:00 UTC

Existing

N

Proposed

Figure 11: Shadow diagrams 21 March 17:00 UTC

8.3 Shadow Casting diagrams June Solstice

Existing

N

Proposed

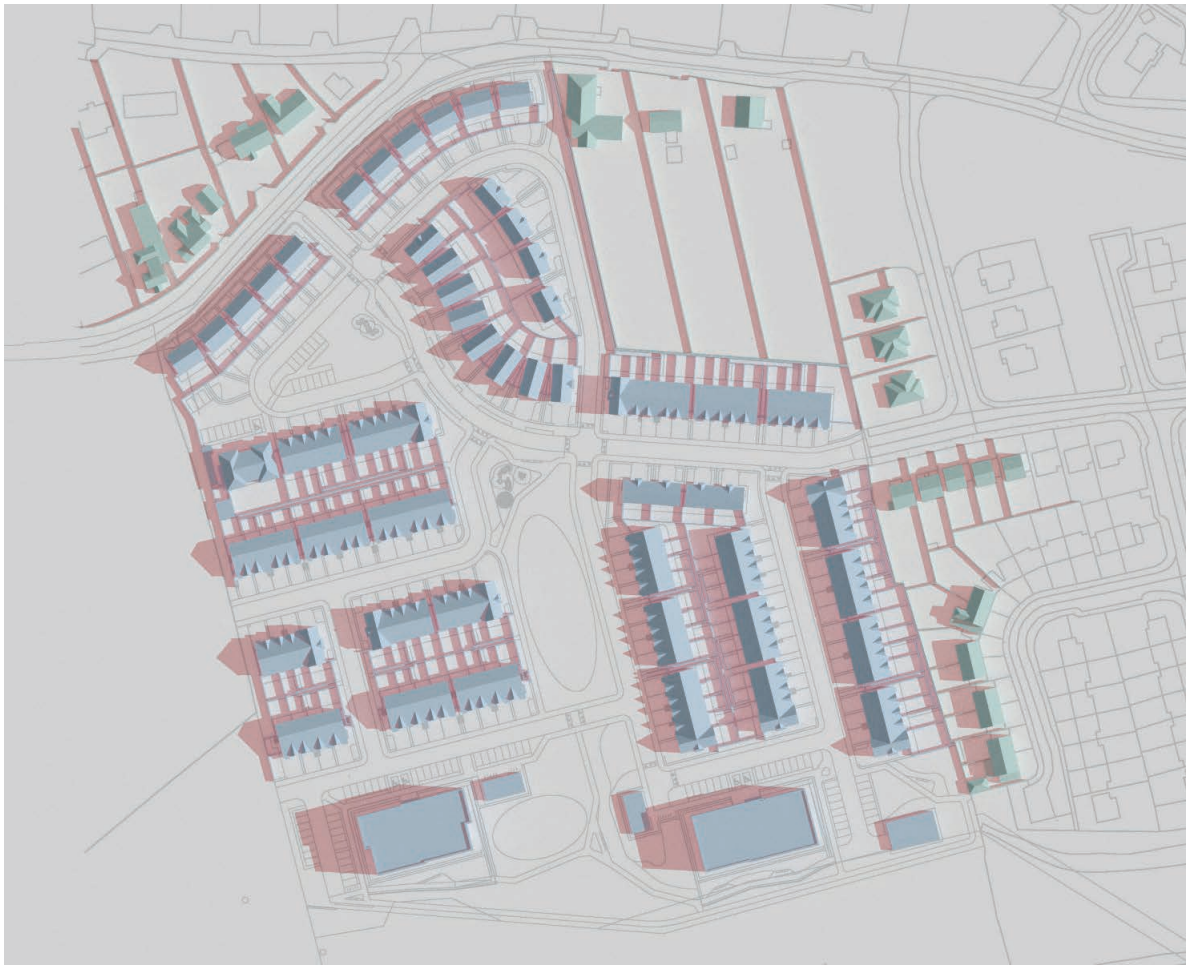


Figure 12: Shadow diagrams 21 June 09.00 UTC +1

Existing

N

Proposed

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

Existing

N

Proposed

Figure 14: Shadow diagrams 21 June 13:00 UTC +1

Existing

N

Proposed

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

Existing

N

Proposed

Figure 16: Shadow diagrams 21 June 17:00 UTC +1

Existing

N

Proposed

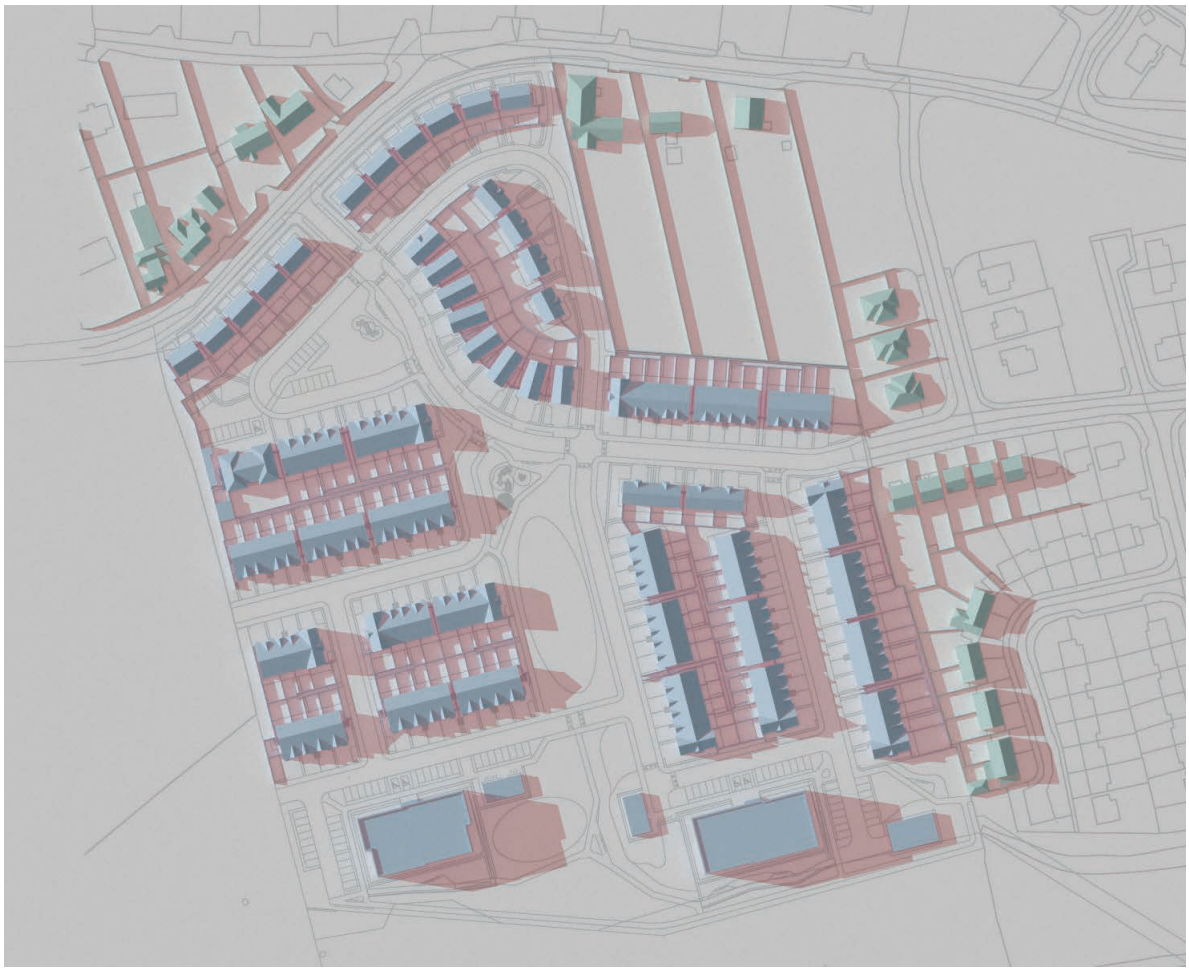


Figure 17: Shadow diagrams 21 June 19:00 UTC +1

8.4 Shadow Casting diagrams December Solstice

