Daylight & Sunlight Assessments of a Proposed Part 8 Residential Development, Balally, Sandyford, Dublin 16

On behalf of Dún Laoghaire-Rathdown County Council and National Development Finance Agency

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Prepared by John Healy
MSc Environmental Design of Buildings

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.

1. Introduction

This proposed development is on Blackthorn Drive, Balally, Dublin 16, it comprises of:

- 62 no. apartment units in a 5-6 storey building over undercroft area, including 31 no. one bed units; 21 no. two bed units; and 10 no. three bed units;
- 1 no. crèche facility of 297m² with associated external play area at upper ground level.
- Energy Centre at sixth floor level and an external plant area set back at fifth floor roof level.
- Undercroft area at lower ground level comprising (a) 1 no. ESB substation (b) car and bicycle parking; (c) bin storage; (d) bulk storage area; and (e) supporting mechanical, electrical and water infrastructure.
- Landscaping works including provision of (a) communal open space; (b) new pedestrian and cycle connections linking Blackthorn Dive with Cedar Road; and (c) public realm area fronting onto Blackthorn Drive.
- All associated site development works including (a) vehicular access off Cedar Road; (b) pedestrian and cycle access off Blackthorn Drive; (c) public lighting; (d) varied site boundary treatment; and (e) temporary construction signage.

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 McCrossan O'Rourke Manning Architects.

1.1.1 Assessment of potential impact to daylight and sunlight availability on adjacent properties.

There will be minimal reduction to the available daylight and sunlight levels to the adjacent dwellings. There will be no reduction in sunlight to private amenity spaces. The results find that any impact on the adjacent residential structures would be imperceivable. The proposed development meets the recommendations of the BRE guidelines (2022).

1.1.2 Assessment of the quality of the proposed development.

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

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

1.1.3 Assessment of daylight in accordance with BR209:2022 and BS EN 17037:2018+A1:2021.

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

1.1.4 Sunlight within the proposed development

In this development of 62 units, 100% have a living spaces which achieves the minimum recommended 1.5 direct sunlight hours. These results are in line with the BRE guidelines example for an apartment layout where 1 in 5 achieves the target sunlight hours.

The communal amenity space and the creche area are well oriented for sunlight and will achieve 2 hours sunlight on the 21st March over in excess of 50% of the area. The proposed development meets the recommendations of the BRE guidelines for gardens and open spaces.

1.1.5 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 95.2% achieving Target Illuminance. Appendix B identifies any rooms which do not achieve target illuminance levels.

To date there is no guidance from Irish local authorities or governmental bodies on the use or interpretation of IS EN 17038:2018. The local authorities guidelines and apartment guidelines refer to BR209 Site layout planning for daylight and sunlight 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.

2. Methodology

2.1 Standards and Guidelines

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

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

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

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

- BR209:2022 Site Layout Planning for Daylight and Sunlight (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 Daylight in Buildings.

2.2 BRE guidance document BR209:2022 - Site Layout Planning for Daylight and Sunlight (3rd edition).

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

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

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

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

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

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

2.3 Daylight to existing dwellings

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

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

BRE guidelines (2022) recommend that: *"Loss of light to existing windows need not be assessed if the distance of each part of the new development from the existing window is three or more times its height above the centre of the existing window."*
The diffuse light of the existing building may be adversely affected if part of a new building measured in a vertical section perpendicular to the main window wall of an existing building, from the centre of the lowest window, subtends an angle of more than 25º to the horizontal. If a window falls within a 45° angle both in plan and elevation with a new development in place then the window may be affected and should be assessed.

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

> *"The guidelines here are intended for use for rooms in adjoining dwellings where daylight is required, including living rooms, kitchens and bedrooms. Windows to bathrooms, toilets, storerooms, circulation areas and garages need not be analysed. The guidelines may also be applied to any existing non-domestic building where the occupants have a reasonable expectation of daylight; this would normally include schools, hospitals, hotels and hostels, small workshops and some offices";*

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

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

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

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

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

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

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

2.4 Sunlight to existing buildings

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

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

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

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

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

2.5 Sunlight to gardens and open spaces

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

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

2.6 Calculations of Trees & Hedges

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

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

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

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

The BRE guidelines sets out criteria for classification for assessment of impact where a new development affects a number of existing buildings or open spaces in relation to an Environmental Impact Assessment. The guide does not give a specific range or percentages but sets out parameters 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, eg a living room in a dwelling or a children's playground.*
>
> *Beneficial impacts occur when there is a significant increase in the amount of skylight and sunlight reaching an existing building where it is required, or in the amount of sunlight reaching an open space.*
>
> *Beneficial impacts should be worked out using the same principles as adverse impacts. Thus a tiny increase in light would be classified as a negligible impact, not a minor beneficial impact."*

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

2.8 Daylight in the Proposed Development.

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

BS EN 17037:2018+A1 sets out two methods for assessing daylight provision in proposed buildings. One method is called the **Illuminance method**. This is based on Target illuminances for daylight to be achieved across specified fractions of a reference plane at working plane height (0.85m) for half the daylight hours in a year. The Illuminance Method requires the use of a suitable weather file 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 ($E_{v,d,med}$) for the capital cities throughout Europe to account for external local illuminance levels.

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

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

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

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

The EN17037:2018 Standard deals exclusively with new developments and does not give guidance or metrics on loss of light or sunlight to existing properties. EN 17037:2018 sets out values for Minimum and Target levels to be achieved with a minimum, medium and high compliance level for each. The guideline recommends that the minimum level should be achieved but does not give guidance on the number of units or fraction within a multiple residential unit development that should achieve these values. Additionally it does not differentiate between room use and weighted targets for rooms which would have a lesser requirement. The UK National annex sets out factors for UK specific settings where it is difficult to achieve natural daylighting.

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

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

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

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

Target Illuminance from Daylight over at least half the daylight hours		
Level of recommendation	Target illuminance 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 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%

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

2.9 Sunlight to proposed developments

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

The BRE guidelines (2022) states that BS EN 17037 should be used to assess for interior access to direct sunlight. BS EN 17037 sets recommendations for access to sunlight in a range achieving compliance from Minimum to 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 recommends a time step of 5 minutes or less for the assessment interval. The minimum level to achieve is 1.5, the medium level is 3 hours and the high level is 4 hours direct sunlight.

3. Daylight to adjacent buildings.

3.1 Site Overview

The proposed site is a greenfield, with boundaries on Blackthorn Drive and Maples Road. The site boundary to the west is shared with Balally Shopping Centre and a greenfield to the east.

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

3.2 Preliminary assessment of adjoining dwellings

The BRE guidelines recommend that loss of light to existing windows need not be assessed if the distance of each part of the new development from the existing window is three or more times its height above the centre of the existing window. The zone of influence 3 times the height of the proposal is plotted in Figure 2 in yellow.

Section planes perpendicular to the window wall of the adjacent properties facing the proposed development are indicated in blue in Figure 2. The plane at location A extend and if it intersects the proposed development, it is plotted in Figure 3 below.

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

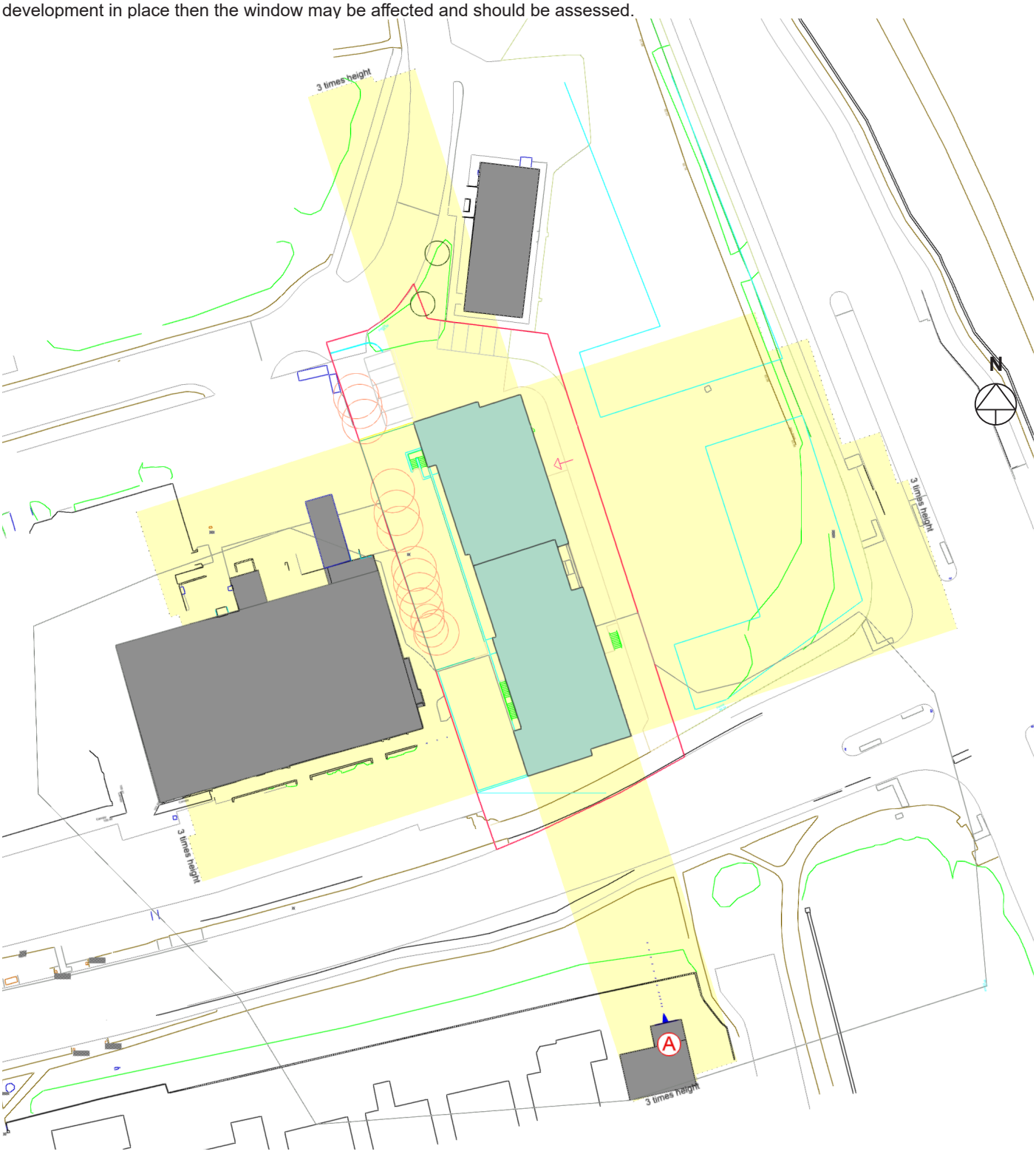


Figure 2: Proposed site plan showing the zone of influence (3 times the height of the proposed building) and direction of the window wall of adjacent residential properties.

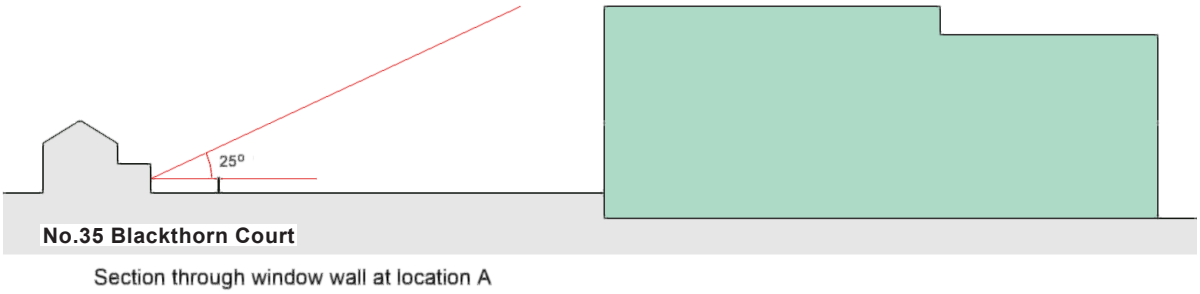


Figure 3: Section perpendicular to window wall at locations indicated in Figure 2.

3.3 Comment on preliminary assessment

Location A through No.35 Blackthorn Court: The 25º line would not be subtended by the proposed development, indicating any reduction in available daylight is likely to be negligible. No further assessment is required.

3.4 Conclusion

Any reduction in available daylight from the proposed development will be negligible and meets the recommendations of the BRE guidelines BR209:2022 (third edition).

4. Assessment of sunlight to adjoining properties

4.1 Sunlight the neighbouring dwellings (Annual Probable Sunlight Hours)

The BRE guidelines recommends assessing window walls for the APSH that face within 90º of due south. The guidelines state that *" In housing the main requirement for sunlight is living rooms, where it is valued at any time of day, but especially in the afternoon. Sunlight is also required in conservatories. It is viewed as less important in bedrooms and in kitchens, where people prefer it in the morning rather than the afternoon."*

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

The BRE guidelines states that obstruction to sunlight may become an issues if

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

4.2 Conclusion

In the relevant residential properties, no windows facing towards the proposed development, face within 90º of due south. As their direct access to sunlight does not exist at present, it cannot be impacted. The proposed development meets the recommendations of the BRE guide.

4.3 Sunlight to adjoining amenity spaces

The BRE document indicates that for an amenity area to have good quality sunlight throughout the year, 50% should receive in excess of 2 hours sunlight on the 21st March. It also states that front gardens need not be assessed for sunlight. Amenity spaces which are south of the proposed development would not be impacted by it.

The shadow diagrams in Section 8 indicate that the shadows caused by the proposed development do not extend to any private garden or amenity space with a requirement for sunlight on the 21st march and no detailed assessment is required.

There will be no reduction in sunlight to any of the neighbouring amenity spaces with a requirement for sunlight and the proposed development meets the requirements of the BRE guidelines.

5. Daylight to proposed units.

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

Compliance is demonstrated by a calculation of Daylight Provision with the illuminance method under BS EN 17037:2018+A1:2021. A summary of the results are presented in Table 6 below and a complete set of room results are shown in Appendix A.

Compliance is also demonstrated with a calculation of Daylight Provision with the illuminance method under IS /BS EN 17037:2018. A summary of the results are presented in Table 7 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. The UK committee fully supports the recommendations of EN17037:2018 but considers the target daylight levels may be hard to achieve in UK dwellings, in particular in urban areas and areas with mature trees. The Target and Minimum levels set out in IS / BS EN17037:2018 does not take into account room use or make allowance for room that have a lesser requirement for daylight. The UK National Annex A1 in BS EN17037:2018+A1:2021 sets out room specific minimum values to be achieved in the UK and Channel Islands. These target values are set to achieve similar minimum daylight levels as the superseded Average Daylight Factor method (ADF) in BS8206-2 2008.

Minimum daylight provision UK NA.1 - BS EN 17037:2018+A1:2021					
	Room Use	Number of rooms	Target illuminance E_T(lx) for half of the assessment grid	Number of rooms to achieve target Lux over 50% of the assessment grid	Percentage of rooms achieving Target
Apartments	LKD	62	200	62	100.0%
	Bedrooms	103	100	103	100.0%
Total		165		165	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.

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. The is the minimum rooms specific values to be achieved in habitable rooms.

5.3 Assessment for Daylight Provision IS / BS EN 17037:2018

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

Daylight provision Illuminance Method IS EN 17037:2018						
		Below Target	Minimum	Medium	High	Percentage of rooms achieving Target
Apartments	Target Illuminance	4.8%	20.0%	70.9%	4.2%	95.2%
	Minimum Illuminance	0.0%	29.1%	58.2%	12.7%	100.0%

Table 7: Summary of room for Target Illuminance compliance with IS/BS EN 17037:2018. Percentage of rooms at each compliance level. Individual room results can be viewed in Appendix B.