Existing

N

Proposed

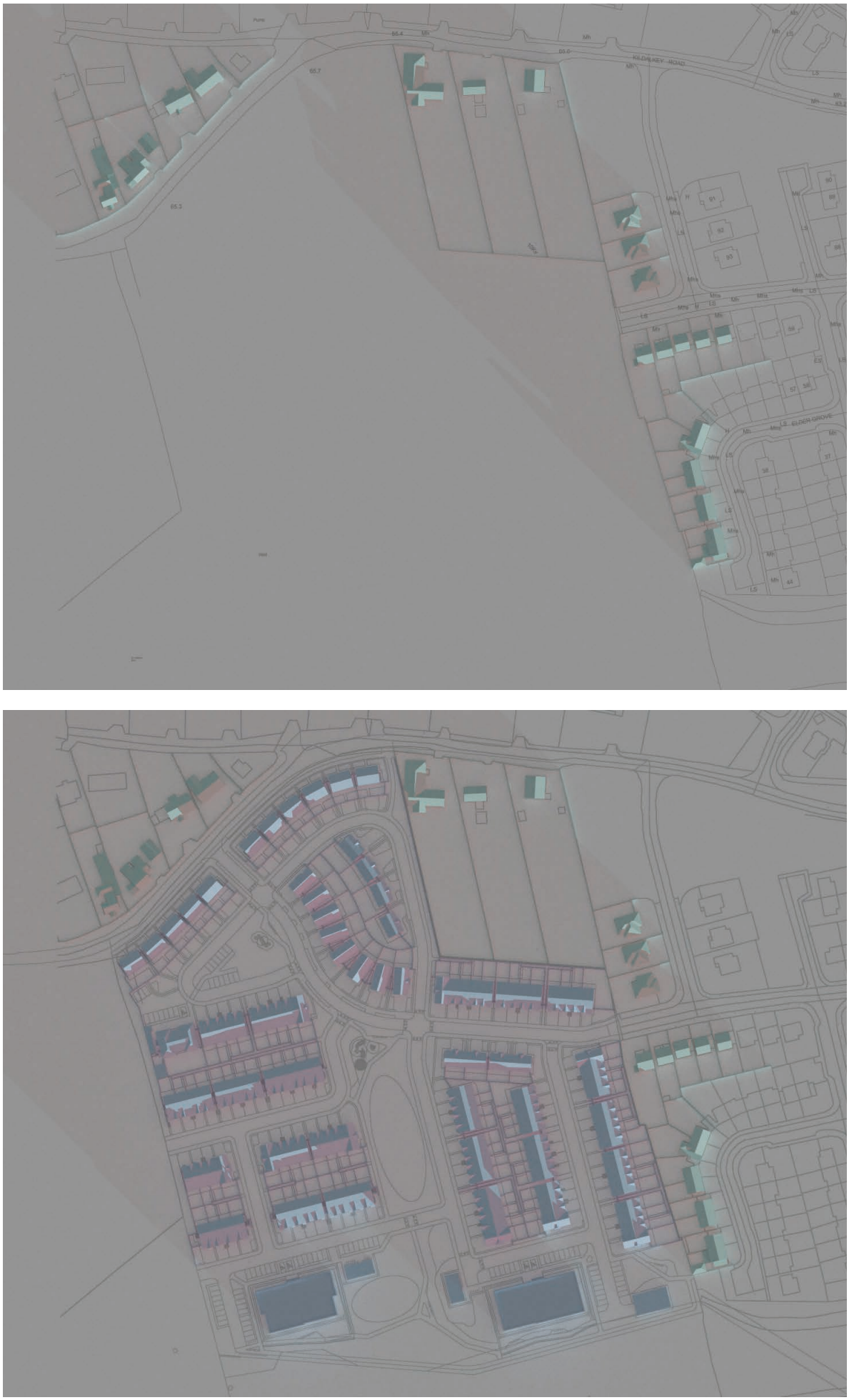


Figure 18: Shadow diagrams 21 December 09:00 UTC

Existing

N

Proposed

Figure 19: Shadow diagrams 21 December 11:00 UTC

Existing

N

Proposed

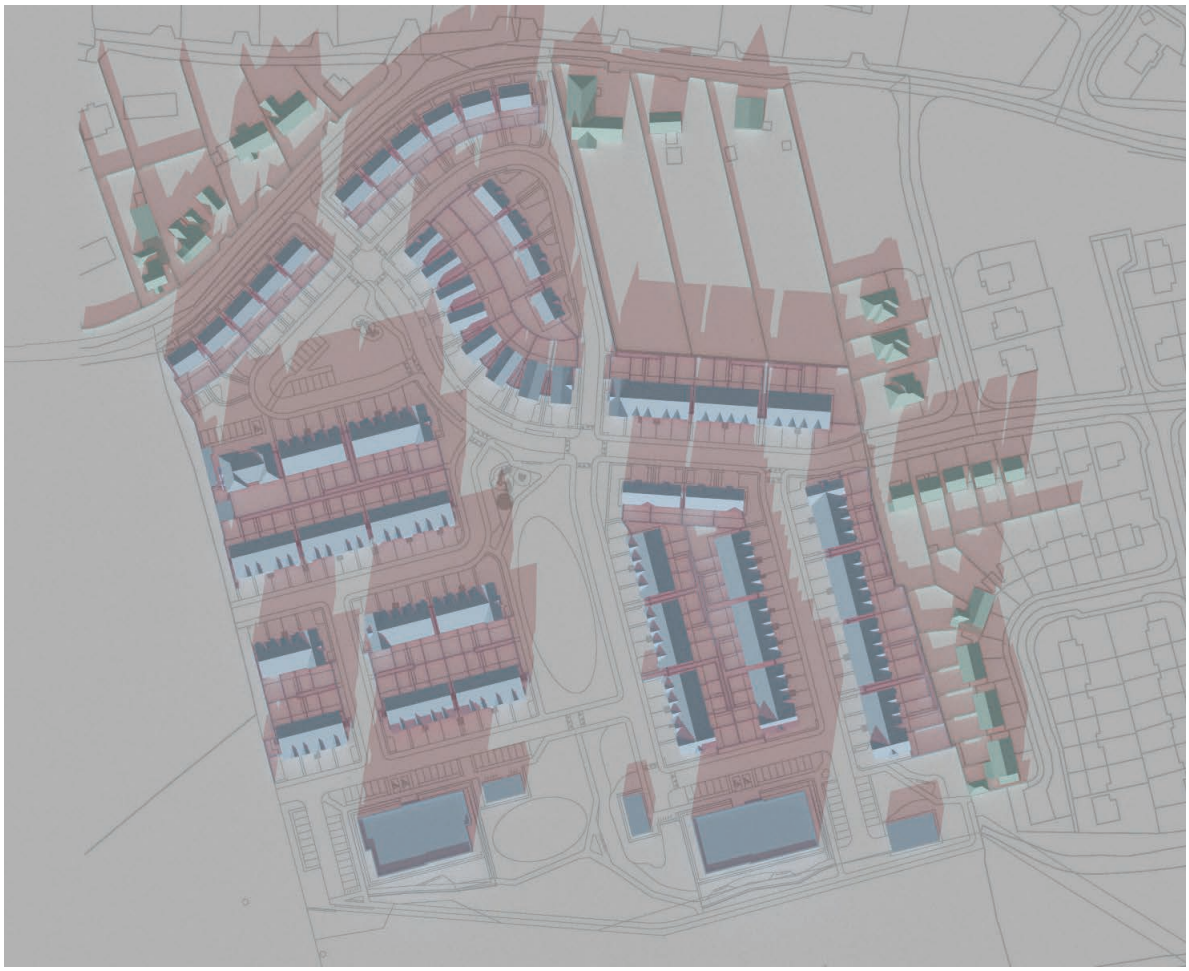
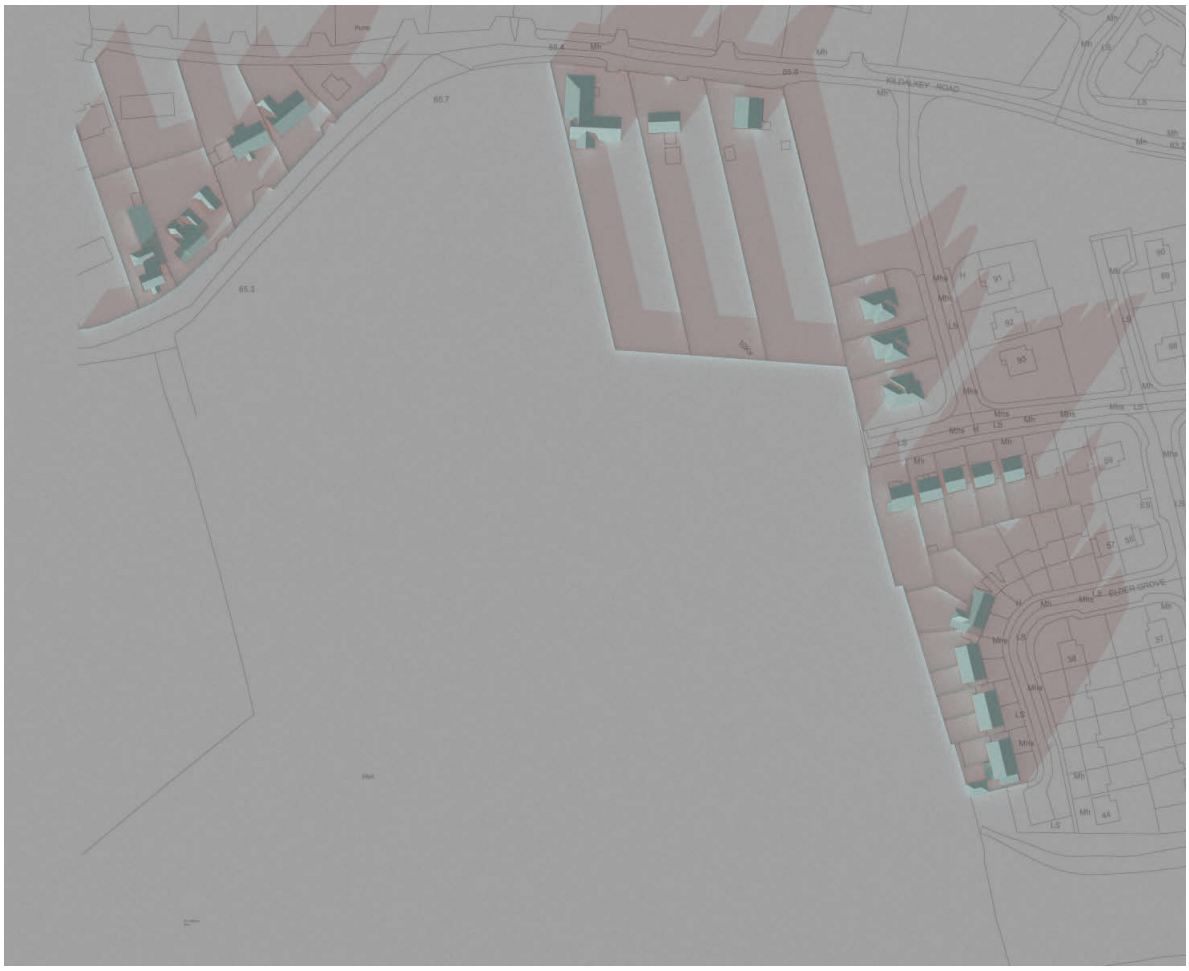


Figure 20: Shadow diagrams 21 December 13:00 UTC

Existing



N

Proposed

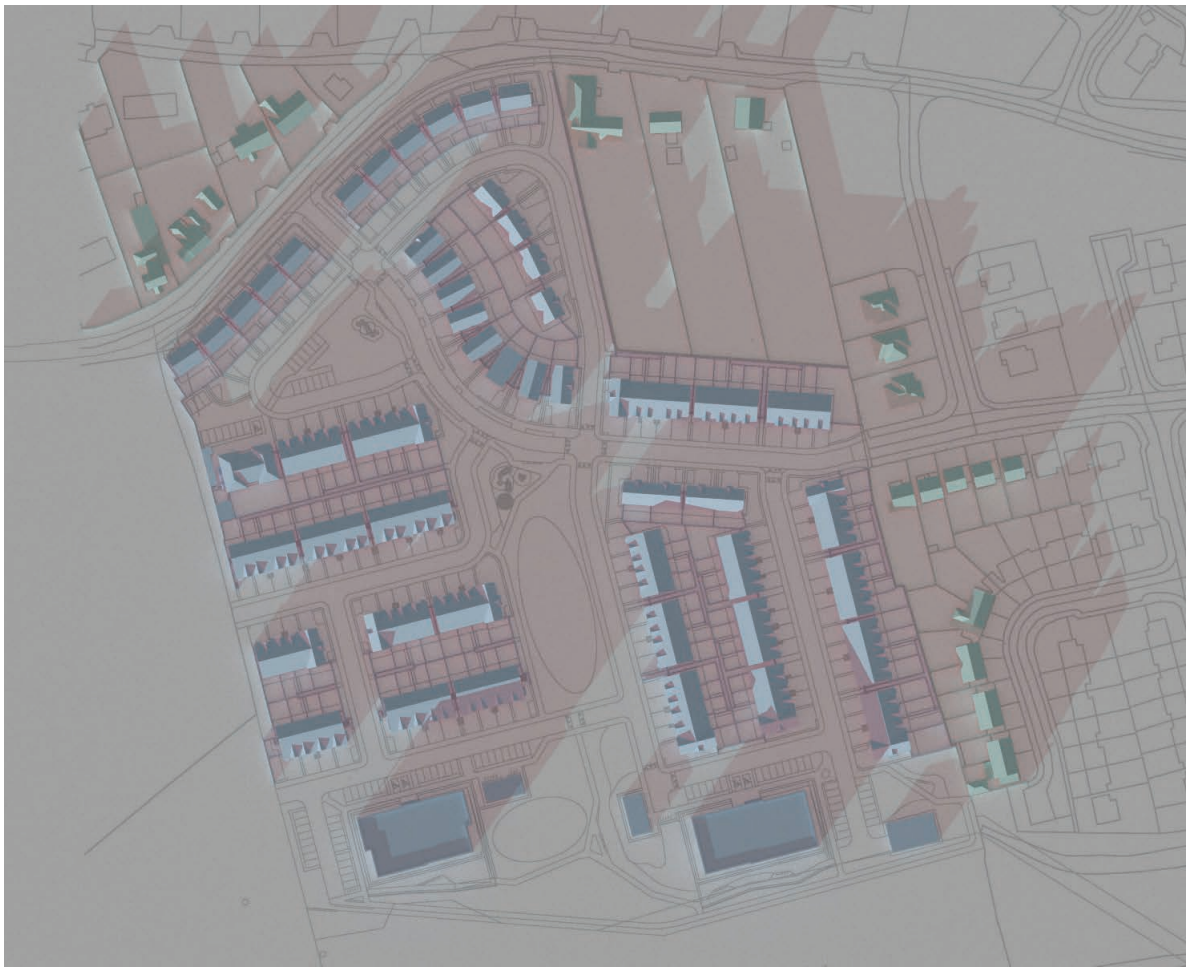


Figure 21: Shadow diagrams 21 December 15:00 UTC

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

Apartment Block A

Ground Floor

First Floor

Figure 22: Block A - Floor plans indicating Daylight Provision to BS EN17037:2021+A1 Table NA.1

Apartment Block A

Second Floor

Third Floor

Figure 23: 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
A129.1	LKD	29.3	280	200	1122	100.0%	Y
A129.2	Bed	9.5	72	100	609	100.0%	Y
A129.3	Bed	12.0	104	100	472	100.0%	Y
A130.1	LKD	26.8	241	200	968	94.6%	Y
A130.2	Bed	9.9	72	100	596	100.0%	Y
A131.1	LKD	30.0	275	200	1923	100.0%	Y
A131.2	Bed	11.2	88	100	742	100.0%	Y
A131.3	Bed	11.2	88	100	768	100.0%	Y
A132.1	LKD	28.2	261	200	1090	95.8%	Y
A132.2	Bed	11.2	88	100	659	100.0%	Y
A133.1	LKD	26.8	241	200	1143	99.6%	Y
A133.2	Bed	9.9	72	100	714	100.0%	Y
A134.1	LKD	28.6	264	200	1781	100.0%	Y
A134.2	Bed	9.6	80	100	841	100.0%	Y
A134.3	Bed	10.9	90	100	755	100.0%	Y
A135.1	LKD	26.8	241	200	762	88.0%	Y
A135.2	Bed	9.9	72	100	469	100.0%	Y
A136.1	LKD	31.3	288	200	976	100.0%	Y
A136.2	Bed	10.3	81	100	538	100.0%	Y
A136.3	Bed	14.4	126	100	417	100.0%	Y
A137.1	LKD	29.3	280	200	1198	100.0%	Y
A137.2	Bed	9.5	72	100	665	100.0%	Y
A137.3	Bed	12.0	104	100	523	100.0%	Y
A138.1	LKD	26.8	241	200	989	96.3%	Y
A138.2	Bed	9.9	72	100	603	100.0%	Y
A139.1	LKD	30.0	275	200	1952	100.0%	Y
A139.2	Bed	11.2	88	100	751	100.0%	Y
A139.3	Bed	11.2	88	100	778	100.0%	Y
A140.1	LKD	28.2	261	200	1104	98.5%	Y
A140.2	Bed	11.2	88	100	669	100.0%	Y
A141.1	LKD	26.8	241	200	1155	99.6%	Y
A141.2	Bed	9.9	72	100	729	100.0%	Y
A142.1	LKD	28.6	264	200	1825	100.0%	Y
A142.2	Bed	9.6	80	100	847	100.0%	Y
A142.3	Bed	10.9	90	100	765	100.0%	Y
A143.1	LKD	26.8	241	200	795	92.5%	Y
A143.2	Bed	9.9	72	100	490	100.0%	Y
A144.1	LKD	31.3	288	200	1059	100.0%	Y
A144.2	Bed	10.3	81	100	593	100.0%	Y
A144.3	Bed	14.4	126	100	478	100.0%	Y
A145.1	LKD	29.3	280	200	1235	100.0%	Y
A145.2	Bed	9.5	72	100	708	100.0%	Y
A145.3	Bed	12.0	104	100	556	100.0%	Y
A146.1	LKD	26.8	241	200	1000	97.5%	Y
A146.2	Bed	9.9	72	100	605	100.0%	Y
A147.1	LKD	30.0	275	200	1968	100.0%	Y
A147.2	Bed	11.2	88	100	741	100.0%	Y
A147.3	Bed	11.2	88	100	769	100.0%	Y
A148.1	LKD	28.2	261	200	1111	97.3%	Y
A148.2	Bed	11.2	88	100	668	100.0%	Y
A149.1	LKD	26.8	241	200	1159	98.8%	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
A149.2	Bed	9.9	72	100	730	100.0%	Y
A150.1	LKD	28.6	264	200	1829	100.0%	Y
A150.2	Bed	9.6	80	100	846	100.0%	Y
A150.3	Bed	10.9	90	100	762	100.0%	Y
A151.1	LKD	26.8	241	200	808	93.4%	Y
A151.2	Bed	9.9	72	100	493	100.0%	Y
A152.1	LKD	31.3	288	200	1121	100.0%	Y
A152.2	Bed	10.3	81	100	646	100.0%	Y
A152.3	Bed	14.4	126	100	514	100.0%	Y
A153.1	LKD	29.3	280	200	1185	100.0%	Y
A153.2	Bed	9.5	72	100	737	100.0%	Y
A153.3	Bed	12.0	104	100	581	100.0%	Y
A154.1	LKD	26.8	241	200	984	97.5%	Y
A154.2	Bed	9.9	72	100	495	100.0%	Y
A155.1	LKD	30.0	275	200	1969	100.0%	Y
A155.2	Bed	11.2	88	100	609	100.0%	Y
A155.3	Bed	11.2	88	100	632	100.0%	Y
A156.1	LKD	28.2	261	200	1113	98.1%	Y
A156.2	Bed	11.2	88	100	546	100.0%	Y
A157.1	LKD	26.8	241	200	1160	100.0%	Y
A157.2	Bed	9.9	72	100	603	100.0%	Y
A158.1	LKD	28.6	264	200	1845	100.0%	Y
A158.2	Bed	9.6	80	100	708	100.0%	Y
A158.3	Bed	10.9	90	100	634	100.0%	Y
A159.1	LKD	26.8	241	200	796	92.9%	Y
A159.2	Bed	9.9	72	100	424	100.0%	Y
A160.1	LKD	31.3	288	200	1102	100.0%	Y
A160.2	Bed	10.3	81	100	678	100.0%	Y
A160.3	Bed	14.4	126	100	539	100.0%	Y

Table 12: Minimum Daylight Provision Compliance for Habitable Rooms to BS EN17037:2018+A1:2021

Apartment Block B

Ground Floor

First Floor

Figure 24: Block B - Floor plans indicating Daylight Provision to BS EN17037:2021+A1 Table NA.1

Apartment Block B

Second Floor

Third Floor

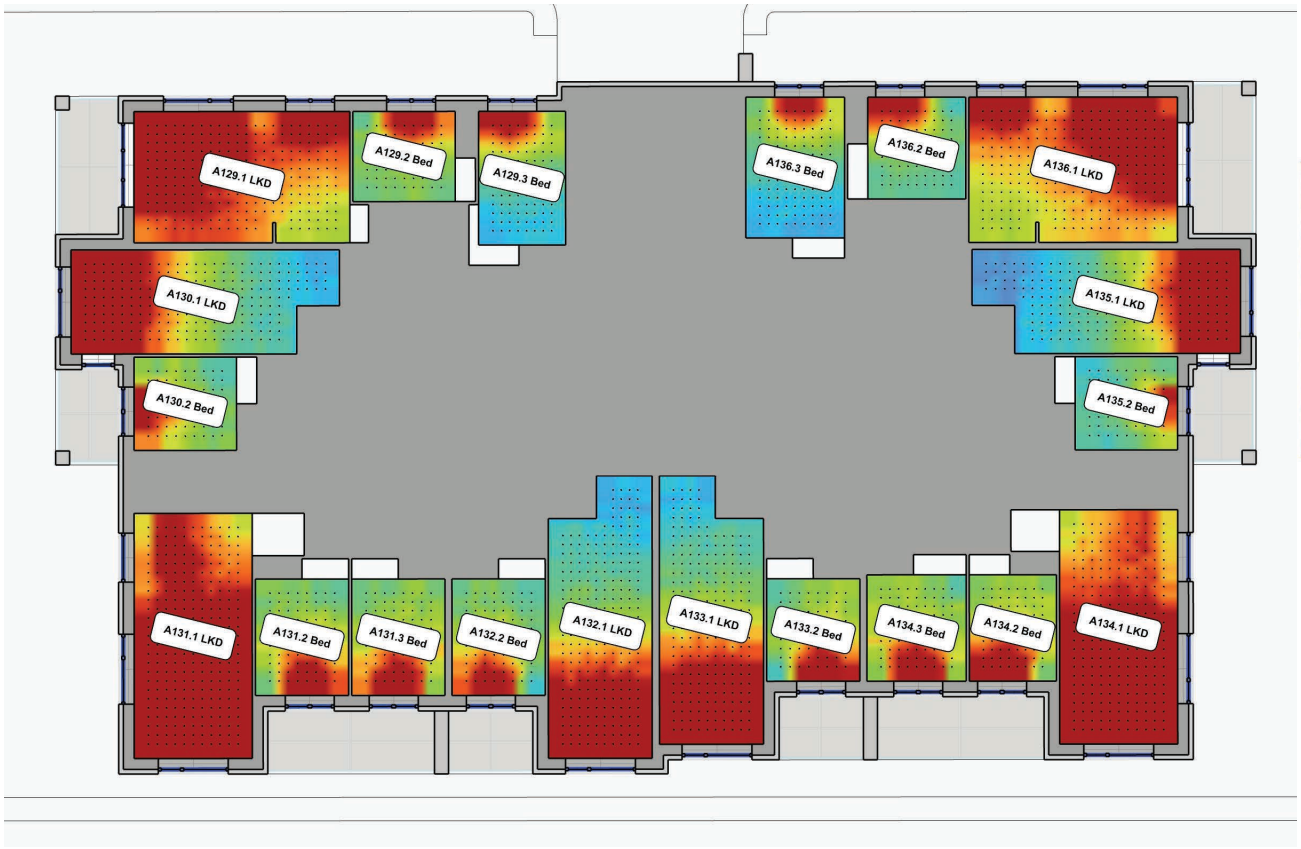
Figure 25: Block B - Floor plans indicating Daylight Provision to BS EN17037:2021+A1 Table NA.1