The results indicate a high level of compliance for Minimum level of 100% and Target level of 95.2% of the spaces achieving the minimum target for each metric. The results indicate that the rooms will achieve high levels of daylight and they will be bright and pleasant.

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 5.1.

6. Sunlight hours in habitable rooms.

6.1 Sunlight Hours

BR209:2022 (third edition) and BS EN 17037 set out recommendations for sunlight hours to be achieved preferably in a main living space. The guidelines recommends the sunlight hours should be assessed preferably on the 21st March over the course of the day. The guidelines sets 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 does give an example of a well designed floor layout in figure below where 4 out of 5 (80%) units in an apartment building would achieve the target sunlight.

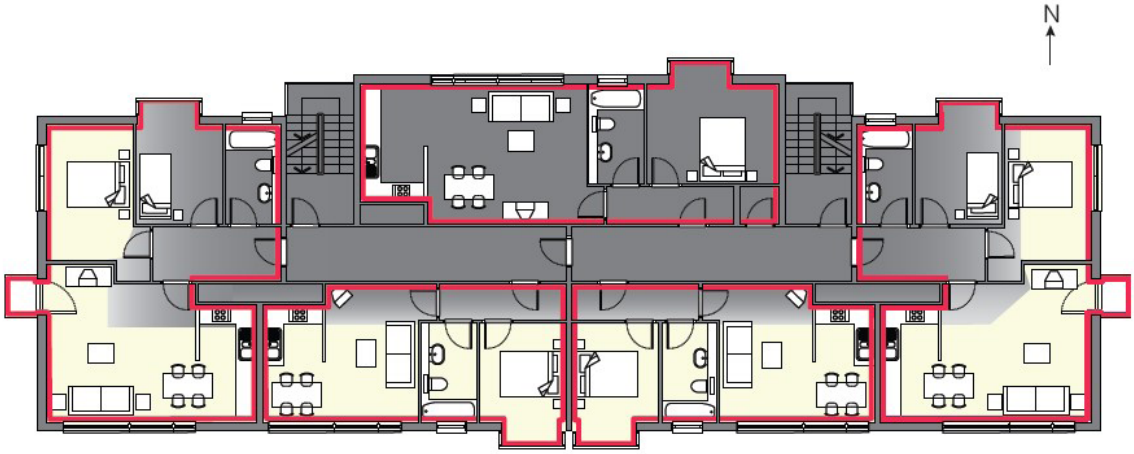


Figure 26: Careful layout design means that four out of the five flats shown have a south-facing living room

Figure 4: Extract from BR209:2022 Section 3 Sun-lighting: Diagram indicating sample floor plan to maximise units with a main living space facing south.

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

Sunlight Hours Summary Table									
	Total Units	Rooms with a window within 90° South		Below recommendation <1.5 hours	Minimum >1.5 hours	Medium >3 Hours	High >4 Hours	Number meets criteria	Ratio meets criteria
		No.	Ratio						
Apartments	62	35	56.5%	0	11	4	47	62	100.0%

Table 8: 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 acknowledges that for large developments with site constraints its not possible to achieve south facing windows to all main living spaces. In this development all of the units were assessed, 35 no. (56.5%) have window to a Living room or Kitchen/ Dining room which face within 90° South.

Often windows with an aspect of greater than 90° due South, to the North West or North East, will still receive sunlight, but it is likely to be lesser amounts especially in the winter period. In this development of 62 units, 100% have a living spaces achieve the minimum recommended 1.5 direct sunlight hours.

6.3 Conclusion

In this development of 62 units, 100% have a living spaces which achieves the minimum recommended 1.5 direct sunlight hours. These results are in line with the BRE guidelines example for an apartment layout where 1 in 5 achieves the target sunlight hours.

7. Sunlight to amenity within the proposed development

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

7.1 Sunlight to amenity within the proposed development

The amenity area within this proposal have been assessed with a calculation of Sun on the Ground on the 21st March. Generated analysis is shown in Figure 4 and the results are set out in Table 8 below.

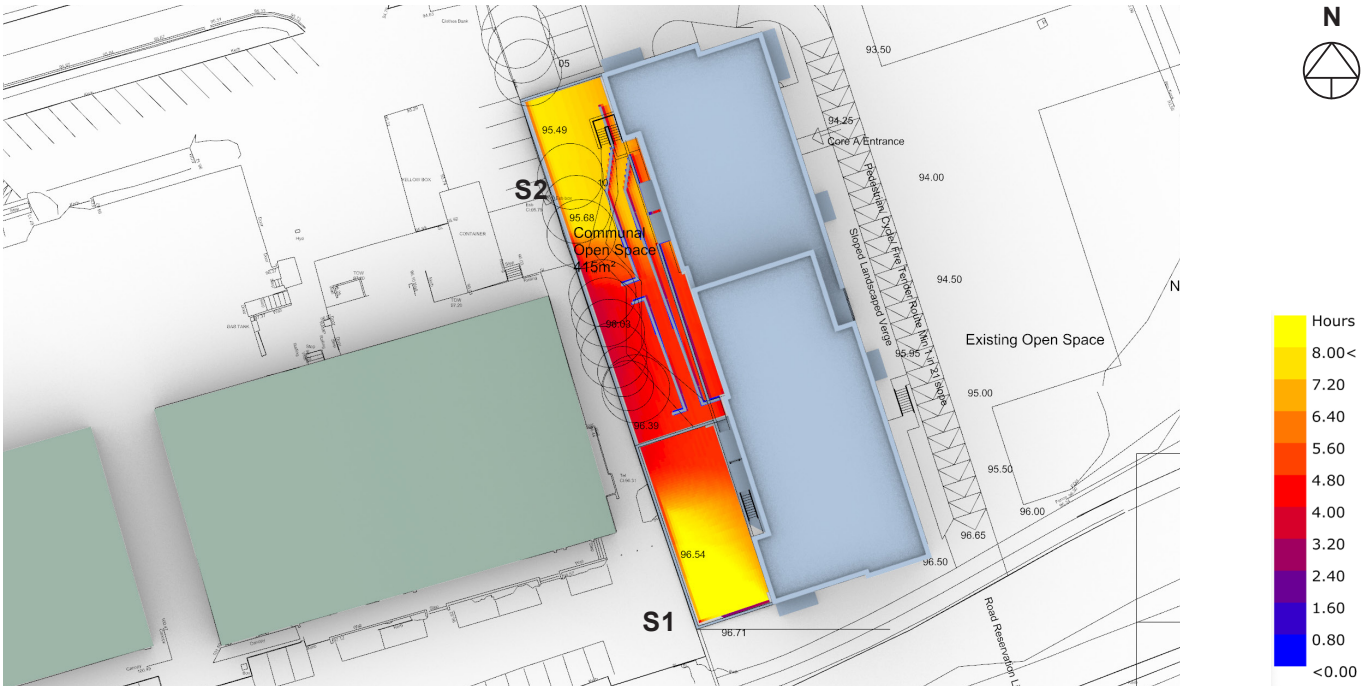


Figure 5: Radiation map of amenity within the Proposed Development, showing available sunlight on 21st March. The scale represents the percentage of daylight received from 0 - 8 hrs.

Sunlight on the ground - within development			
No.	Use	Proposed	Meets criteria of >50% area
S1	Creche	99.5%	Yes
S2	Communal open space	88.7%	Yes

Table 9: Calculation of Sun on the Ground to amenity area within the proposed development.

7.2 Conclusion

The communal amenity space and the creche area are well oriented for sunlight and will achieve 2 hours sunlight on the 21st March over in excess of 50% of the area. The proposed development meets the recommendations of the BRE guidelines for gardens and open spaces.

8. Shadow Diagrams

8.1 BRE Guidance on Shadow Studies

Shadow diagrams are a visual aid to understand where possible shading may occur. 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 and it is common for large areas of the ground to be in shadow throughout the day especially in a built up area and sun barely rises above an altitude of 10° during the course of the day. The guidelines recommends that Sunlight at an altitude of 10° or less does not count. Below are the times for the Equinox and Solstice that the sun is above 10° altitude rounded to the nearest half hour.

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

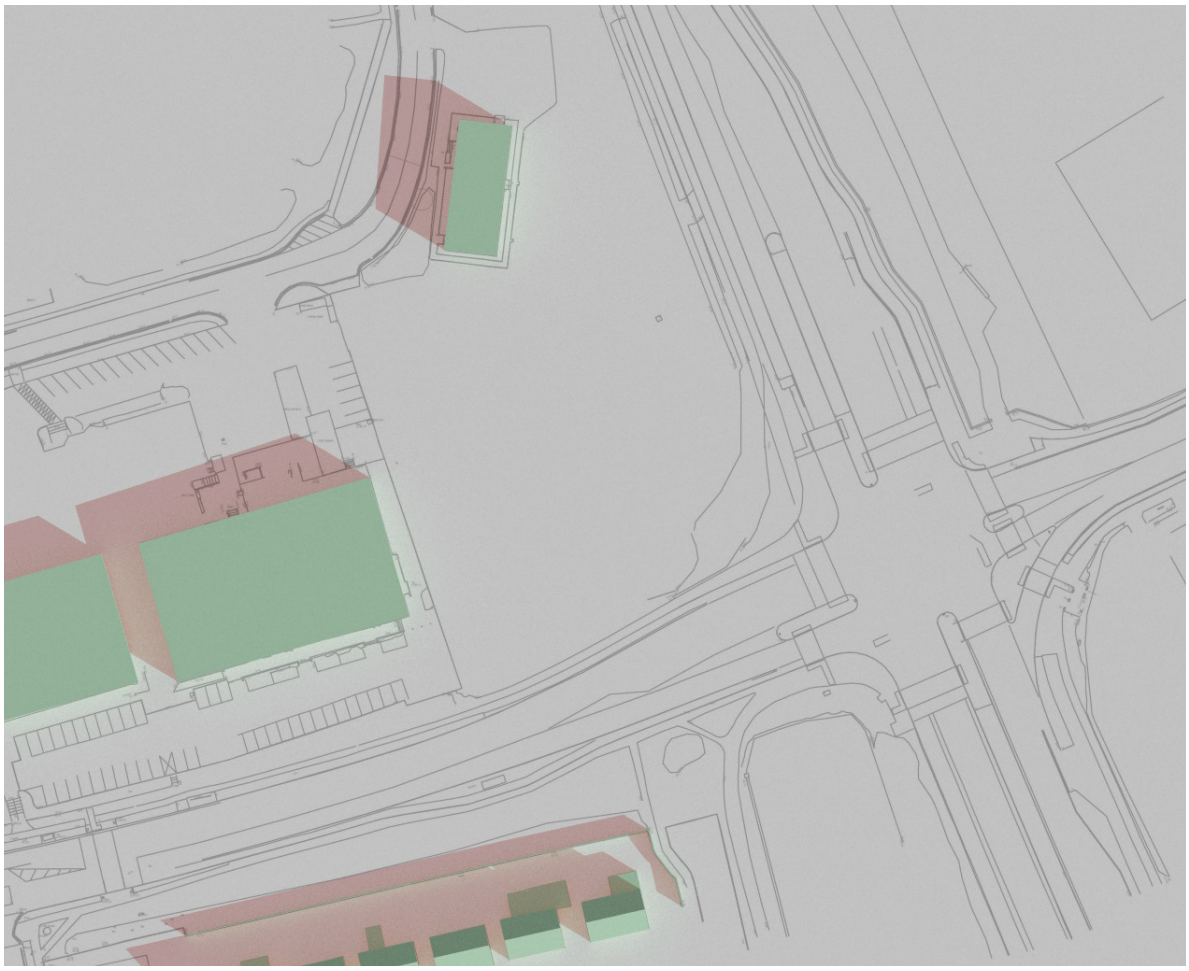
Section 8.2 shows the existing and proposed shadow diagrams for the Equinox on the 21st March at 2 hourly intervals during the day between 09:00 and 17:00.
Section 8.3 shows the existing and proposed shadow diagrams for the Summer Solstice on the 21st June at 2 hourly intervals during the day between 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.

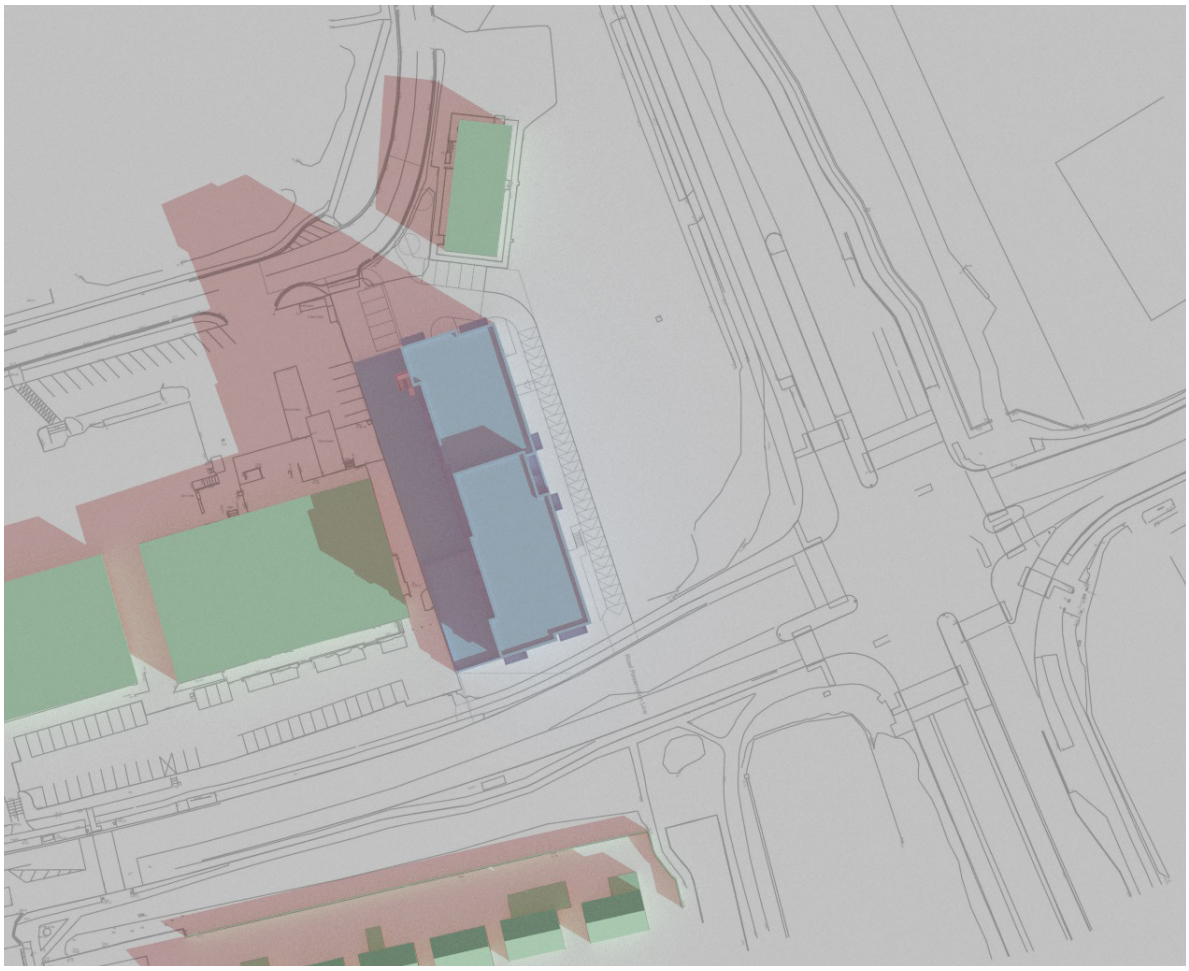
The site is a greenfield site, there is no shadow cast from any structures in the existing scenario. Shadow diagrams are a visual aid to understand where possible shading may occur. The use of shadow diagrams as an assessment method should be taken over the course of the day and not a specific time due to the transient nature of the sun and the shade caused by obstructions.