Block B - 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
B161.1	LKD	41.5	384	200	1172	100.0%	Y
B161.2	Bed	10.9	90	100	552	100.0%	Y
B161.3	Bed	13.3	110	100	470	100.0%	Y
B162.1	LKD	47.0	442	200	1738	100.0%	Y
B162.2	Bed	9.2	72	100	1292	100.0%	Y
B162.3	Bed	12.0	100	100	974	100.0%	Y
B163.1	LKD	30.8	275	200	1152	100.0%	Y
B163.2	Bed	9.9	72	100	739	100.0%	Y
B163.3	Bed	9.9	72	100	1110	100.0%	Y
B164.1	LKD	30.8	275	200	1122	100.0%	Y
B164.2	Bed	11.2	88	100	660	100.0%	Y
B164.3	Bed	11.2	88	100	1045	100.0%	Y
B165.1	LKD	49.5	476	200	1520	100.0%	Y
B165.2	Bed	13.4	120	100	886	100.0%	Y
B165.3	Bed	9.2	72	100	1005	100.0%	Y
B166.1	LKD	39.3	354	200	1047	100.0%	Y
B166.2	Bed	9.4	80	100	609	100.0%	Y
B166.3	Bed	11.7	100	100	505	100.0%	Y
B167.1	LKD	41.5	384	200	1234	100.0%	Y
B167.2	Bed	10.9	90	100	599	100.0%	Y
B167.3	Bed	13.3	110	100	528	100.0%	Y
B168.1	LKD	47.0	442	200	1775	100.0%	Y
B168.2	Bed	9.2	72	100	1317	100.0%	Y
B168.3	Bed	12.0	100	100	995	100.0%	Y
B169.1	LKD	30.8	275	200	1170	100.0%	Y
B169.2	Bed	9.9	72	100	754	100.0%	Y
B169.3	Bed	9.9	72	100	1120	100.0%	Y
B170.1	LKD	30.8	275	200	1141	100.0%	Y
B170.2	Bed	11.2	88	100	677	100.0%	Y
B170.3	Bed	11.2	88	100	1066	100.0%	Y
B171.1	LKD	49.5	476	200	1555	100.0%	Y
B171.2	Bed	9.2	72	100	1028	100.0%	Y
B171.3	Bed	13.4	120	100	896	100.0%	Y
B172.1	LKD	39.3	354	200	1123	100.0%	Y
B172.2	Bed	9.4	80	100	670	100.0%	Y
B172.3	Bed	11.7	100	100	572	100.0%	Y
B173.1	LKD	41.5	384	200	1266	100.0%	Y
B173.2	Bed	10.9	90	100	638	100.0%	Y
B173.3	Bed	13.3	110	100	560	100.0%	Y
B174.1	LKD	47.0	442	200	1774	100.0%	Y
B174.2	Bed	9.2	72	100	1334	100.0%	Y
B174.3	Bed	12.0	100	100	991	100.0%	Y
B175.1	LKD	30.8	275	200	1169	100.0%	Y
B175.2	Bed	9.9	72	100	744	100.0%	Y
B175.3	Bed	9.9	72	100	1111	100.0%	Y
B176.1	LKD	30.8	275	200	1145	100.0%	Y
B176.2	Bed	11.2	88	100	676	100.0%	Y
B176.3	Bed	11.2	88	100	1065	100.0%	Y
B177.1	LKD	49.5	476	200	1566	100.0%	Y
B177.2	Bed	9.2	72	100	1055	100.0%	Y
B177.3	Bed	13.4	120	100	908	100.0%	Y

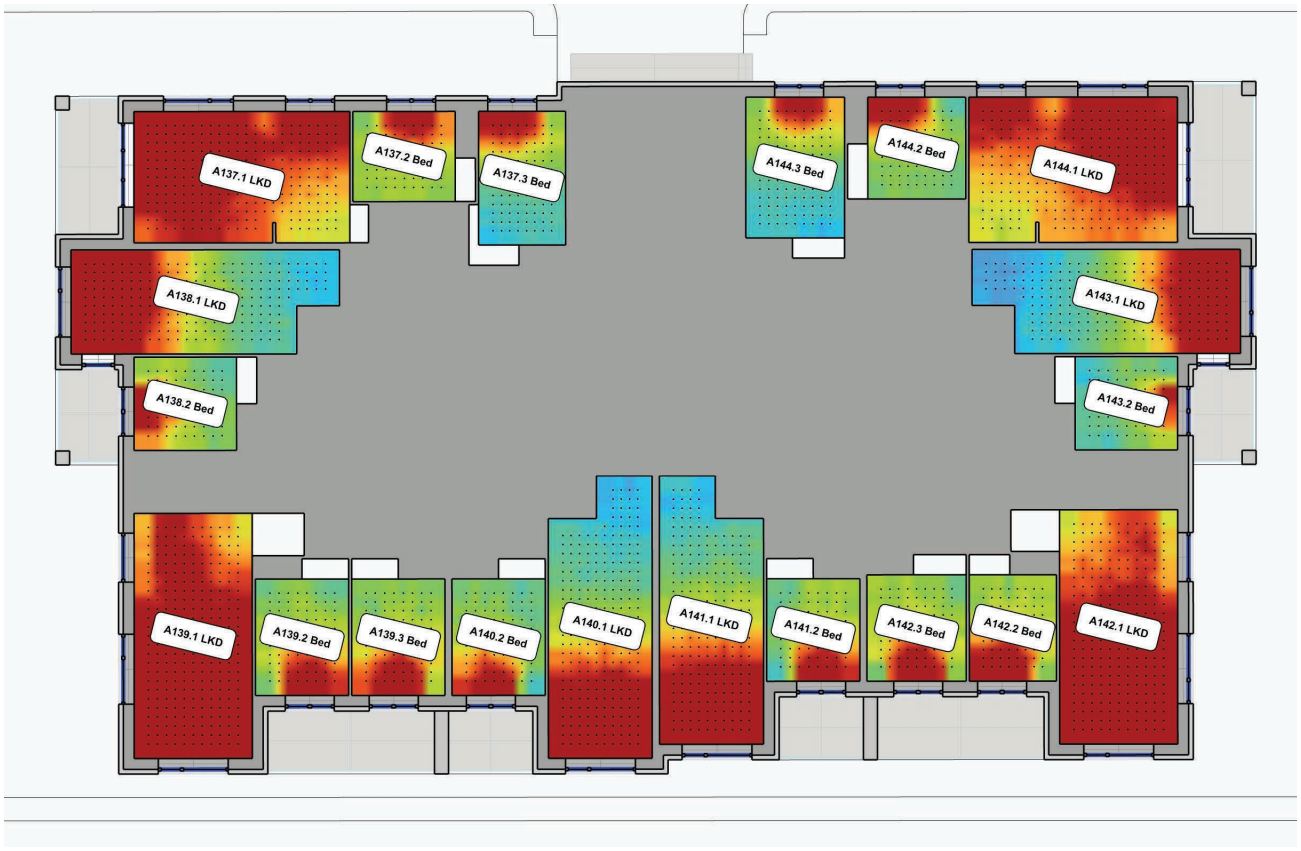
Block B - Minimum Illuminance Levels to BS EN17037:2018+A1:2021 - Table NA.1							
Space ID	Use	Area m2	Sensor Count	Target Lux	Mean Lux	% of grid target exceeded - Minimum 50% of Grid	Meets Criteria
B178.1	LKD	39.3	354	200	1170	100.0%	Y
B178.2	Bed	9.4	80	100	709	100.0%	Y
B178.3	Bed	11.7	100	100	608	100.0%	Y
B179.1	LKD	41.5	384	200	1203	100.0%	Y
B179.2	Bed	10.9	90	100	669	100.0%	Y
B179.3	Bed	13.3	110	100	584	100.0%	Y
B180.1	LKD	47.0	442	200	1774	100.0%	Y
B180.2	Bed	9.2	72	100	1330	100.0%	Y
B180.3	Bed	12.0	100	100	847	100.0%	Y
B181.1	LKD	30.8	275	200	1161	100.0%	Y
B181.2	Bed	9.9	72	100	612	100.0%	Y
B181.3	Bed	9.9	72	100	947	100.0%	Y
B182.1	LKD	30.8	275	200	1136	100.0%	Y
B182.2	Bed	11.2	88	100	559	100.0%	Y
B182.3	Bed	11.2	88	100	902	100.0%	Y
B183.1	LKD	49.5	476	200	1564	100.0%	Y
B183.2	Bed	9.2	72	100	1064	100.0%	Y
B183.3	Bed	13.4	120	100	771	100.0%	Y
B184.1	LKD	39.3	354	200	1127	100.0%	Y
B184.2	Bed	9.4	80	100	746	100.0%	Y
B184.3	Bed	11.7	100	100	636	100.0%	Y

Table 13: Minimum Daylight Provision Compliance for Habitable Rooms to BS EN17037:2018+A1:2021

Appendix B - Supplementary Information - Daylight Provision Room Results to IS EN 17037:2018+A1:2021