8.2 Shadow Casting diagrams March Equinox

Existing

N



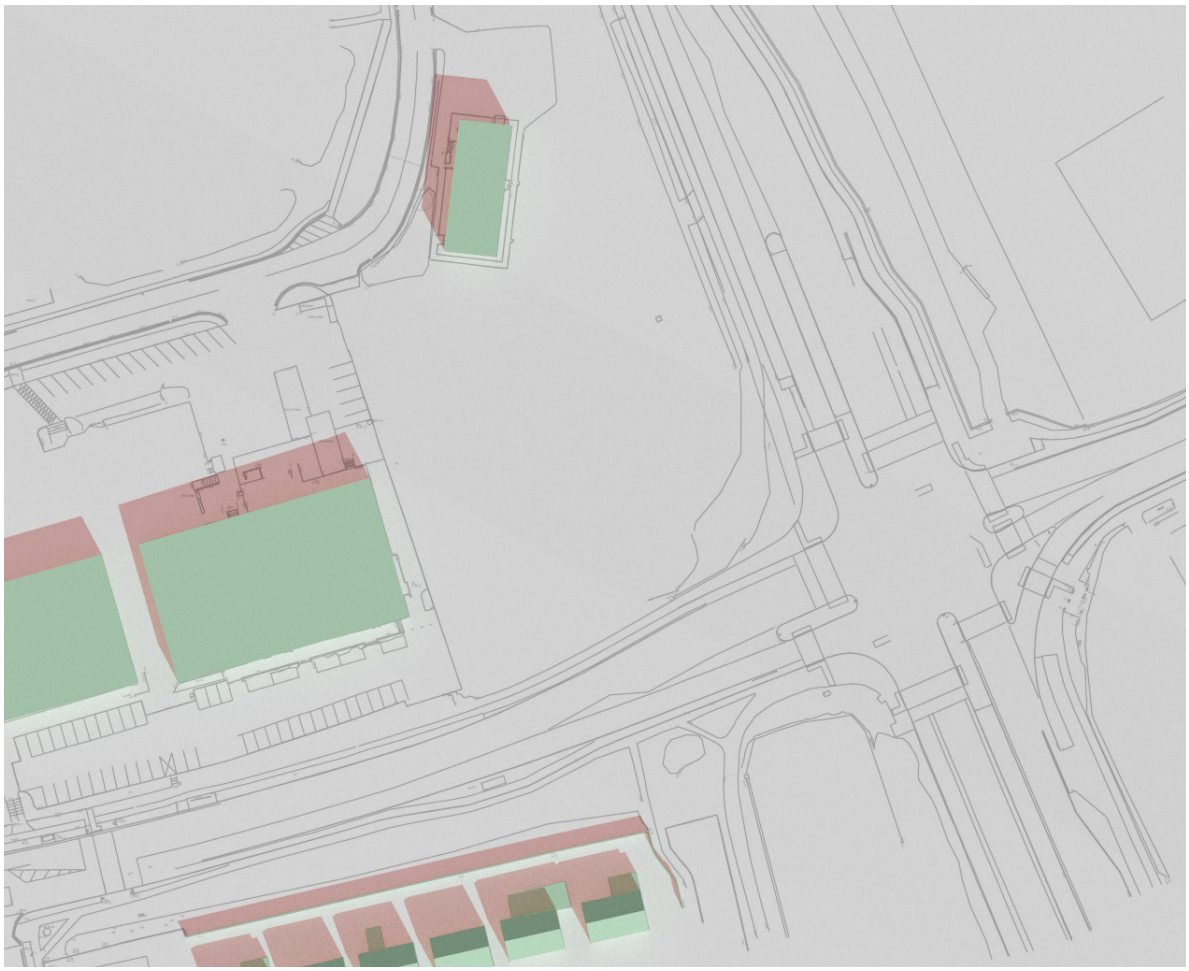


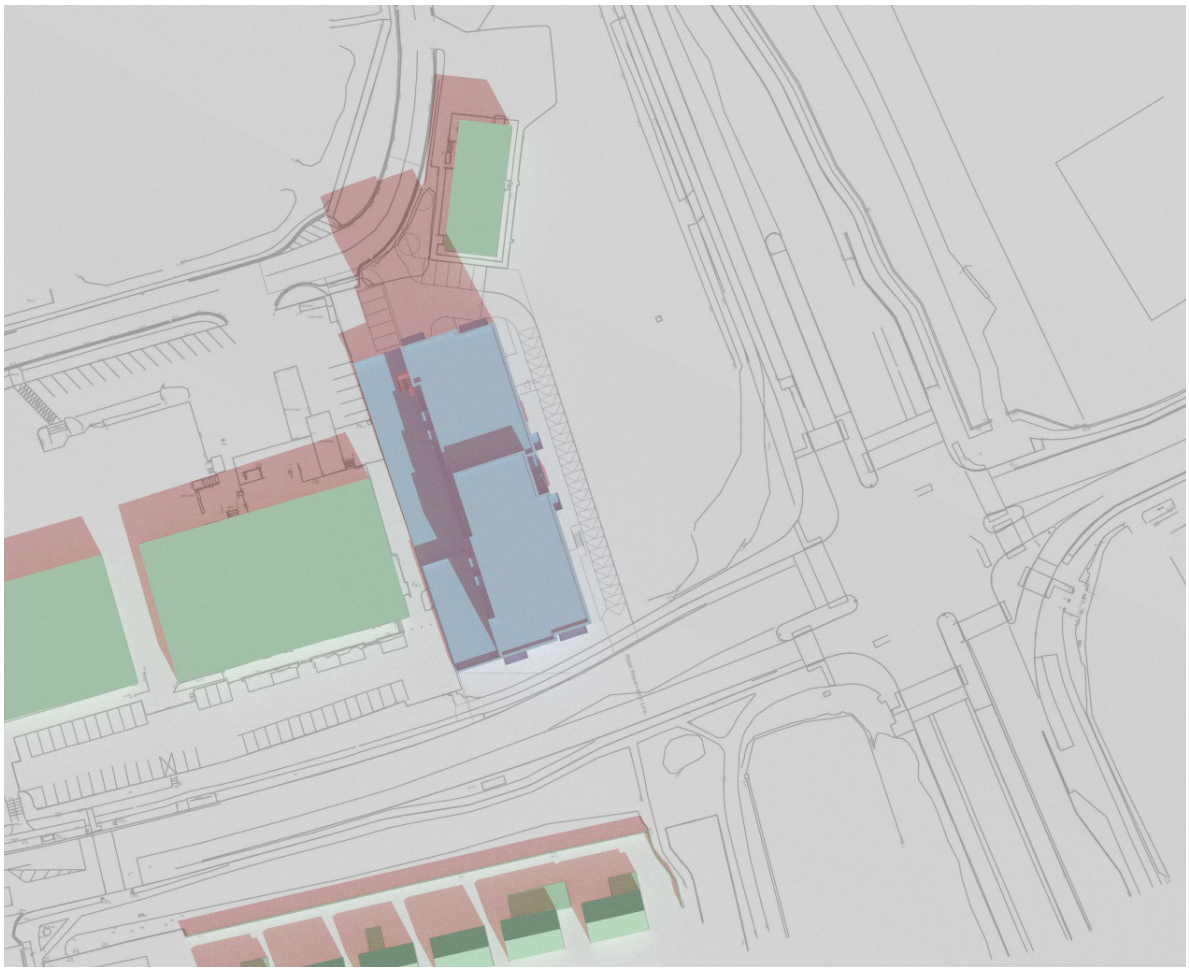
Proposed

Figure 6: Shadow diagrams 21 March 09:00 UTC

Existing

N



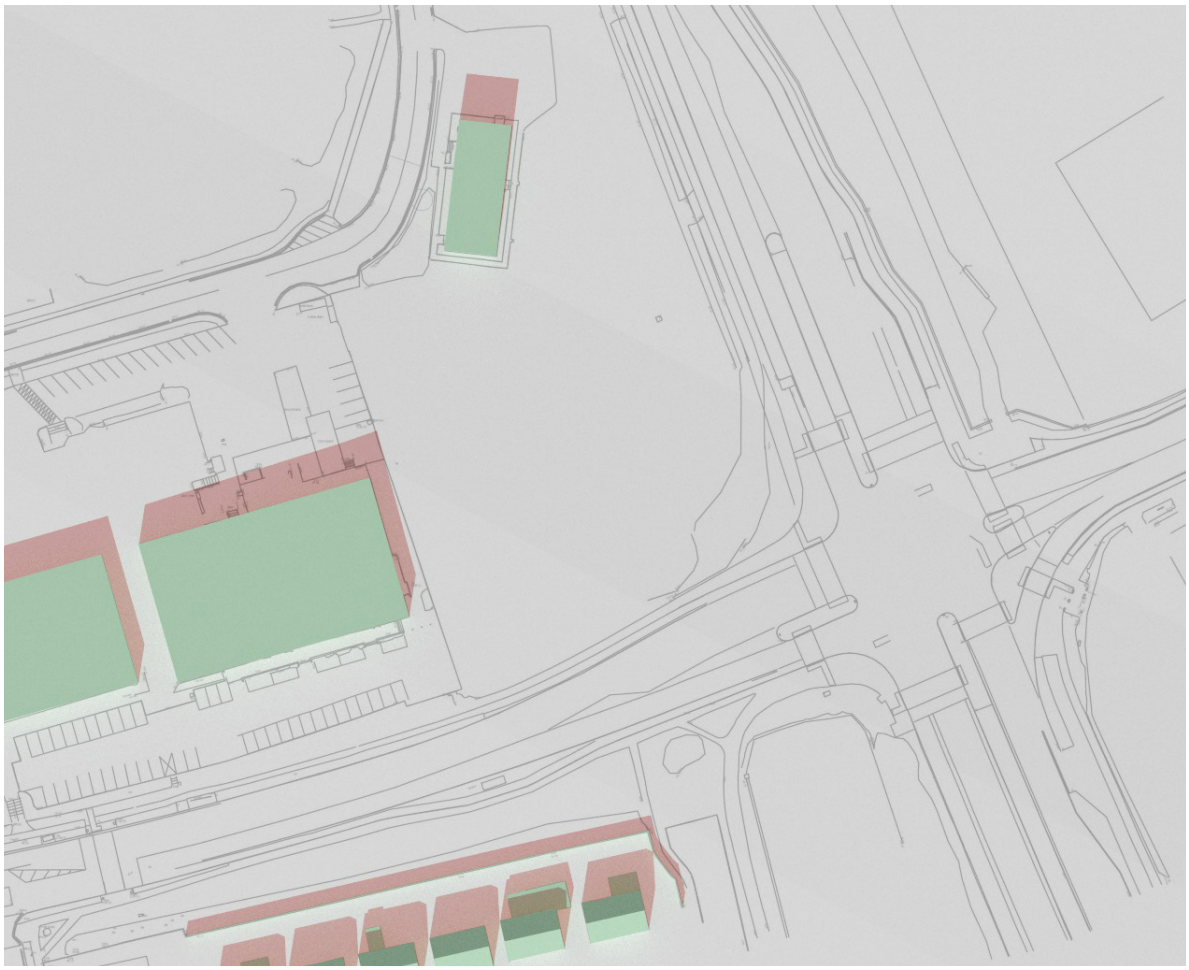


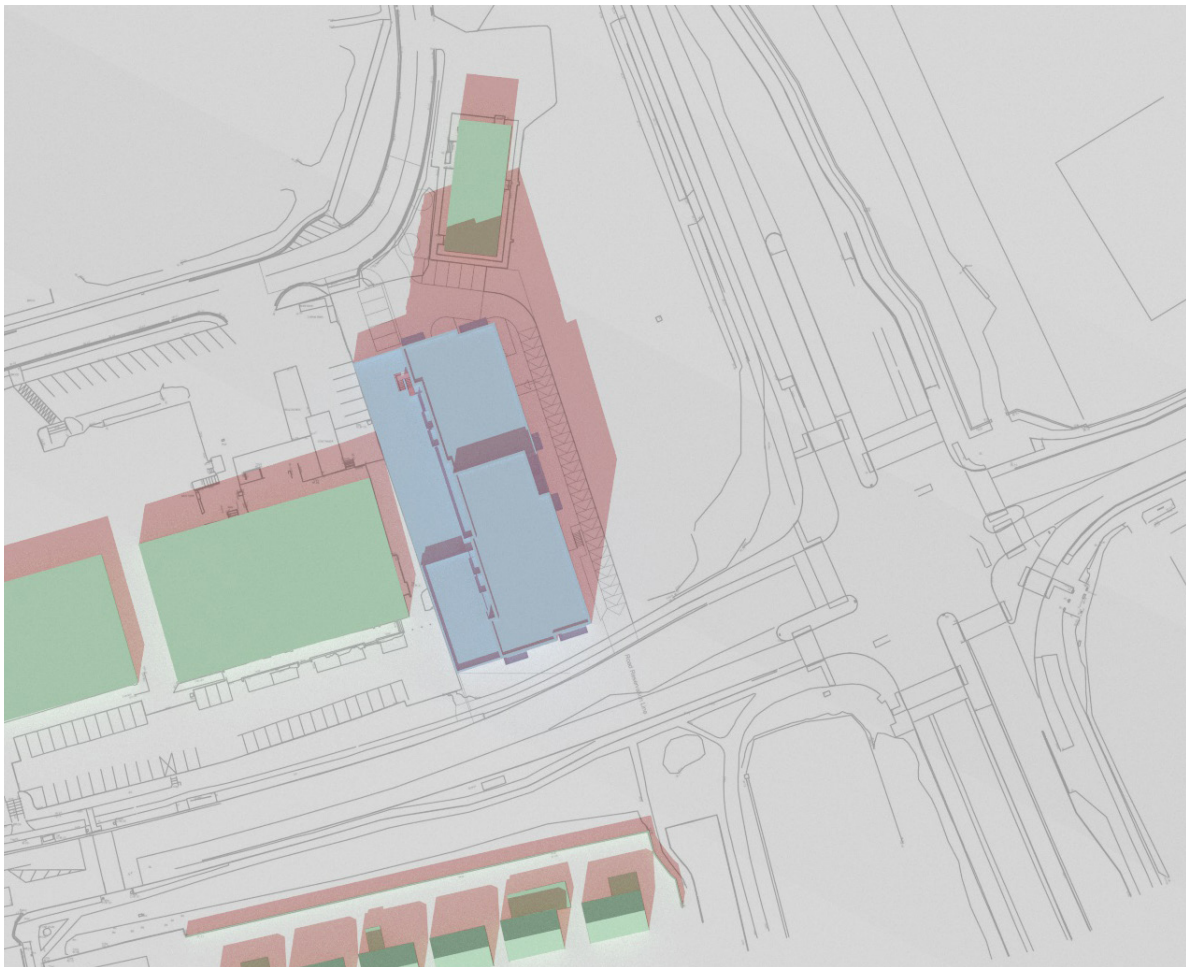
Proposed

Figure 7: Shadow diagrams 21 March 11:00 UTC

Existing

N



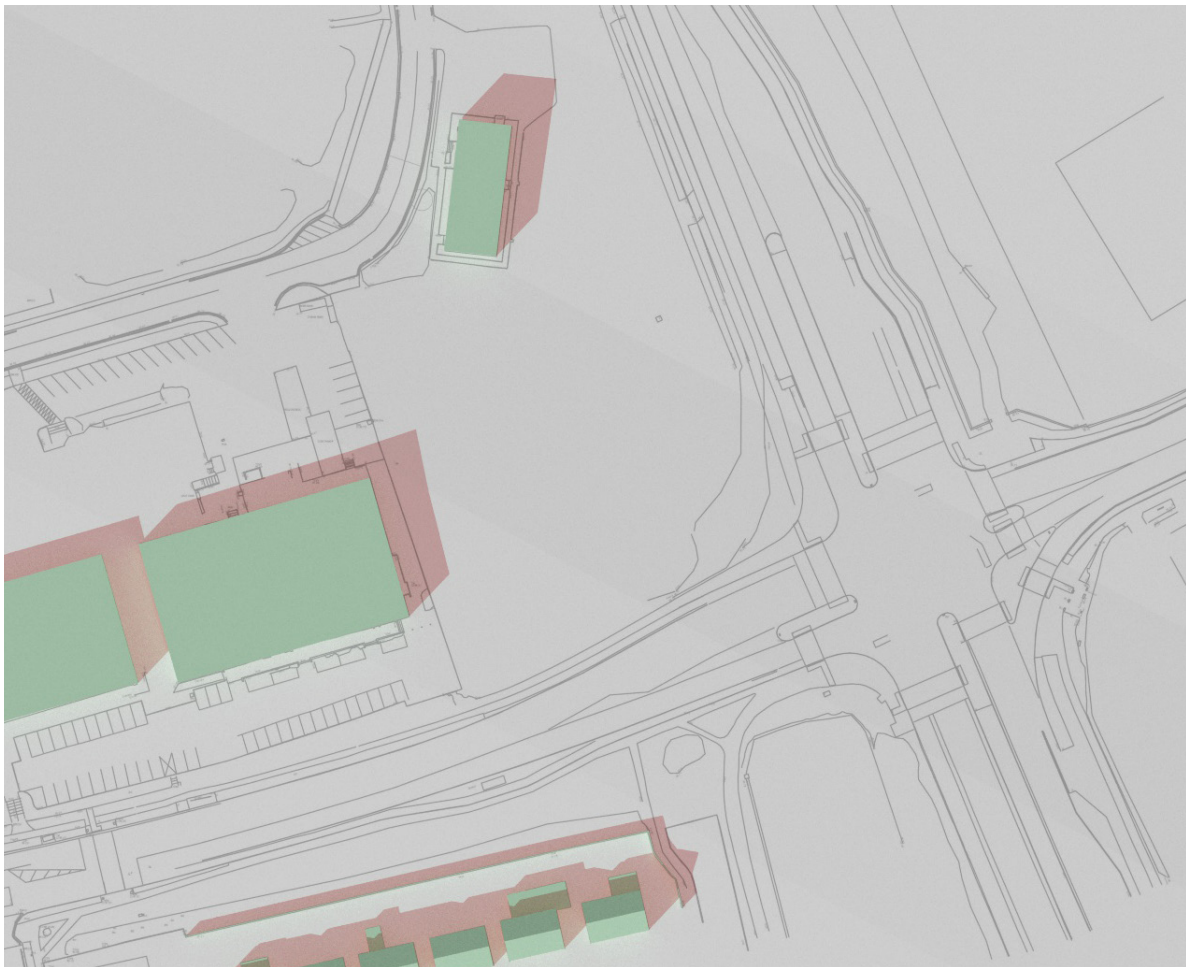


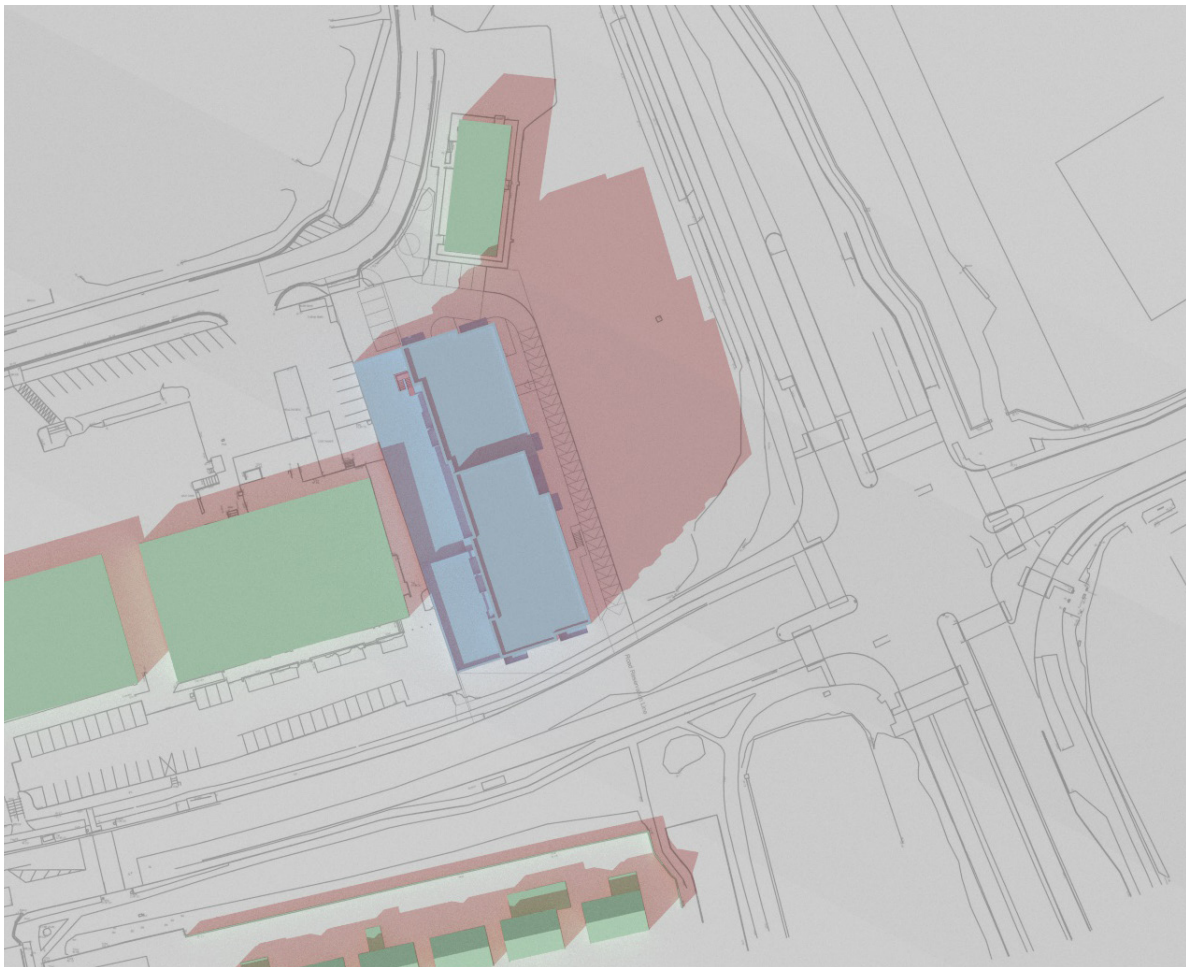
Proposed

Figure 8: Shadow diagrams 21 March 13:00 UTC

Existing

N



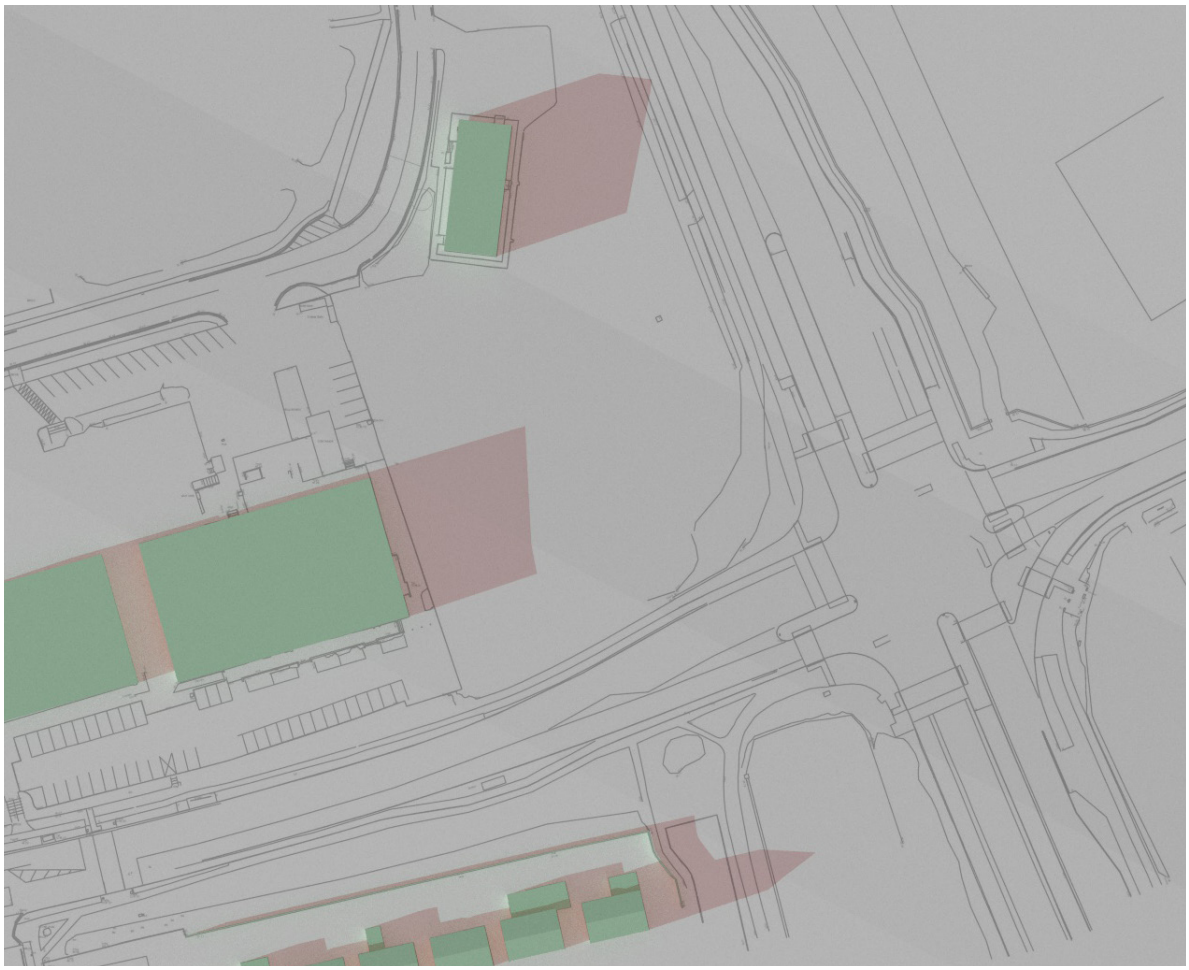


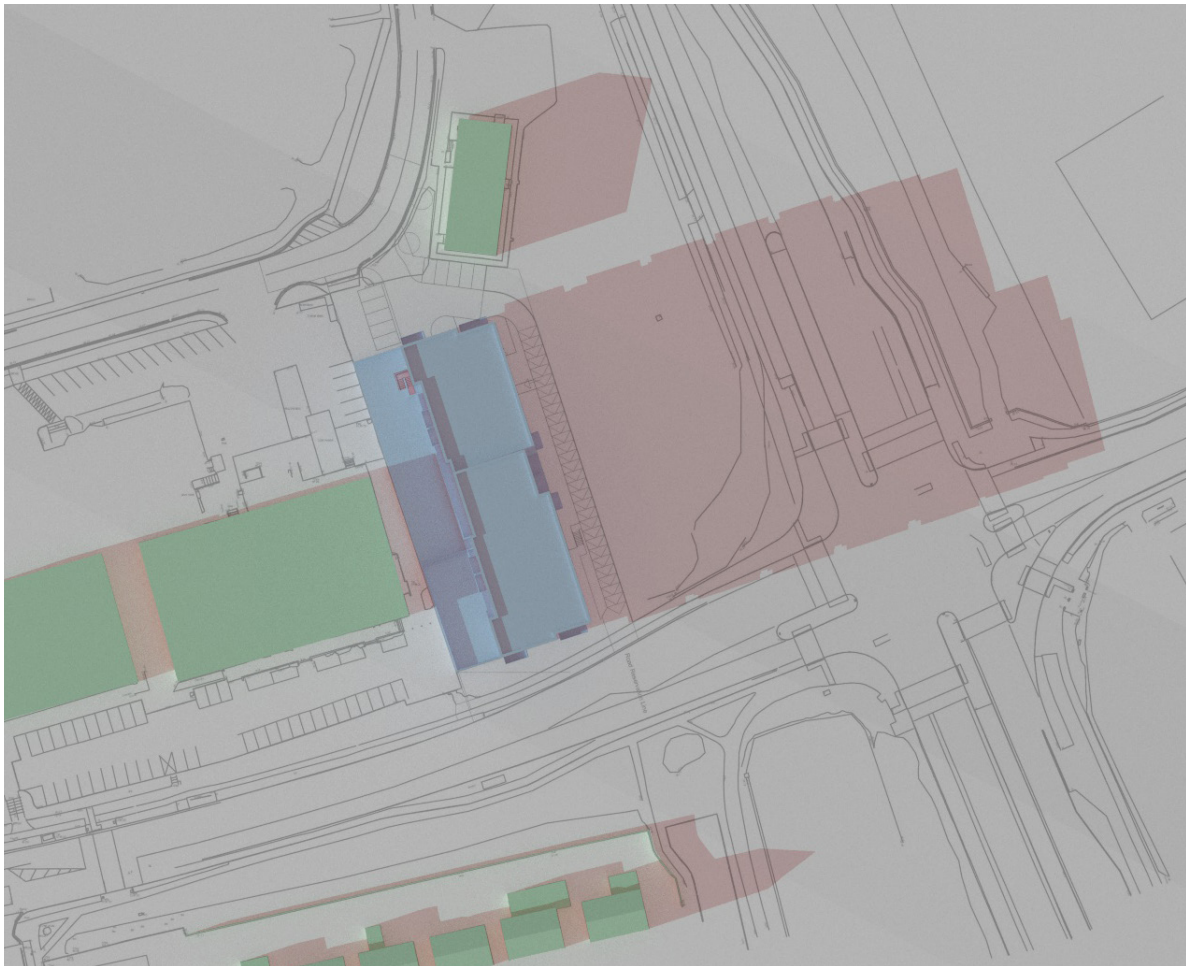
Proposed

Figure 9: Shadow diagrams 21 March 15:00 UTC

Existing

N





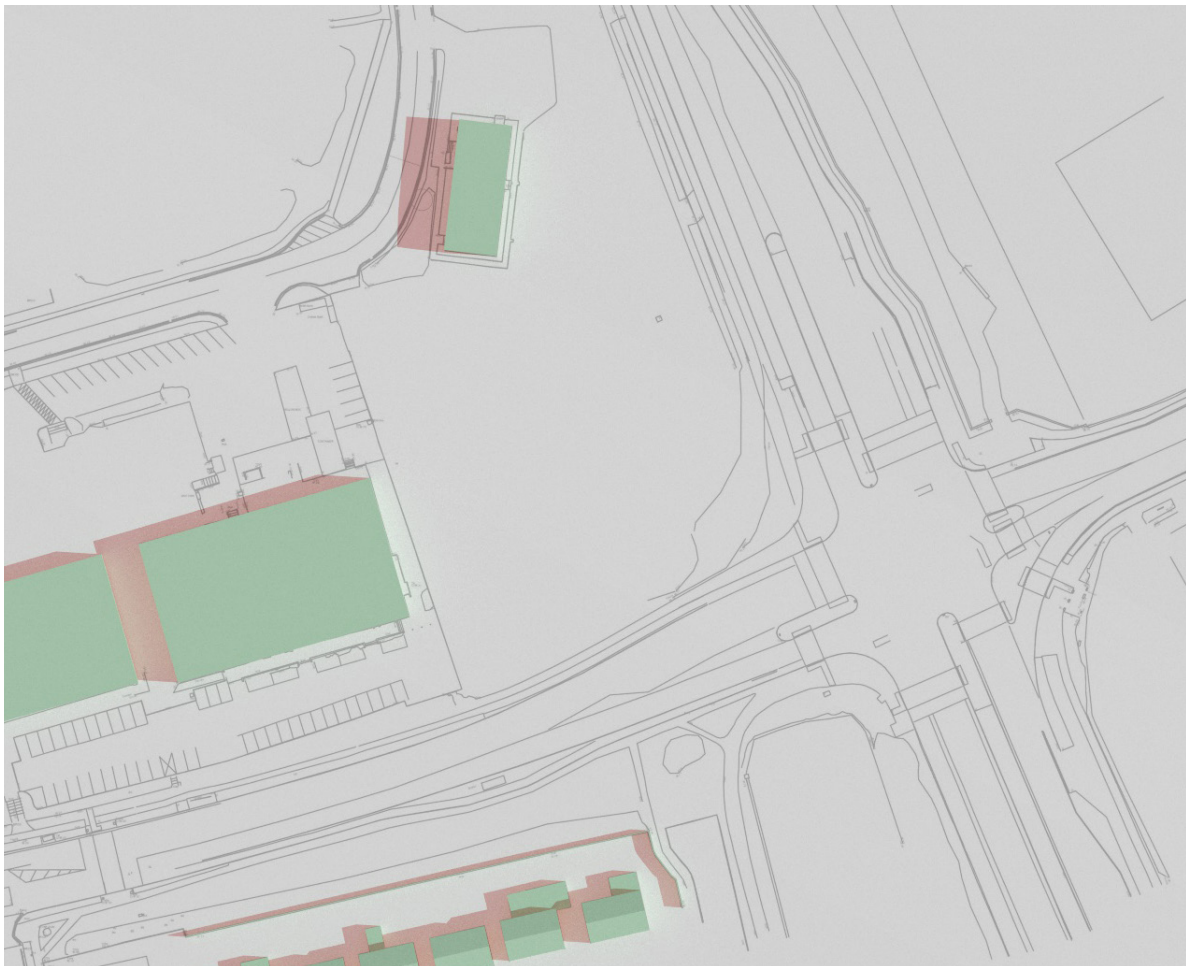
Proposed

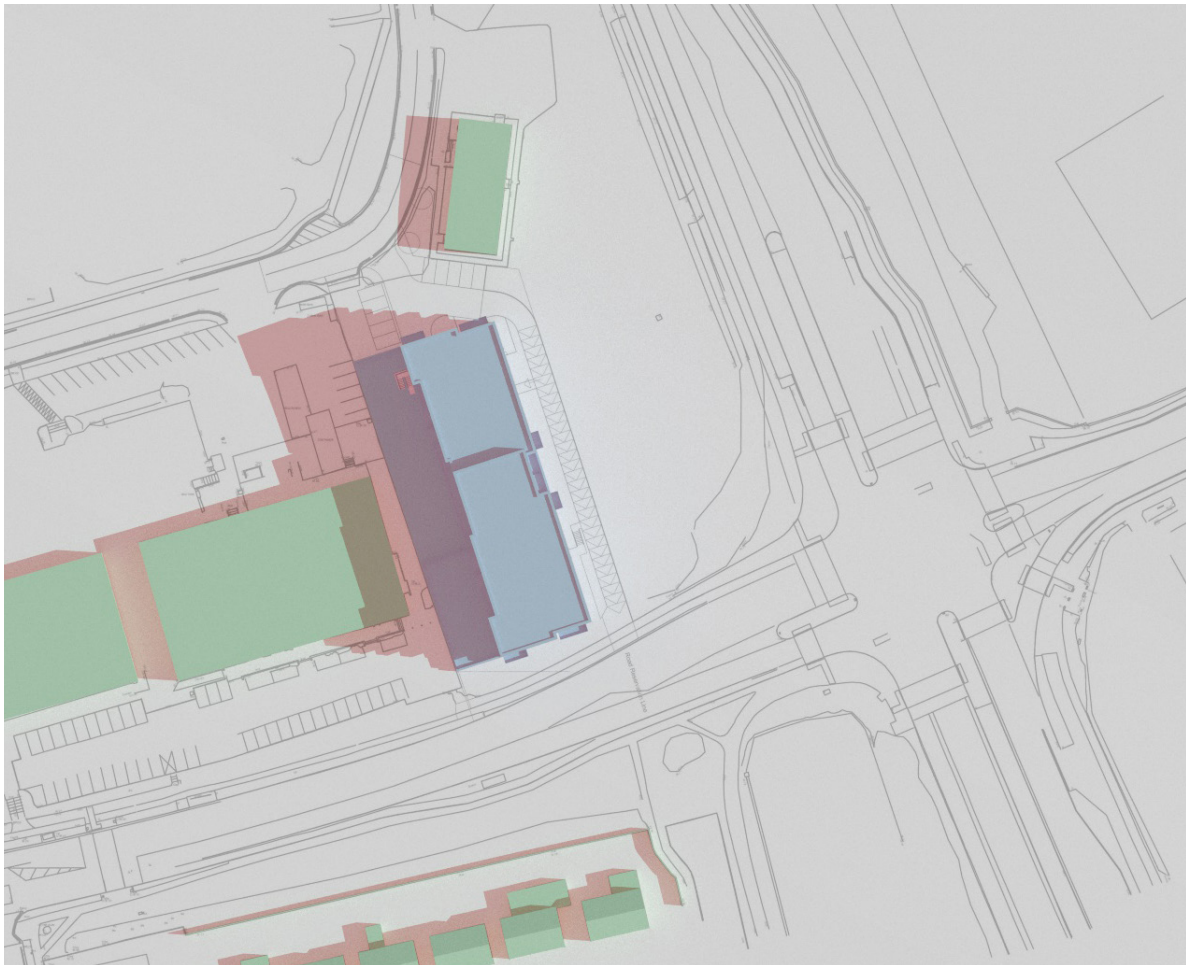
Figure 10: Shadow diagrams 21 March 17:00 UTC