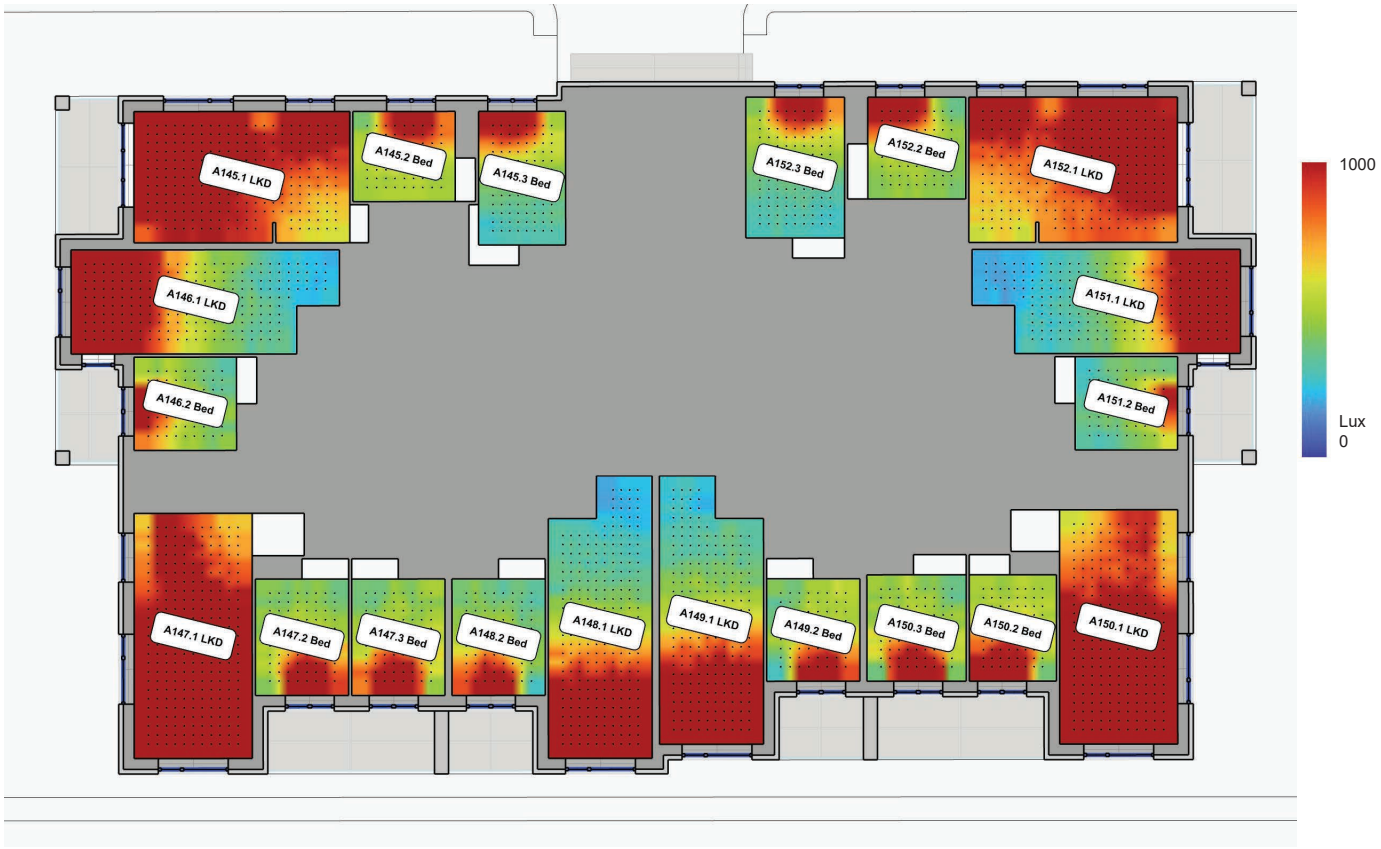


Ground Floor

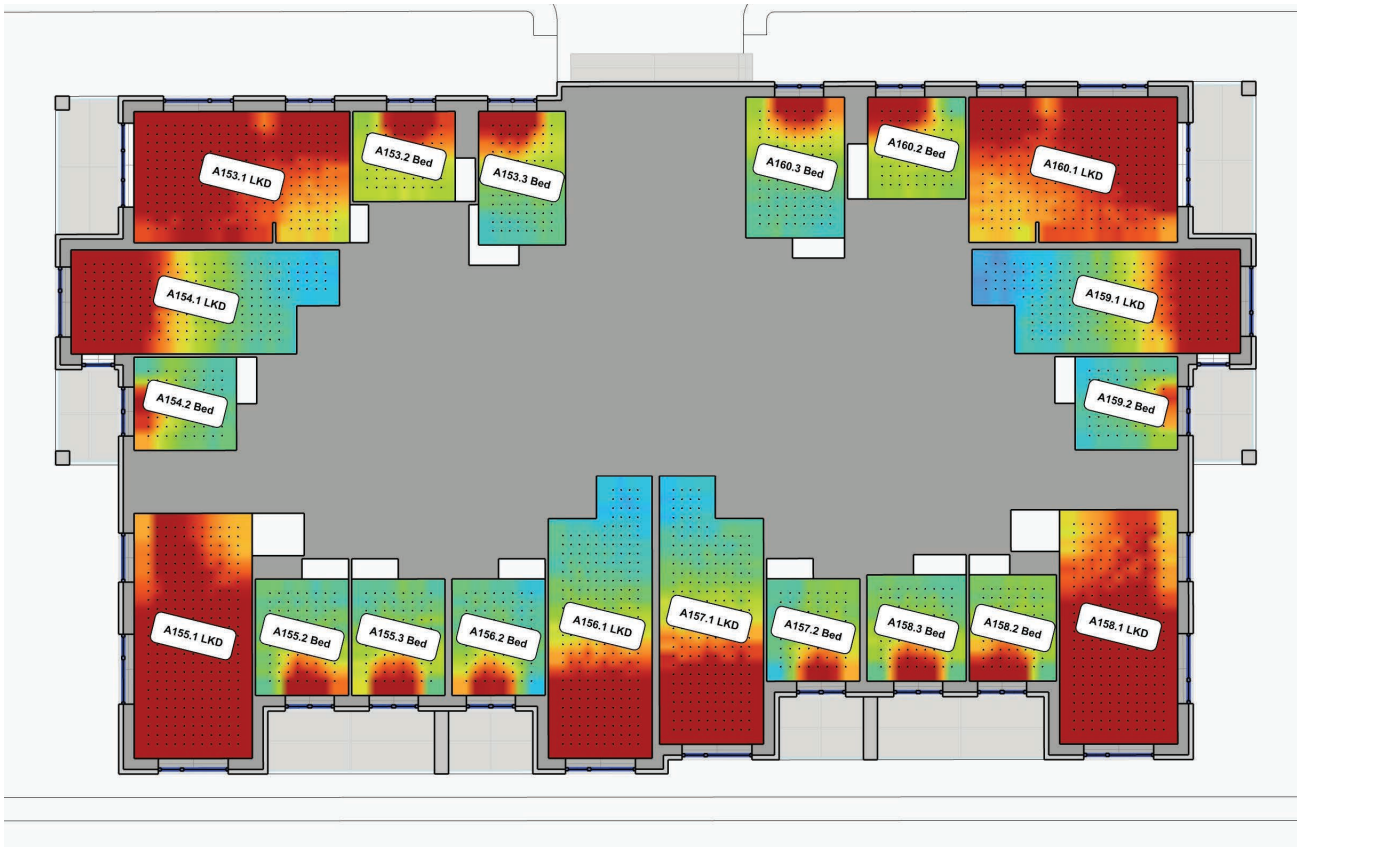


First Floor

Figure 26: Block A - Daylight Provision and Annual Average Illuminance to all Habitable Rooms



Second Floor



Third Floor

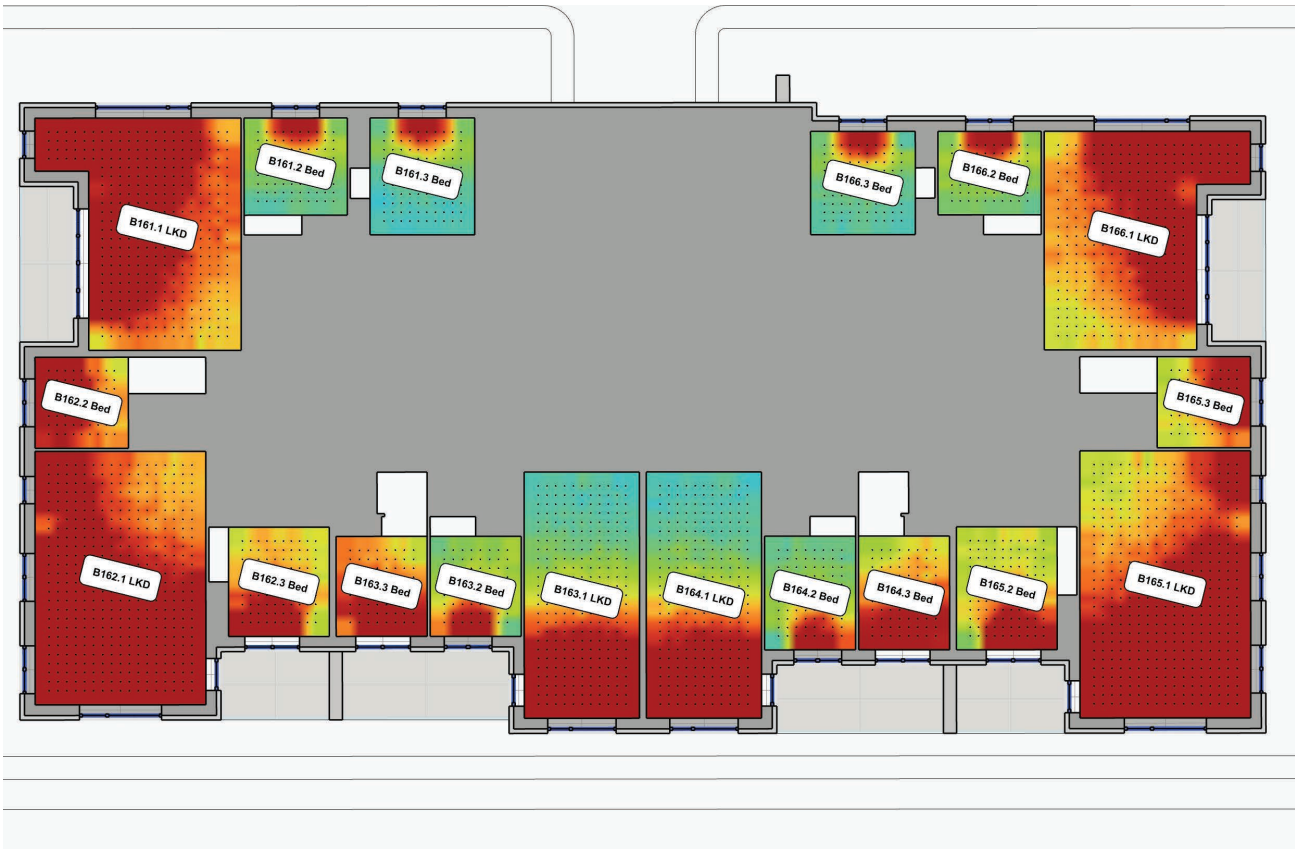
Figure 27: Block A - Daylight Provision and Annual Average Illuminance to all Habitable Rooms