8.3 Shadow Casting diagrams June Solstice

Existing

N

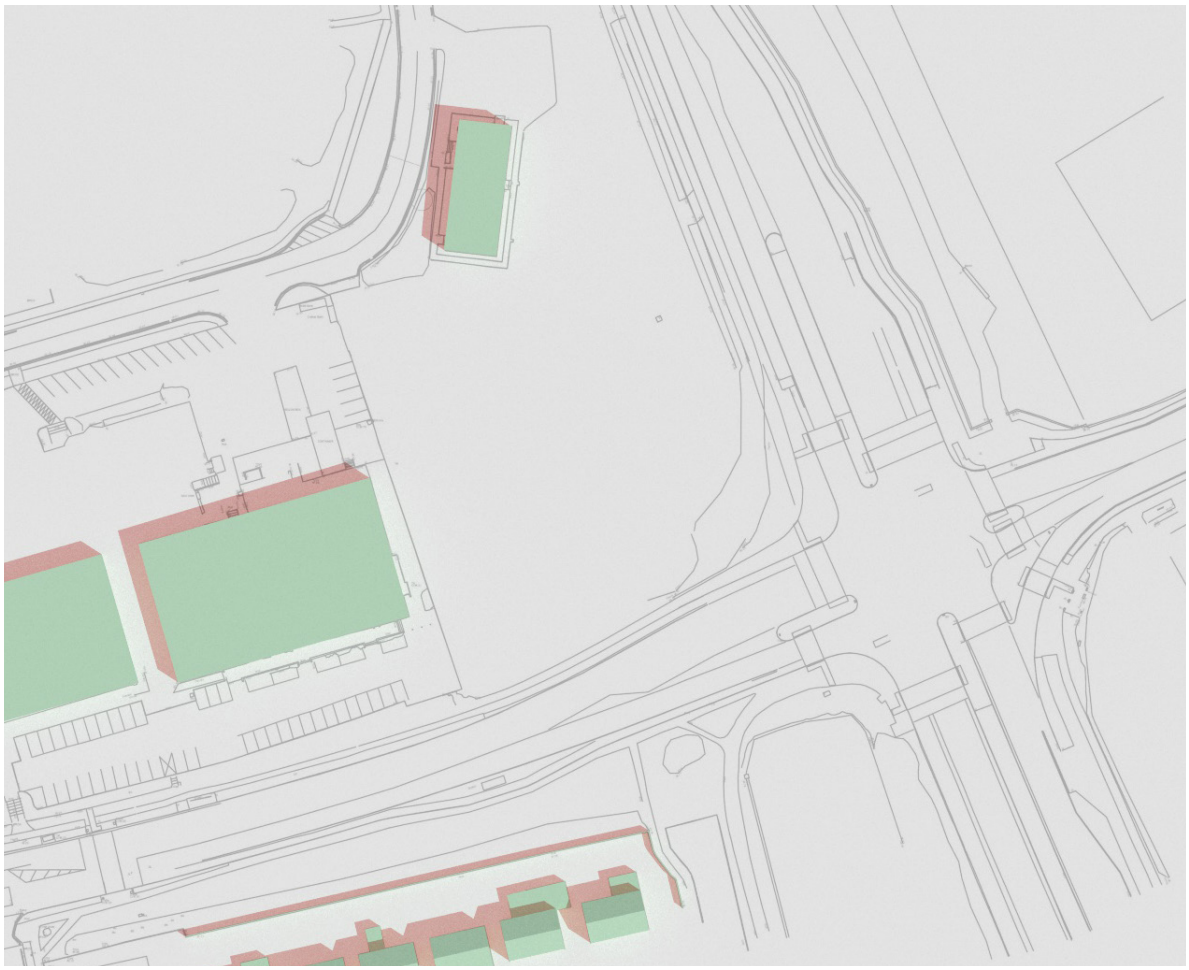




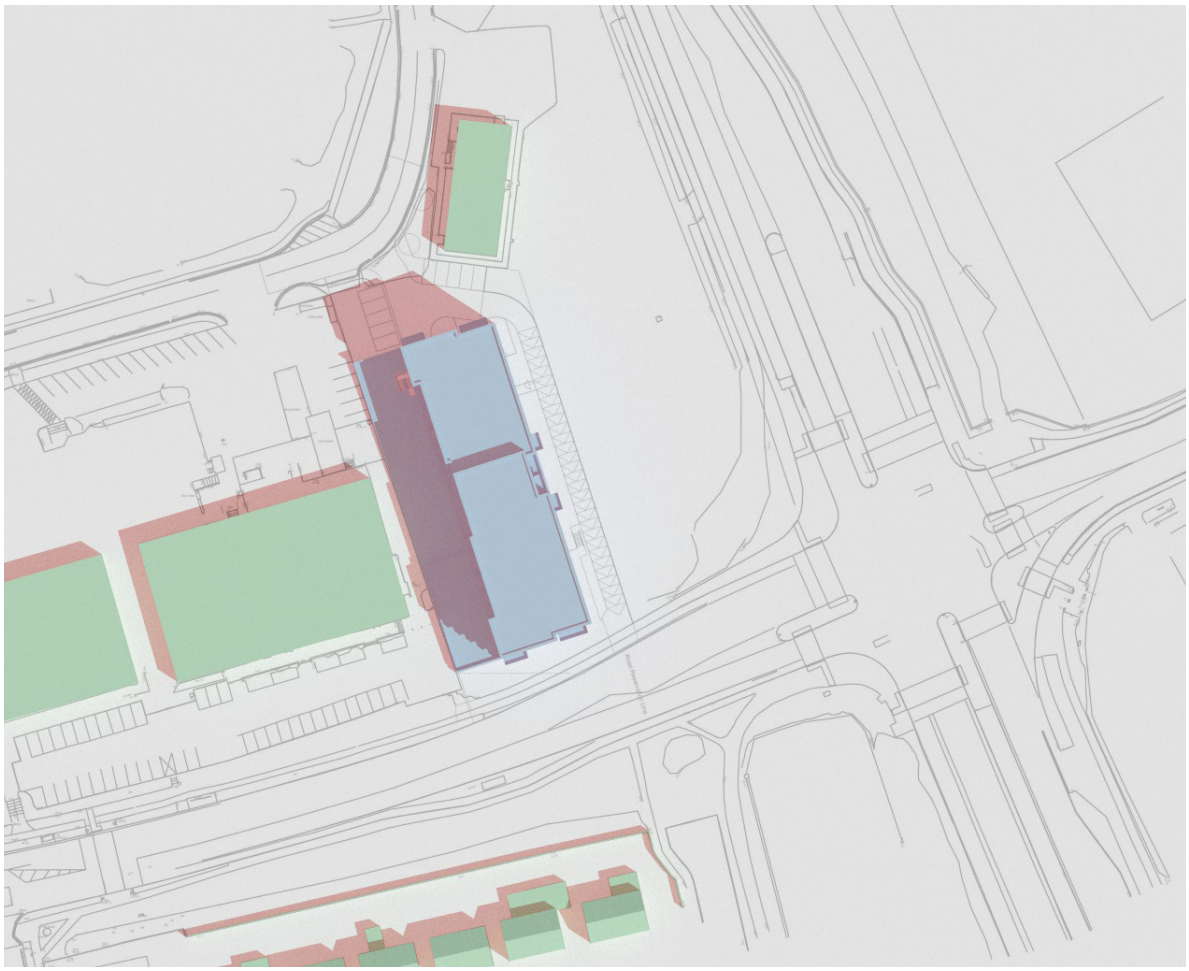
Proposed

Figure 11: Shadow diagrams 21 June 09.00 UTC +1

Existing



N

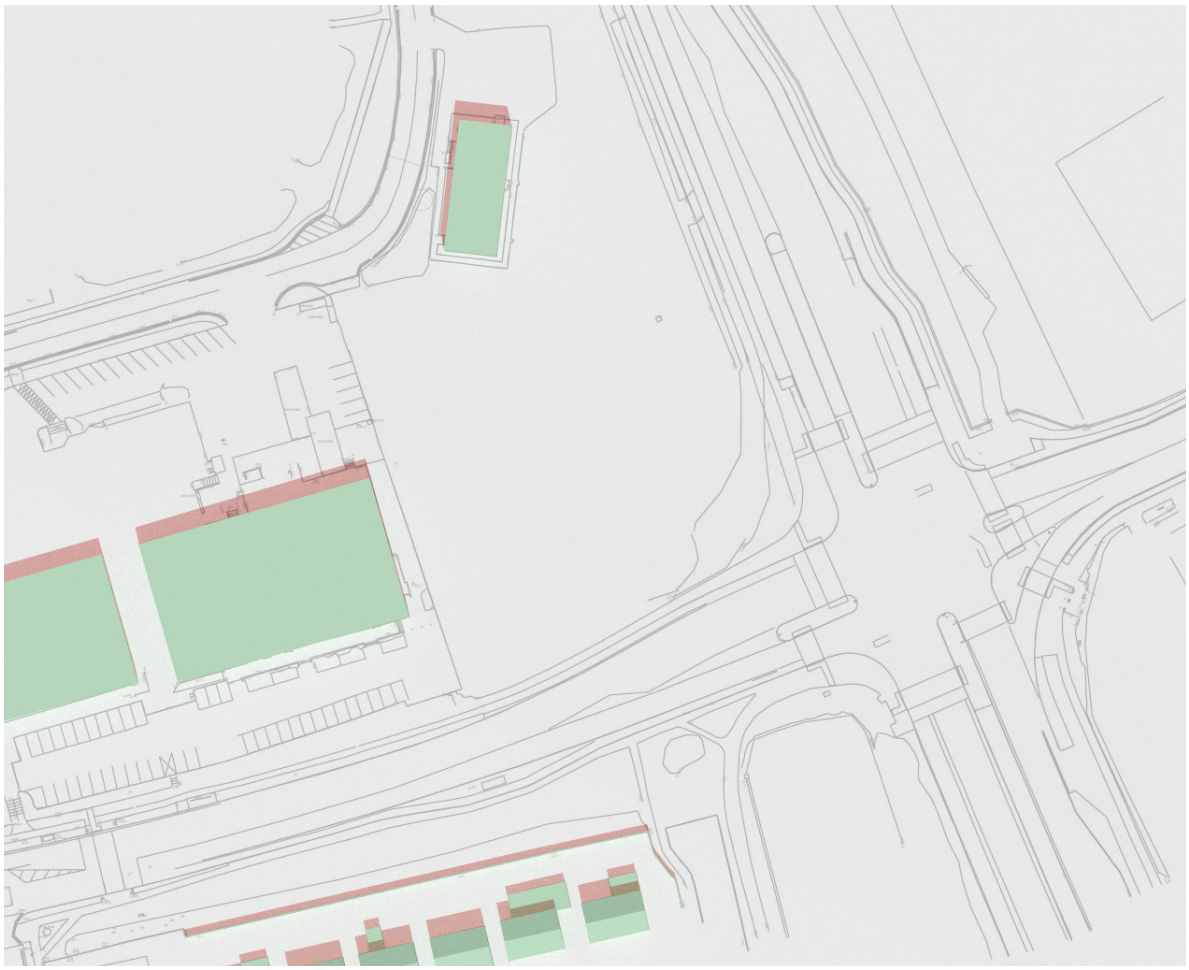


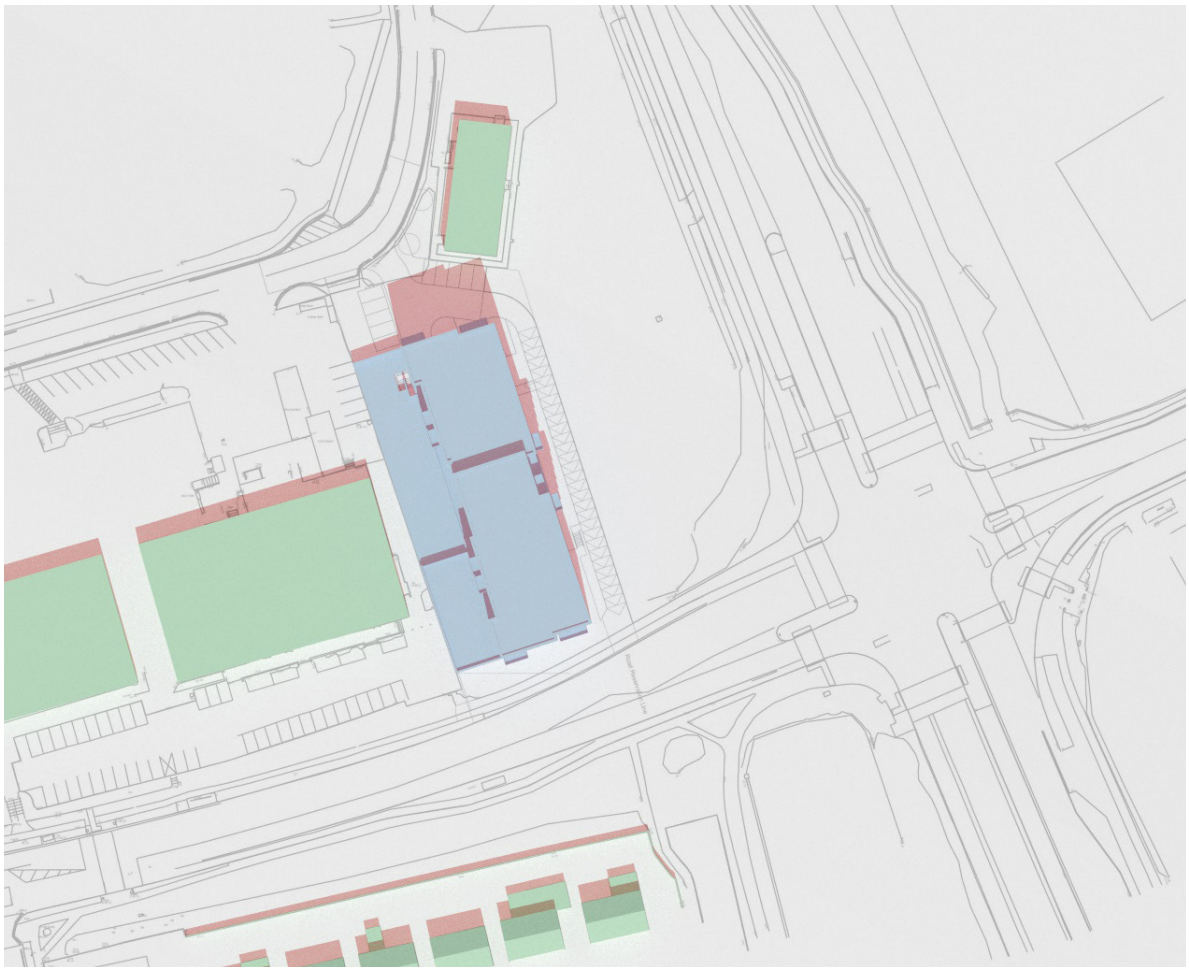