Block A - IS EN 17037:2018+A1:2021 Daylight Provision Room Schedule

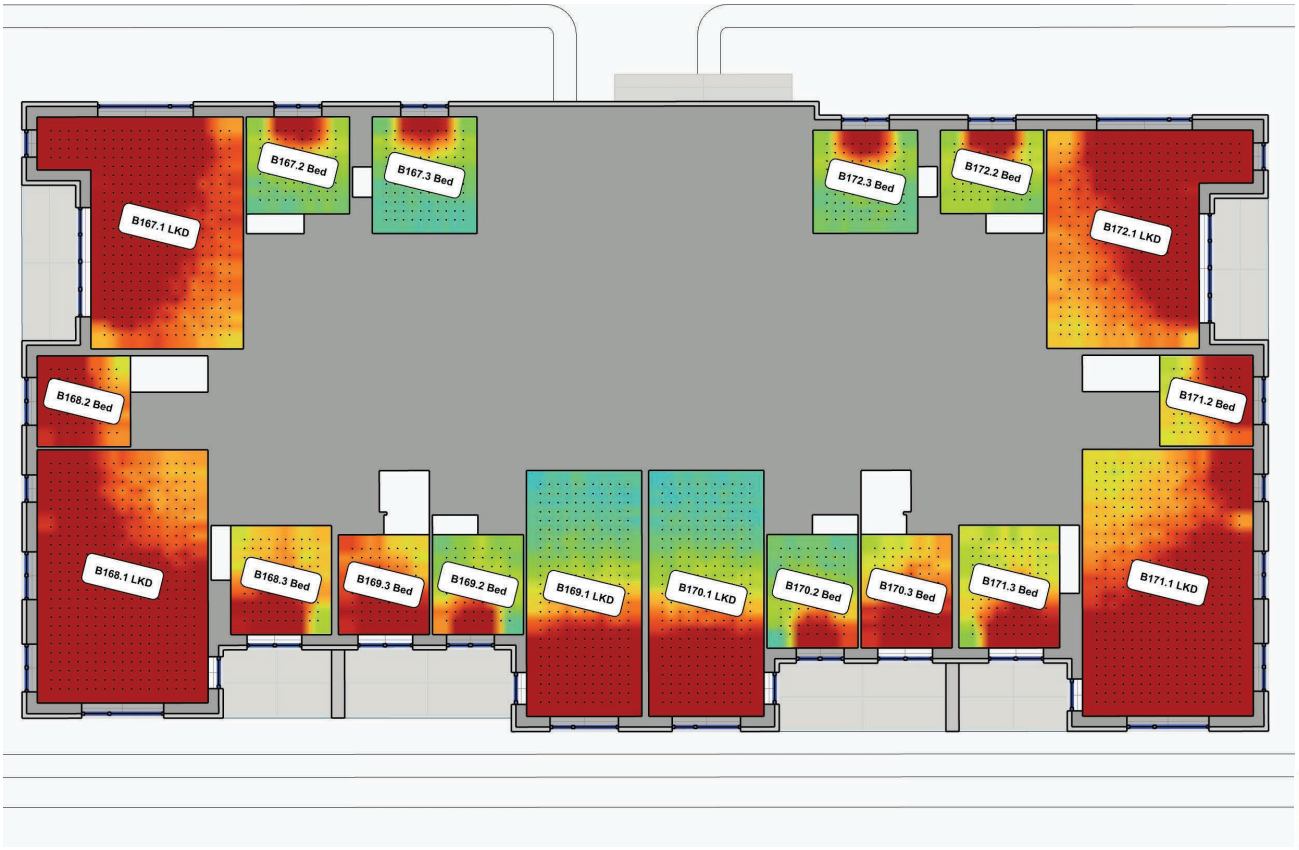
Space ID	Description	Area m2	Sensor Count	Target Illuminance	300lux_50	500lux_50	750lux_50	Minimum Target Illuminance	100lux_95	300lux_95	500lux_95
A129.1	LKD	29.3	280	High	78.8%	68.1%	55.0%	High	86.8%	69.2%	52.8%
A129.2	Bed	9.5	72	Medium	69.3%	50.4%	26.5%	Medium	83.5%	56.2%	31.1%
A129.3	Bed	12.0	104	Minimum	56.4%	31.4%	3.9%	Minimum	75.4%	29.9%	1.2%
A130.1	LKD	26.8	241	Minimum	59.8%	41.4%	25.5%	Minimum	66.8%	24.9%	8.7%
A130.2	Bed	9.9	72	Minimum	54.8%	34.7%	18.0%	Minimum	73.8%	36.9%	16.1%
A131.1	LKD	30.0	275	High	79.8%	70.4%	60.5%	High	85.0%	67.0%	54.3%
A131.2	Bed	11.2	88	Minimum	56.4%	38.6%	23.4%	Minimum	73.8%	42.1%	22.1%
A131.3	Bed	11.2	88	Minimum	56.4%	41.3%	24.7%	Minimum	74.8%	43.5%	25.0%
A132.1	LKD	28.2	261	Minimum	57.5%	42.4%	28.4%	Minimum	62.8%	27.1%	8.1%
A132.2	Bed	11.2	88	Minimum	52.1%	35.5%	18.8%	Minimum	71.5%	38.5%	18.2%
A133.1	LKD	26.8	241	Minimum	59.2%	44.5%	31.5%	Minimum	65.8%	32.1%	9.9%
A133.2	Bed	9.9	72	Minimum	55.0%	39.0%	22.8%	Minimum	73.6%	41.4%	21.6%
A134.1	LKD	28.6	264	High	78.9%	68.7%	57.5%	High	84.7%	66.9%	51.3%
A134.2	Bed	9.6	80	Minimum	58.8%	42.9%	29.6%	Minimum	76.3%	46.2%	29.0%
A134.3	Bed	10.9	90	Minimum	57.2%	40.1%	25.0%	Minimum	75.7%	44.9%	27.3%
A135.1	LKD	26.8	241	Minimum	54.7%	31.6%	15.3%	Minimum	61.7%	12.4%	4.2%
A135.2	Bed	9.9	72	Fail	49.5%	23.7%	9.7%	Minimum	70.8%	27.1%	8.0%
A136.1	LKD	31.3	288	High	78.0%	65.9%	52.4%	High	86.0%	67.2%	50.8%
A136.2	Bed	10.3	81	Minimum	62.3%	41.0%	11.8%	Medium	80.9%	51.1%	20.3%
A136.3	Bed	14.4	126	Minimum	52.0%	21.1%	0.0%	Minimum	71.2%	21.2%	0.0%
A137.1	LKD	29.3	280	High	80.1%	70.6%	58.6%	High	87.3%	71.5%	56.7%
A137.2	Bed	9.5	72	Medium	70.9%	53.9%	33.8%	Medium	85.4%	62.4%	41.4%
A137.3	Bed	12.0	104	Minimum	61.3%	40.0%	11.1%	Minimum	78.2%	42.3%	6.3%
A138.1	LKD	26.8	241	Minimum	61.9%	45.3%	28.3%	Minimum	68.6%	29.0%	10.6%
A138.2	Bed	9.9	72	Minimum	56.1%	35.8%	19.0%	Minimum	74.9%	41.4%	17.4%
A139.1	LKD	30.0	275	High	80.5%	71.5%	61.5%	High	85.1%	67.5%	55.1%
A139.2	Bed	11.2	88	Minimum	58.0%	40.0%	25.9%	Minimum	75.7%	44.2%	25.4%
A139.3	Bed	11.2	88	Minimum	57.2%	41.7%	25.8%	Minimum	76.2%	45.9%	26.8%
A140.1	LKD	28.2	261	Minimum	58.1%	42.8%	28.6%	Minimum	64.8%	28.6%	8.3%
A140.2	Bed	11.2	88	Minimum	52.6%	35.7%	18.6%	Minimum	71.9%	39.3%	19.5%
A141.1	LKD	26.8	241	Minimum	61.6%	46.2%	33.5%	Minimum	67.0%	33.8%	11.0%
A141.2	Bed	9.9	72	Minimum	55.6%	38.9%	21.6%	Minimum	71.5%	40.3%	19.1%
A142.1	LKD	28.6	264	High	79.5%	69.9%	59.0%	High	85.0%	67.6%	52.5%
A142.2	Bed	9.6	80	Minimum	61.0%	44.0%	31.0%	Minimum	77.3%	48.4%	30.9%
A142.3	Bed	10.9	90	Minimum	58.2%	40.5%	26.3%	Minimum	76.8%	46.9%	30.3%
A143.1	LKD	26.8	241	Minimum	58.8%	37.8%	17.8%	Minimum	64.7%	15.2%	4.3%
A143.2	Bed	9.9	72	Minimum	51.5%	25.7%	10.5%	Minimum	73.1%	32.6%	9.0%
A144.1	LKD	31.3	288	High	79.2%	68.9%	55.7%	High	87.1%	70.8%	55.5%
A144.2	Bed	10.3	81	Minimum	65.5%	46.4%	21.6%	Medium	83.2%	56.3%	32.7%
A144.3	Bed	14.4	126	Minimum	56.7%	34.5%	5.4%	Minimum	76.9%	37.9%	4.0%
A145.1	LKD	29.3	280	High	80.5%	71.3%	59.6%	High	87.6%	72.4%	58.2%
A145.2	Bed	9.5	72	Medium	73.3%	56.0%	37.2%	Medium	86.0%	65.5%	46.0%
A145.3	Bed	12.0	104	Minimum	63.4%	42.6%	15.3%	Minimum	79.1%	46.5%	11.7%
A146.1	LKD	26.8	241	Minimum	61.9%	45.8%	28.1%	Minimum	68.1%	27.3%	9.9%
A146.2	Bed	9.9	72	Minimum	56.3%	35.9%	18.1%	Minimum	75.7%	41.3%	18.2%
A147.1	LKD	30.0	275	High	80.6%	71.7%	61.9%	High	85.5%	68.4%	55.5%
A147.2	Bed	11.2	88	Minimum	57.0%	38.6%	22.9%	Minimum	75.8%	44.8%	25.5%
A147.3	Bed	11.2	88	Minimum	57.5%	41.6%	25.2%	Minimum	75.3%	43.7%	23.7%
A148.1	LKD	28.2	261	Minimum	58.7%	43.4%	30.7%	Minimum	64.6%	27.6%	8.4%
A148.2	Bed	11.2	88	Minimum	52.8%	35.6%	18.3%	Minimum	72.7%	39.4%	18.8%

Block A - IS EN 17037:2018+A1:2021 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
A149.1	LKD	26.8	241	Minimum	61.2%	45.8%	32.3%	Minimum	69.1%	36.0%	13.5%
A149.2	Bed	9.9	72	Minimum	56.5%	39.3%	22.8%	Minimum	74.5%	43.2%	21.4%
A150.1	LKD	28.6	264	High	79.7%	70.5%	60.1%	High	85.4%	68.2%	53.6%
A150.2	Bed	9.6	80	Minimum	60.0%	43.5%	30.4%	Medium	78.2%	50.3%	33.1%
A150.3	Bed	10.9	90	Minimum	58.3%	40.4%	26.2%	Minimum	75.9%	45.4%	27.6%
A151.1	LKD	26.8	241	Minimum	59.9%	40.4%	19.6%	Minimum	66.3%	18.2%	4.5%
A151.2	Bed	9.9	72	Minimum	53.1%	27.8%	11.2%	Minimum	74.4%	35.4%	10.2%
A152.1	LKD	31.3	288	High	79.8%	70.3%	57.2%	High	87.7%	73.1%	57.9%
A152.2	Bed	10.3	81	Medium	68.1%	50.5%	28.5%	Medium	84.5%	59.4%	38.1%
A152.3	Bed	14.4	126	Minimum	59.7%	39.5%	9.7%	Minimum	78.3%	43.8%	7.9%
A153.1	LKD	29.3	280	High	80.1%	70.8%	59.1%	High	87.7%	72.9%	58.9%
A153.2	Bed	9.5	72	Medium	73.5%	56.7%	39.5%	Medium	86.4%	67.4%	48.6%
A153.3	Bed	12.0	104	Minimum	65.0%	45.2%	20.5%	Minimum	79.5%	48.7%	16.7%
A154.1	LKD	26.8	241	Minimum	62.6%	46.8%	29.2%	Minimum	68.4%	27.9%	8.8%
A154.2	Bed	9.9	72	Minimum	52.6%	31.1%	14.6%	Minimum	73.4%	38.4%	14.6%
A155.1	LKD	30.0	275	High	80.8%	72.1%	62.3%	High	85.5%	68.2%	55.7%
A155.2	Bed	11.2	88	Fail	49.8%	31.6%	15.1%	Minimum	72.0%	39.4%	16.9%
A155.3	Bed	11.2	88	Minimum	52.9%	36.7%	17.9%	Minimum	72.6%	40.9%	18.2%
A156.1	LKD	28.2	261	Minimum	59.3%	44.1%	30.9%	Minimum	66.0%	31.7%	8.8%
A156.2	Bed	11.2	88	Fail	47.6%	29.4%	12.3%	Minimum	68.6%	34.7%	11.4%
A157.1	LKD	26.8	241	Minimum	61.3%	45.8%	32.7%	Minimum	67.1%	33.1%	10.3%
A157.2	Bed	9.9	72	Minimum	51.4%	34.1%	16.5%	Minimum	71.3%	38.0%	16.7%
A158.1	LKD	28.6	264	High	79.7%	70.5%	60.2%	High	85.4%	68.7%	54.5%
A158.2	Bed	9.6	80	Minimum	55.8%	39.8%	23.4%	Minimum	75.5%	44.3%	25.4%
A158.3	Bed	10.9	90	Minimum	54.2%	36.8%	20.2%	Minimum	73.8%	40.9%	19.4%
A159.1	LKD	26.8	241	Minimum	60.5%	41.1%	19.2%	Minimum	66.2%	17.1%	4.4%
A159.2	Bed	9.9	72	Fail	49.2%	22.7%	7.7%	Minimum	72.2%	30.7%	7.7%
A160.1	LKD	31.3	288	High	79.7%	69.9%	57.3%	High	88.1%	74.5%	59.5%
A160.2	Bed	10.3	81	Medium	69.6%	52.9%	33.5%	Medium	85.2%	62.5%	42.1%
A160.3	Bed	14.4	126	Minimum	63.0%	42.9%	16.2%	Minimum	79.1%	47.4%	14.5%