Proposed

Figure 12: Shadow diagrams 21 June 11:00 UTC +1

Existing

N

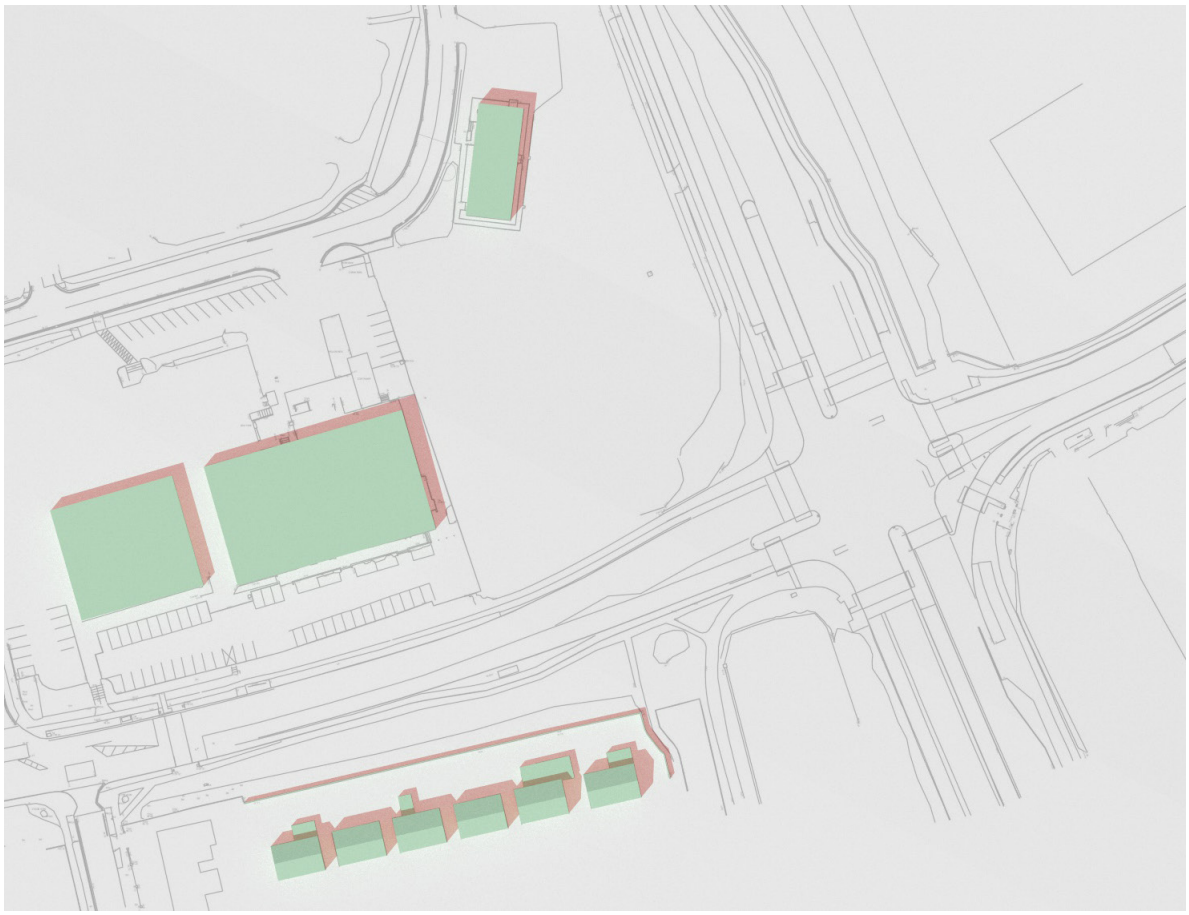




Proposed

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

Existing



N

Proposed

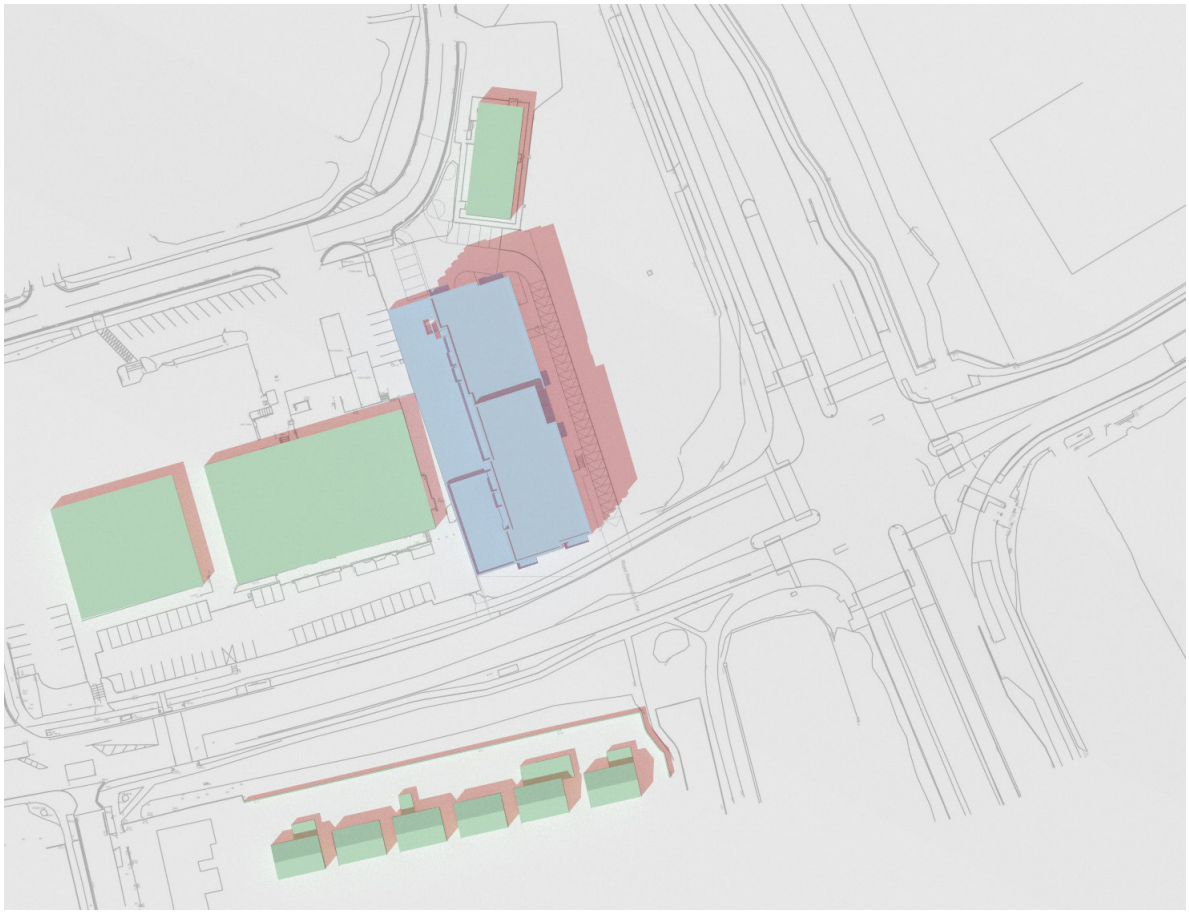
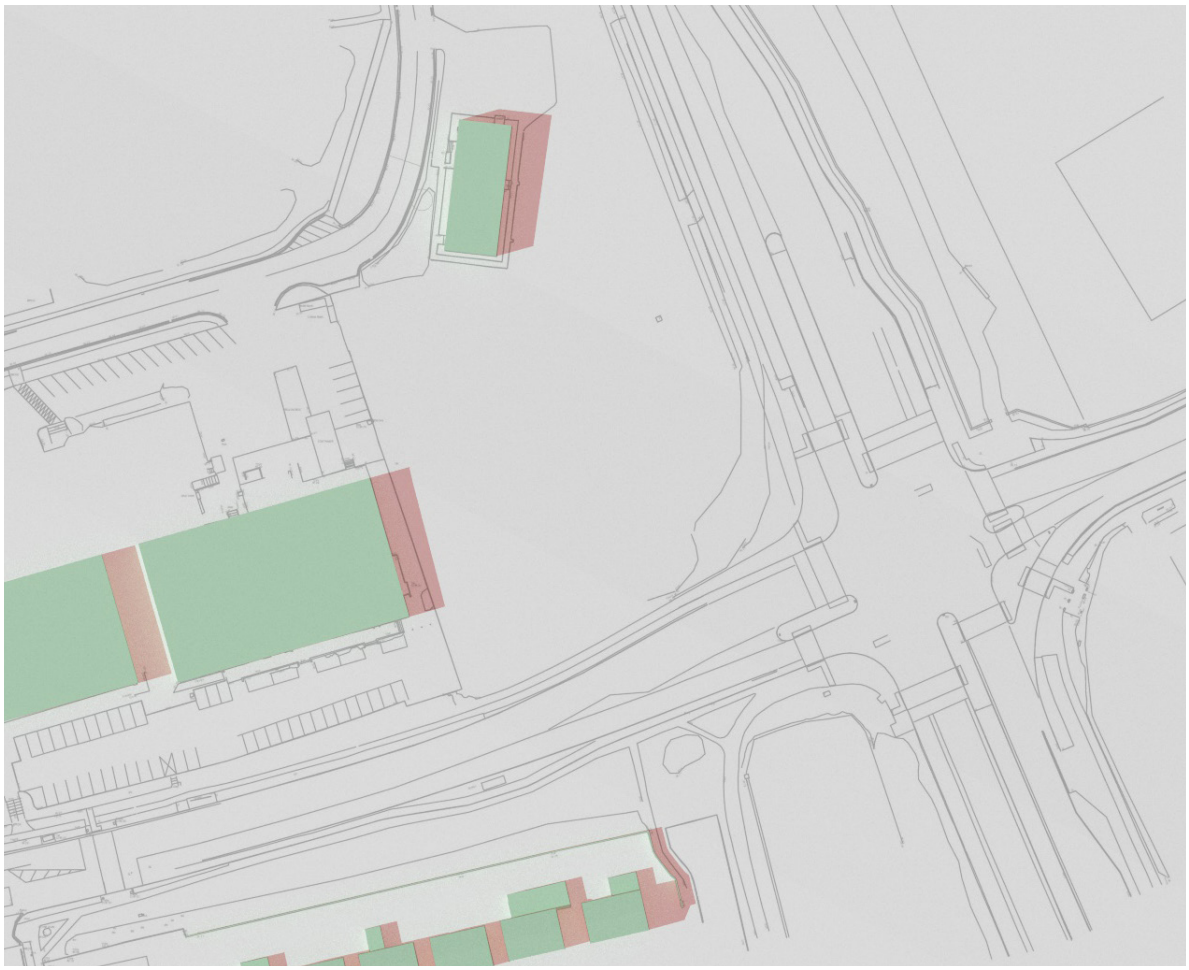