Table 14: Daylight Provision individual values for all habitable rooms to EN 17037 Table A.1.

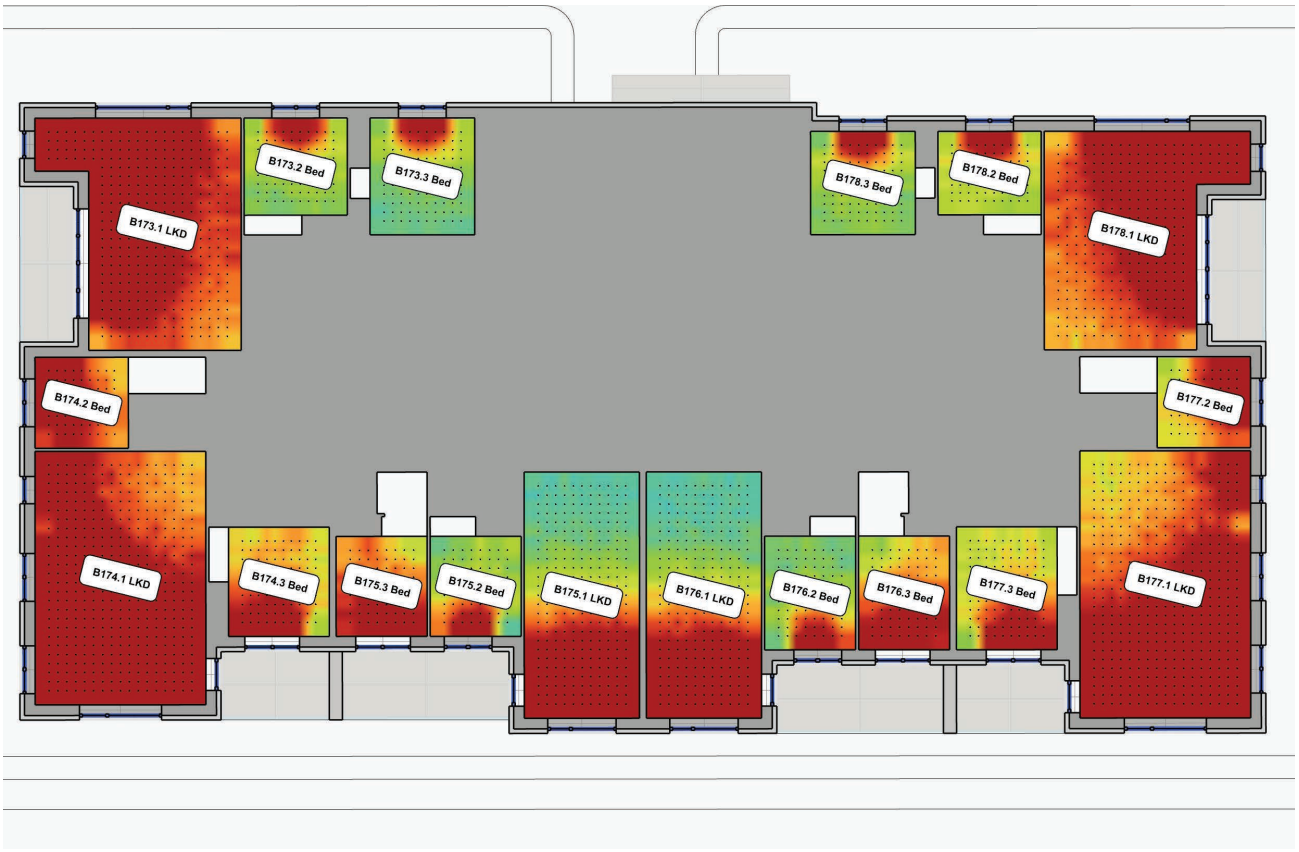


Ground Floor

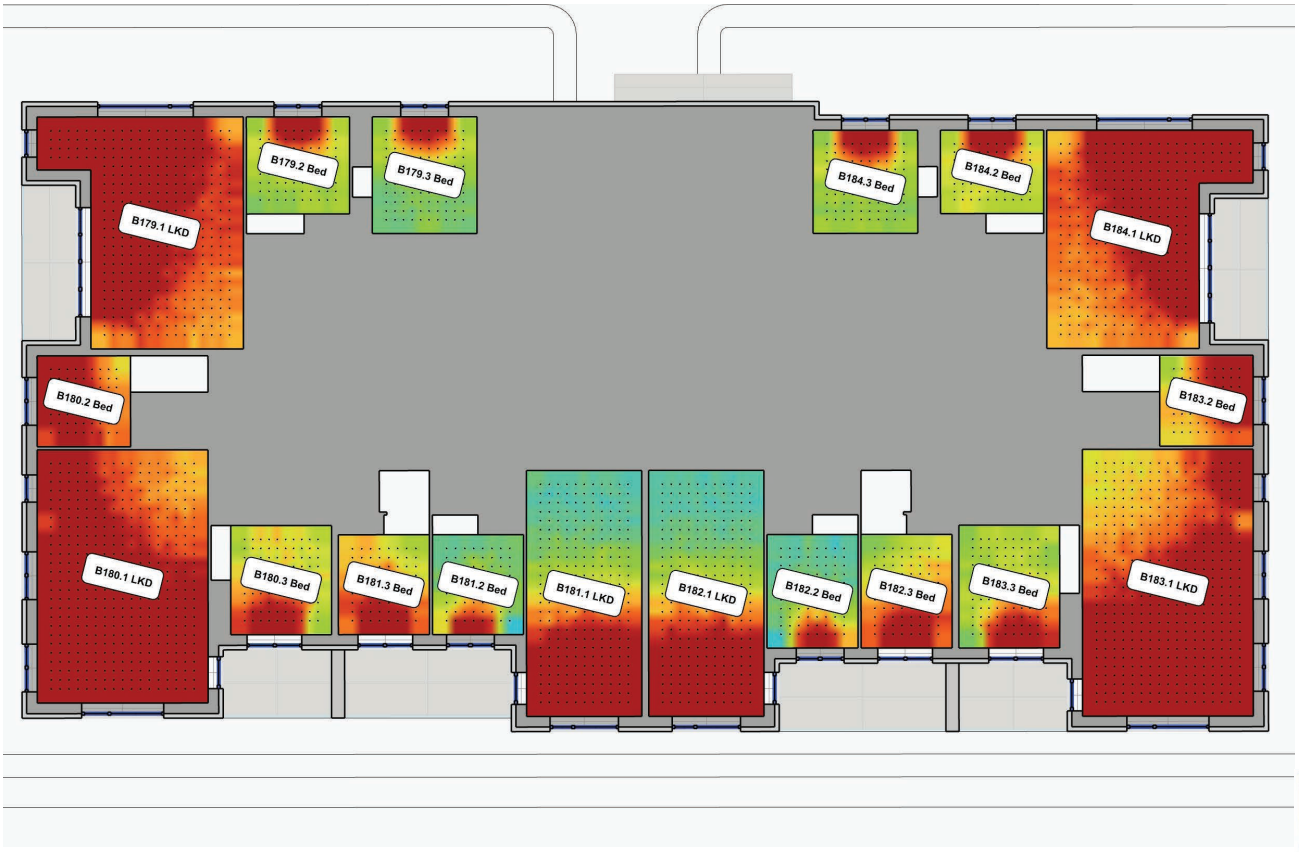


First Floor

Figure 28: Block B - Daylight Provision and Annual Average Illuminance to all Habitable Rooms



Second Floor



Third Floor

Figure 29: Block B - Daylight Provision and Annual Average Illuminance to all Habitable Rooms

Block B - IS EN 17037:2018+A1:2021 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
B161.1	LKD	41.5	384	High	78.5%	67.0%	54.5%	High	86.7%	69.3%	53.9%
B161.2	Bed	10.9	90	Minimum	65.3%	45.2%	16.8%	Medium	80.5%	51.3%	21.1%
B161.3	Bed	13.3	110	Minimum	56.8%	33.2%	5.2%	Minimum	77.7%	40.4%	6.0%
B162.1	LKD	47.0	442	High	78.8%	68.2%	58.2%	High	85.0%	67.3%	54.9%
B162.2	Bed	9.2	72	Medium	74.7%	60.6%	45.6%	Medium	84.7%	64.7%	46.2%
B162.3	Bed	12.0	100	Minimum	64.1%	48.9%	36.6%	Medium	80.9%	56.2%	40.0%
B163.1	LKD	30.8	275	Minimum	60.6%	45.6%	34.4%	Minimum	70.4%	39.4%	16.6%
B163.2	Bed	9.9	72	Minimum	56.1%	40.8%	24.2%	Minimum	75.4%	44.7%	25.3%
B163.3	Bed	9.9	72	Medium	68.5%	54.0%	40.6%	Medium	81.4%	58.9%	42.1%
B164.1	LKD	30.8	275	Minimum	59.7%	44.9%	31.5%	Minimum	69.7%	37.8%	16.0%
B164.2	Bed	11.2	88	Minimum	52.4%	35.4%	20.0%	Minimum	72.7%	38.8%	18.9%
B164.3	Bed	11.2	88	Medium	66.5%	51.8%	39.1%	Medium	80.1%	54.1%	38.5%
B165.1	LKD	49.5	476	High	77.5%	66.2%	55.0%	High	84.2%	65.4%	50.3%
B165.2	Bed	13.4	120	Minimum	60.9%	45.5%	31.8%	Medium	79.4%	52.7%	36.5%
B165.3	Bed	9.2	72	Medium	73.7%	58.2%	39.0%	Medium	84.4%	62.5%	40.2%
B166.1	LKD	39.3	354	High	78.4%	66.1%	53.0%	High	86.4%	68.7%	52.6%
B166.2	Bed	9.4	80	Medium	68.7%	50.2%	26.4%	Medium	83.7%	56.7%	31.7%
B166.3	Bed	11.7	100	Minimum	60.0%	38.4%	7.1%	Minimum	80.0%	47.9%	13.0%
B167.1	LKD	41.5	384	High	79.4%	68.8%	57.0%	High	87.3%	71.7%	57.5%
B167.2	Bed	10.9	90	Minimum	67.7%	49.4%	26.4%	Medium	82.6%	55.6%	32.4%
B167.3	Bed	13.3	110	Minimum	61.4%	40.1%	11.8%	Minimum	79.8%	49.7%	17.9%
B168.1	LKD	47.0	442	High	79.4%	69.2%	59.5%	High	85.5%	68.3%	55.7%
B168.2	Bed	9.2	72	Medium	75.4%	62.2%	48.8%	Medium	85.3%	66.4%	49.8%
B168.3	Bed	12.0	100	Medium	65.4%	50.5%	37.7%	Medium	81.6%	58.1%	41.2%
B169.1	LKD	30.8	275	Minimum	62.0%	47.1%	36.3%	Minimum	71.6%	40.9%	18.0%
B169.2	Bed	9.9	72	Minimum	56.8%	41.0%	24.5%	Minimum	76.1%	45.6%	27.6%
B169.3	Bed	9.9	72	Medium	69.5%	55.5%	42.4%	Medium	82.2%	61.1%	44.3%
B170.1	LKD	30.8	275	Minimum	61.2%	46.4%	32.1%	Minimum	70.9%	39.1%	17.7%
B170.2	Bed	11.2	88	Minimum	54.0%	36.2%	20.8%	Minimum	74.1%	41.4%	20.1%
B170.3	Bed	11.2	88	Medium	67.5%	53.2%	40.9%	Medium	81.4%	57.3%	41.6%
B171.1	LKD	49.5	476	High	77.9%	67.4%	56.4%	High	84.8%	67.0%	52.5%
B171.2	Bed	9.2	72	Medium	74.4%	59.4%	43.1%	Medium	84.3%	63.2%	44.2%
B171.3	Bed	13.4	120	Minimum	62.1%	46.1%	32.5%	Medium	79.7%	53.4%	36.6%
B172.1	LKD	39.3	354	High	79.2%	68.3%	55.8%	High	87.4%	72.0%	57.0%
B172.2	Bed	9.4	80	Medium	71.3%	53.8%	34.6%	Medium	85.3%	61.6%	40.6%
B172.3	Bed	11.7	100	Minimum	65.6%	46.5%	20.8%	Medium	82.3%	54.6%	29.5%
B173.1	LKD	41.5	384	High	79.7%	69.5%	58.0%	High	87.5%	72.9%	59.1%
B173.2	Bed	10.9	90	Medium	69.3%	52.2%	31.4%	Medium	83.8%	58.4%	37.5%
B173.3	Bed	13.3	110	Minimum	64.5%	44.4%	19.9%	Medium	81.5%	53.8%	28.4%
B174.1	LKD	47.0	442	High	79.5%	69.6%	59.9%	High	85.8%	69.0%	56.4%
B174.2	Bed	9.2	72	Medium	75.9%	63.0%	49.9%	Medium	85.2%	66.3%	49.8%
B174.3	Bed	12.0	100	Medium	65.8%	50.8%	37.6%	Medium	81.5%	57.8%	41.3%
B175.1	LKD	30.8	275	Minimum	62.5%	47.5%	36.6%	Minimum	72.3%	41.6%	21.0%
B175.2	Bed	9.9	72	Minimum	56.5%	40.6%	24.2%	Minimum	75.9%	45.0%	26.3%
B175.3	Bed	9.9	72	Medium	69.6%	55.4%	42.3%	Medium	82.1%	60.7%	43.6%
B176.1	LKD	30.8	275	Minimum	62.0%	46.9%	33.5%	Minimum	71.6%	39.2%	18.8%
B176.2	Bed	11.2	88	Minimum	53.5%	36.3%	20.1%	Minimum	75.1%	42.7%	22.6%
B176.3	Bed	11.2	88	Medium	67.6%	53.6%	40.9%	Medium	80.8%	56.0%	40.6%
B177.1	LKD	49.5	476	High	78.2%	67.7%	56.8%	High	85.0%	67.7%	53.3%
B177.2	Bed	9.2	72	Medium	75.0%	61.1%	45.2%	Medium	84.6%	63.9%	45.1%

Block B - IS EN 17037:2018+A1:2021 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
B177.3	Bed	13.4	120	Minimum	62.4%	46.5%	33.4%	Medium	80.3%	54.9%	37.3%
B178.1	LKD	39.3	354	High	80.1%	70.1%	57.9%	High	88.0%	74.3%	59.8%
B178.2	Bed	9.4	80	Medium	73.7%	56.7%	39.3%	Medium	86.1%	65.5%	46.4%
B178.3	Bed	11.7	100	Minimum	68.0%	49.7%	27.0%	Medium	84.1%	58.4%	37.1%
B179.1	LKD	41.5	384	High	79.2%	68.4%	57.1%	High	87.4%	72.2%	58.6%
B179.2	Bed	10.9	90	Medium	70.6%	53.9%	34.5%	Medium	85.1%	61.6%	40.8%
B179.3	Bed	13.3	110	Minimum	66.1%	47.5%	24.2%	Medium	82.4%	56.0%	32.9%
B180.1	LKD	47.0	442	High	79.5%	69.5%	59.7%	High	85.9%	69.1%	56.3%
B180.2	Bed	9.2	72	Medium	75.9%	62.9%	49.3%	High	85.9%	67.5%	51.8%
B180.3	Bed	12.0	100	Minimum	62.4%	46.3%	33.7%	Medium	80.1%	54.7%	37.2%
B181.1	LKD	30.8	275	Minimum	61.9%	47.1%	36.3%	Minimum	71.6%	41.1%	18.7%
B181.2	Bed	9.9	72	Minimum	53.3%	36.4%	18.9%	Minimum	73.3%	41.4%	18.6%
B181.3	Bed	9.9	72	Medium	66.2%	51.2%	37.7%	Medium	80.9%	57.0%	39.1%
B182.1	LKD	30.8	275	Minimum	61.7%	46.4%	32.8%	Minimum	71.4%	39.6%	18.5%
B182.2	Bed	11.2	88	Fail	48.3%	31.3%	13.4%	Minimum	71.1%	36.6%	14.0%
B182.3	Bed	11.2	88	Minimum	64.7%	49.0%	36.8%	Medium	79.8%	53.5%	38.0%
B183.1	LKD	49.5	476	High	78.2%	67.9%	56.8%	High	85.0%	67.4%	53.4%
B183.2	Bed	9.2	72	Medium	75.1%	61.2%	46.1%	Medium	85.2%	65.8%	47.9%
B183.3	Bed	13.4	120	Minimum	58.1%	40.6%	26.9%	Medium	77.9%	50.1%	33.6%
B184.1	LKD	39.3	354	High	79.4%	68.8%	56.6%	High	87.8%	73.6%	59.2%
B184.2	Bed	9.4	80	Medium	74.6%	58.0%	41.9%	Medium	86.4%	67.1%	48.8%
B184.3	Bed	11.7	100	Medium	69.2%	51.8%	31.2%	Medium	84.7%	59.9%	39.9%

Table 15: 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 Blocks A & B				
Unit ID	Room Use	Habitable room window within 90° south	No. sunlight hours on 21st March	EN17037:2018 Level of exposure to sunlight
A129.1	LKD	Yes	3.8	Medium
A130.1	LKD	Yes	5.6	High
A131.1	LKD	Yes	8.8	High
A132.1	LKD	Yes	8.8	High
A133.1	LKD	Yes	8.3	High
A134.1	LKD	Yes	8.8	High
A135.1	LKD	Yes	1.8	Minimum
A136.1	LKD	No	1.5	Minimum
A137.1	LKD	Yes	3.8	Medium
A138.1	LKD	Yes	5.7	High
A139.1	LKD	Yes	8.8	High
A140.1	LKD	Yes	8.8	High
A141.1	LKD	Yes	8.3	High
A142.1	LKD	Yes	8.8	High
A143.1	LKD	Yes	1.8	Minimum
A144.1	LKD	No	1.6	Minimum
A145.1	LKD	Yes	3.8	Medium
A146.1	LKD	Yes	5.7	High
A147.1	LKD	Yes	8.8	High
A148.1	LKD	Yes	8.8	High
A149.1	LKD	Yes	8.3	High
A150.1	LKD	Yes	8.8	High
A151.1	LKD	Yes	1.8	Minimum
A152.1	LKD	No	1.8	Minimum
A153.1	LKD	Yes	3.3	Medium
A154.1	LKD	Yes	5.7	High
A155.1	LKD	Yes	8.8	High
A156.1	LKD	Yes	8.8	High
A157.1	LKD	Yes	8.3	High
A158.1	LKD	Yes	8.8	High
A159.1	LKD	Yes	1.6	Minimum
A160.1	LKD	No	2.1	Minimum
B161.1	LKD	Yes	3.8	Medium
B162.1	LKD	Yes	9.3	High
B163.1	LKD	Yes	8.8	High
B164.1	LKD	Yes	8.8	High
B165.1	LKD	Yes	9.3	High
B166.1	LKD	No	2.7	Minimum
B167.1	LKD	Yes	3.8	Medium
B168.1	LKD	Yes	9.3	High
B169.1	LKD	Yes	8.8	High
B170.1	LKD	Yes	8.8	High
B171.1	LKD	Yes	9.3	High
B172.1	LKD	No	2.7	Minimum
B173.1	LKD	Yes	4.0	High
B174.1	LKD	Yes	9.3	High
B175.1	LKD	Yes	8.8	High
B176.1	LKD	Yes	8.8	High
B177.1	LKD	Yes	9.3	High
B178.1	LKD	No	2.7	Minimum

Sunlight Hours Apartments Blocks A & B				
Unit ID	Room Use	Habitable room window within 90° south	No. sunlight hours on 21st March	EN17037:2018 Level of exposure to sunlight
B179.1	LKD	Yes	4.3	High
B180.1	LKD	Yes	9.3	High
B181.1	LKD	Yes	8.8	High
B182.1	LKD	Yes	8.8	High
B183.1	LKD	Yes	9.3	High
B184.1	LKD	No	2.7	Minimum

Table 16: Sunlight Hours