Figure 14: Shadow diagrams 21 June 15:00 UTC +1

Existing



N

Proposed

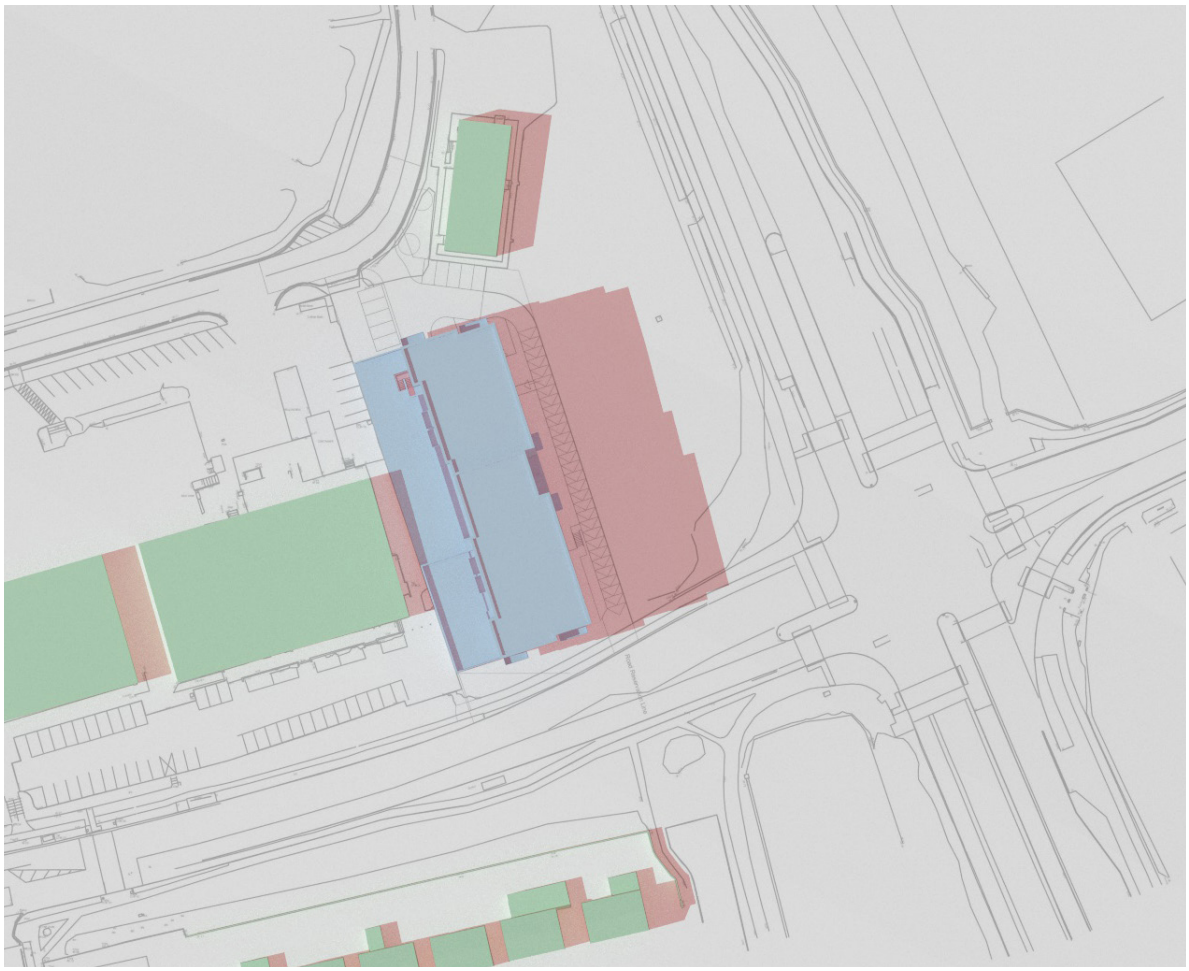
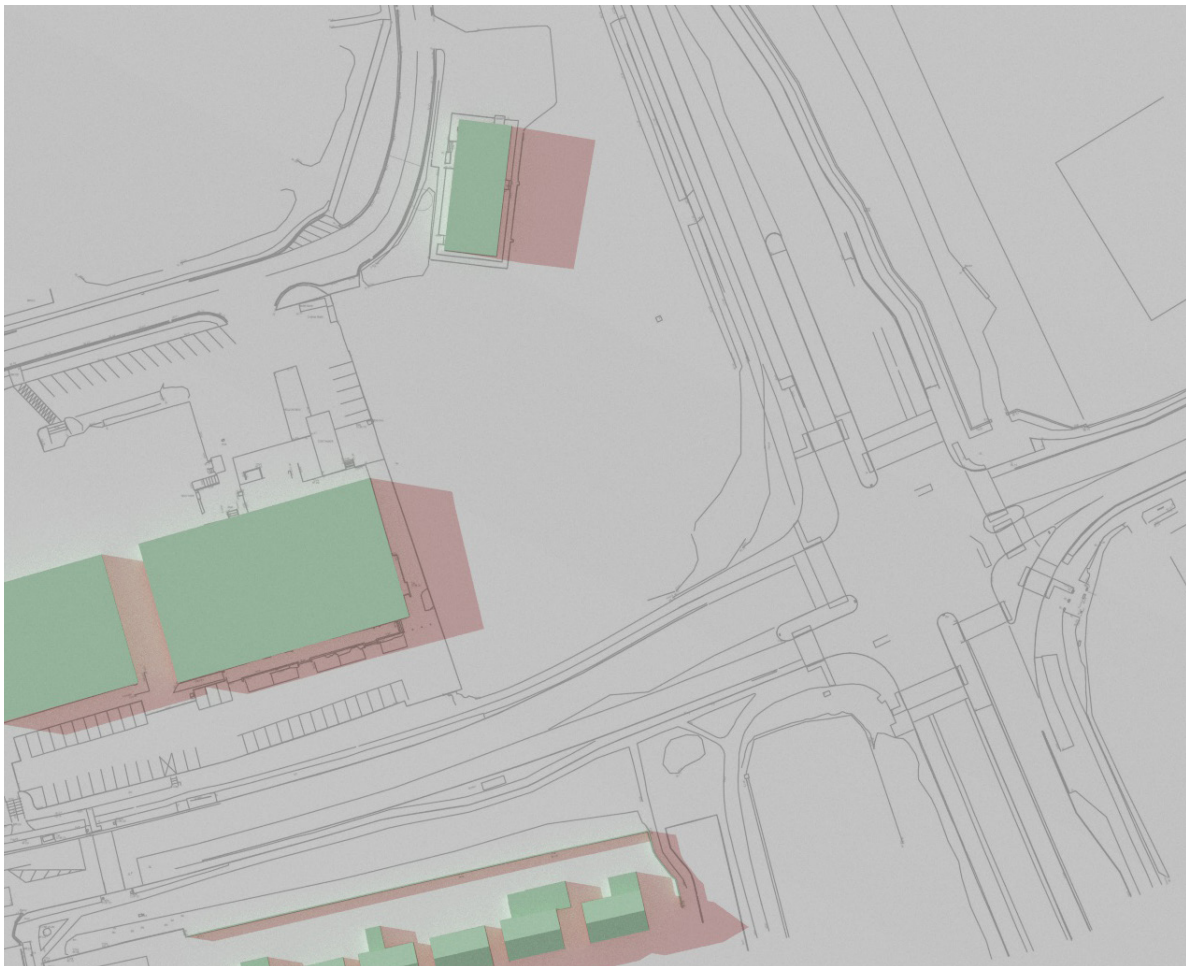
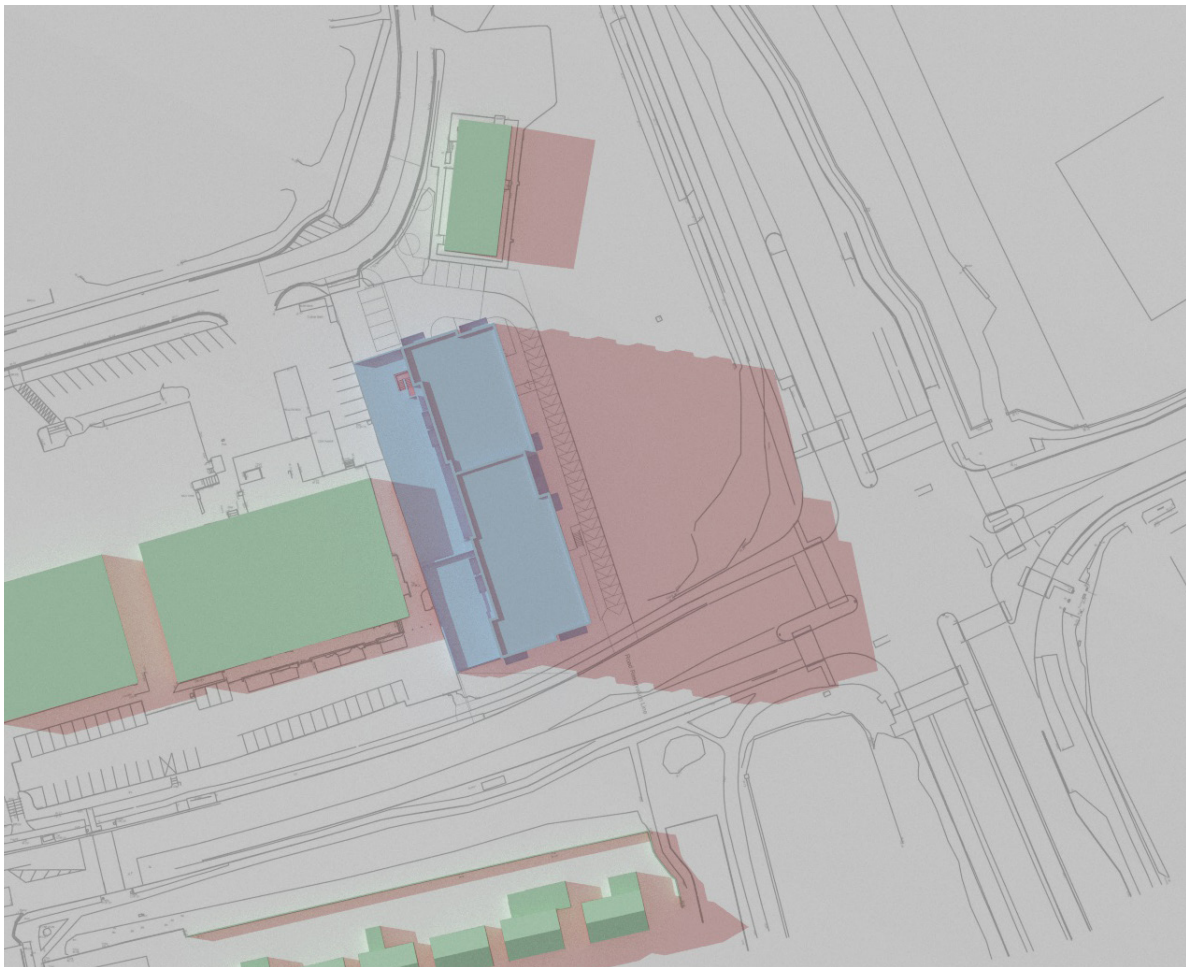


Figure 15: Shadow diagrams 21 June 17:00 UTC +1

Existing

N





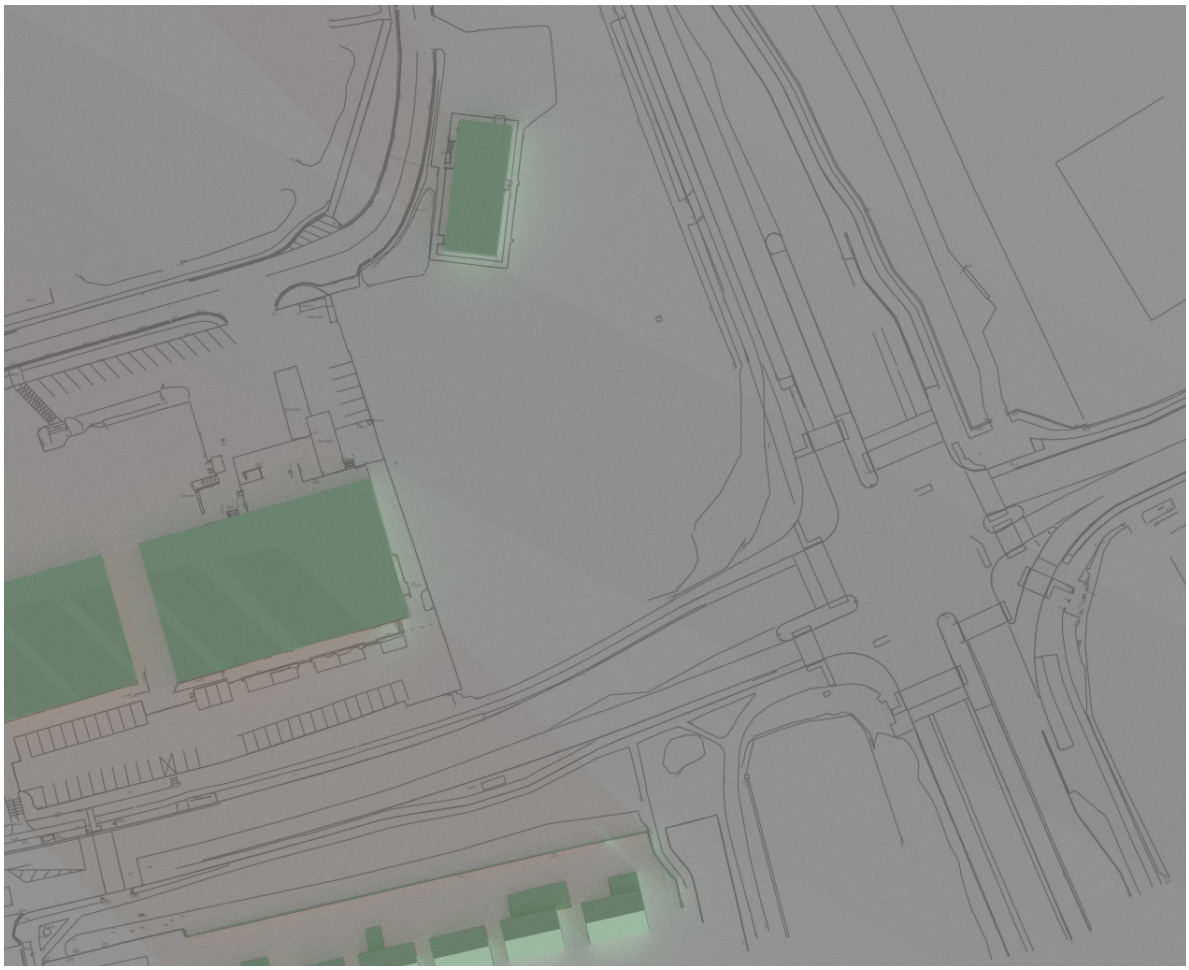
Proposed

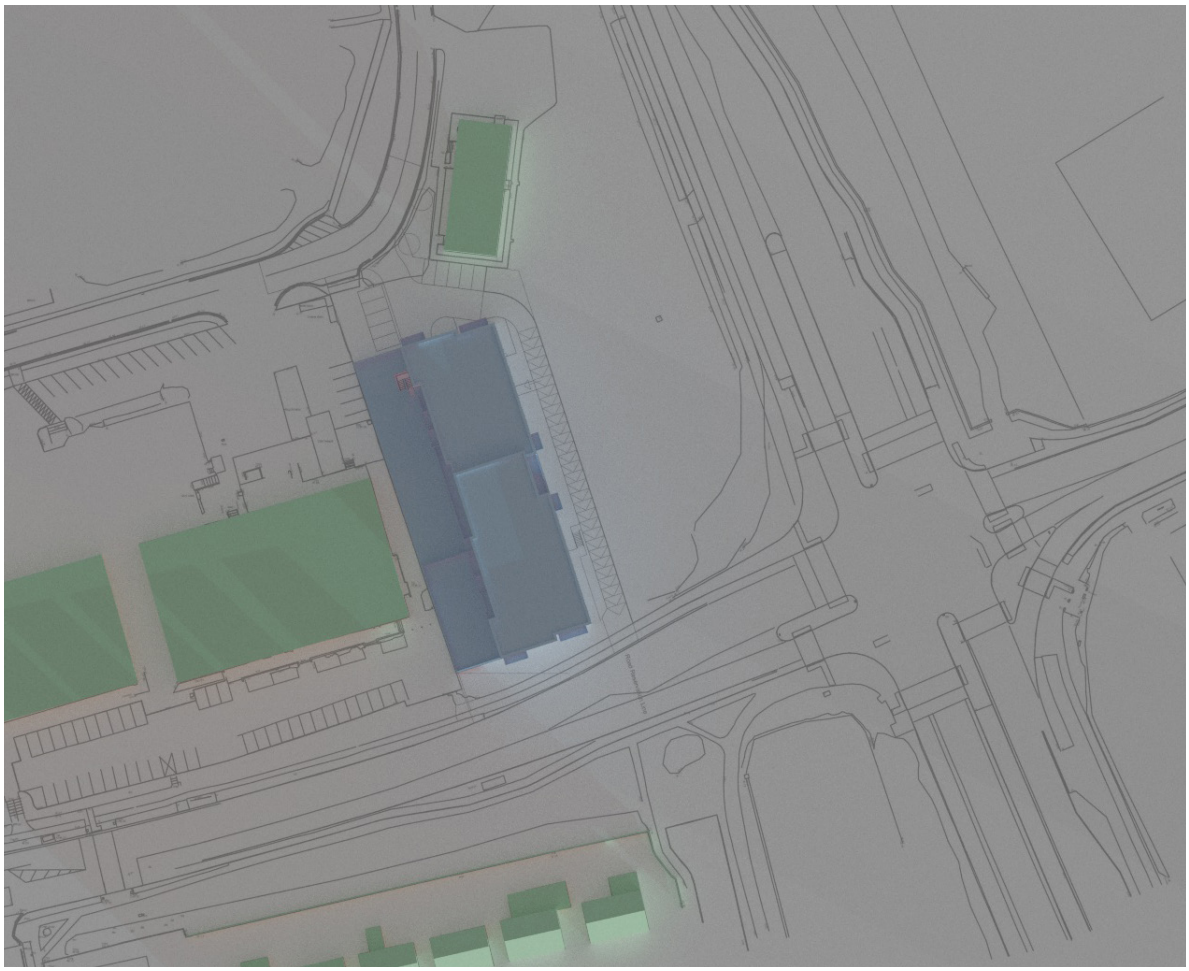
Figure 16: Shadow diagrams 21 June 19:00 UTC +1

8.5 Shadow Casting diagrams December Solstice

Existing

N



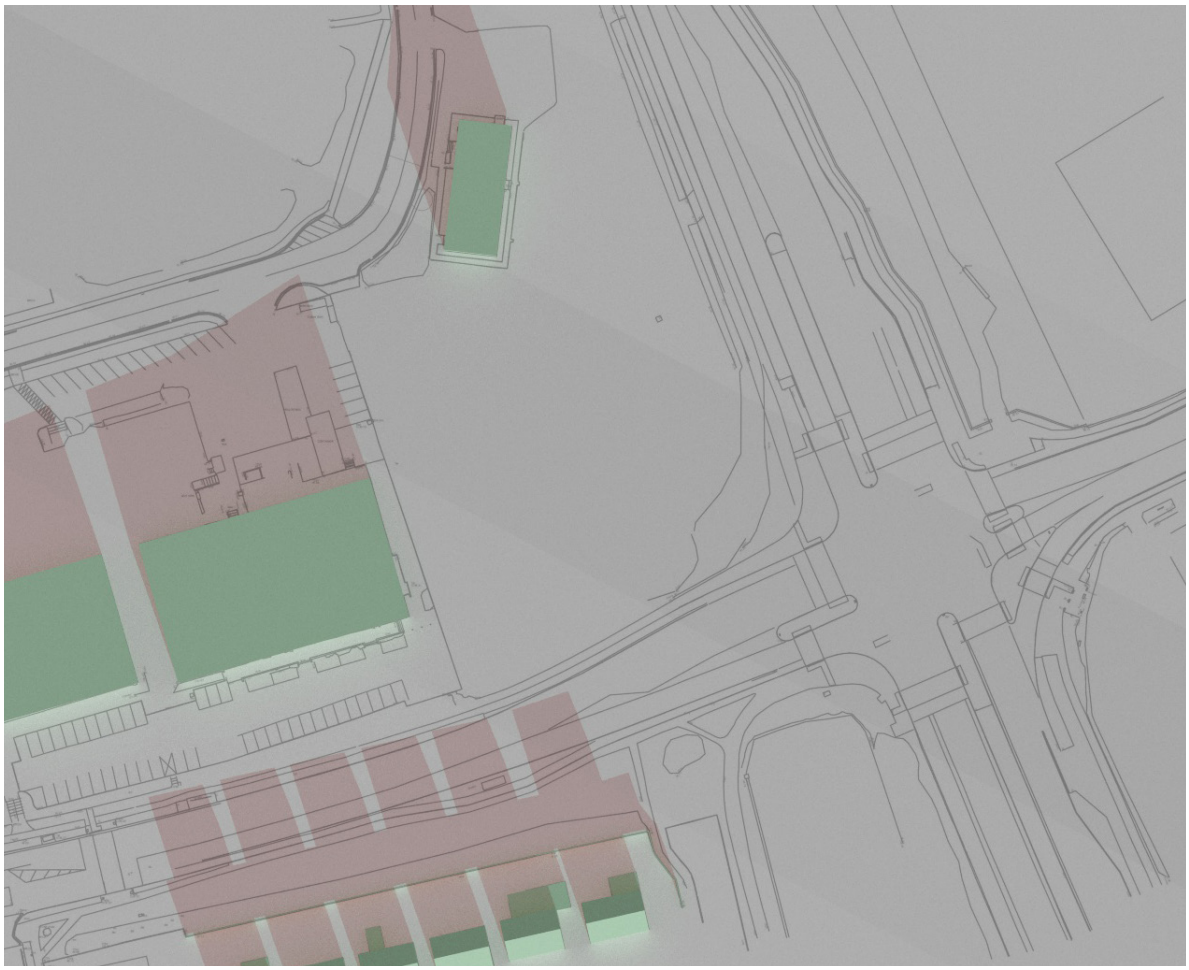


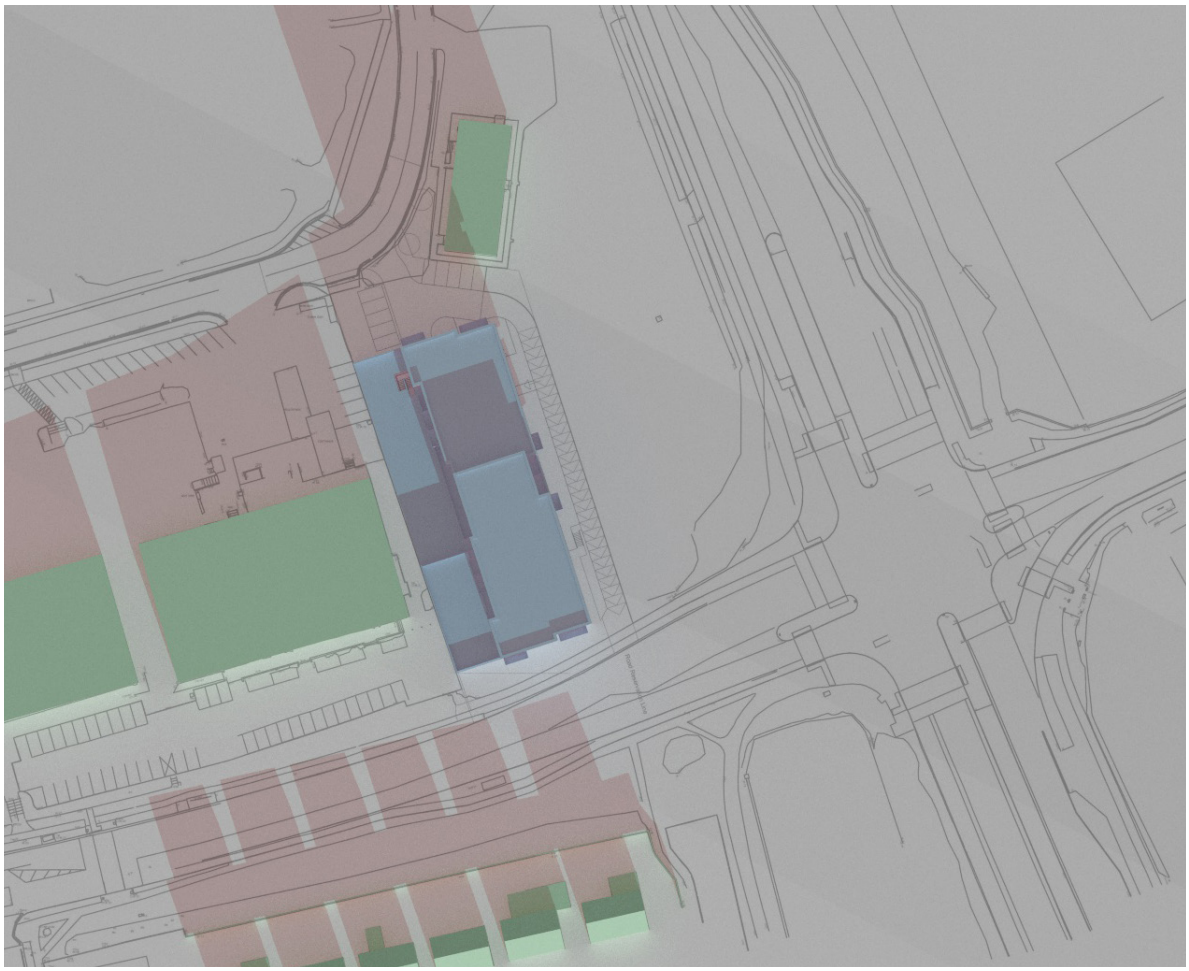
Proposed

Figure 17: Shadow diagrams 21 December 09:00 UTC

Existing

N



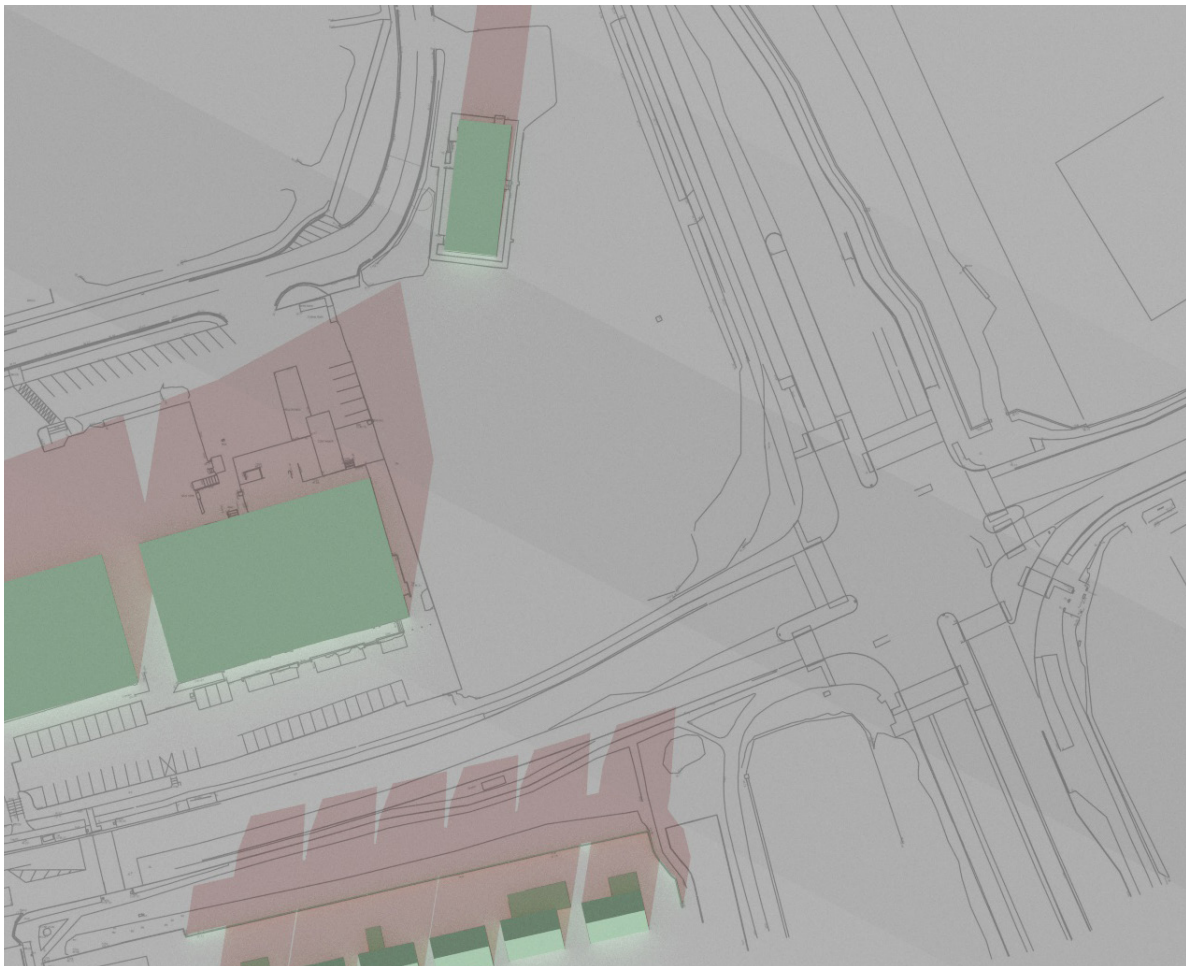


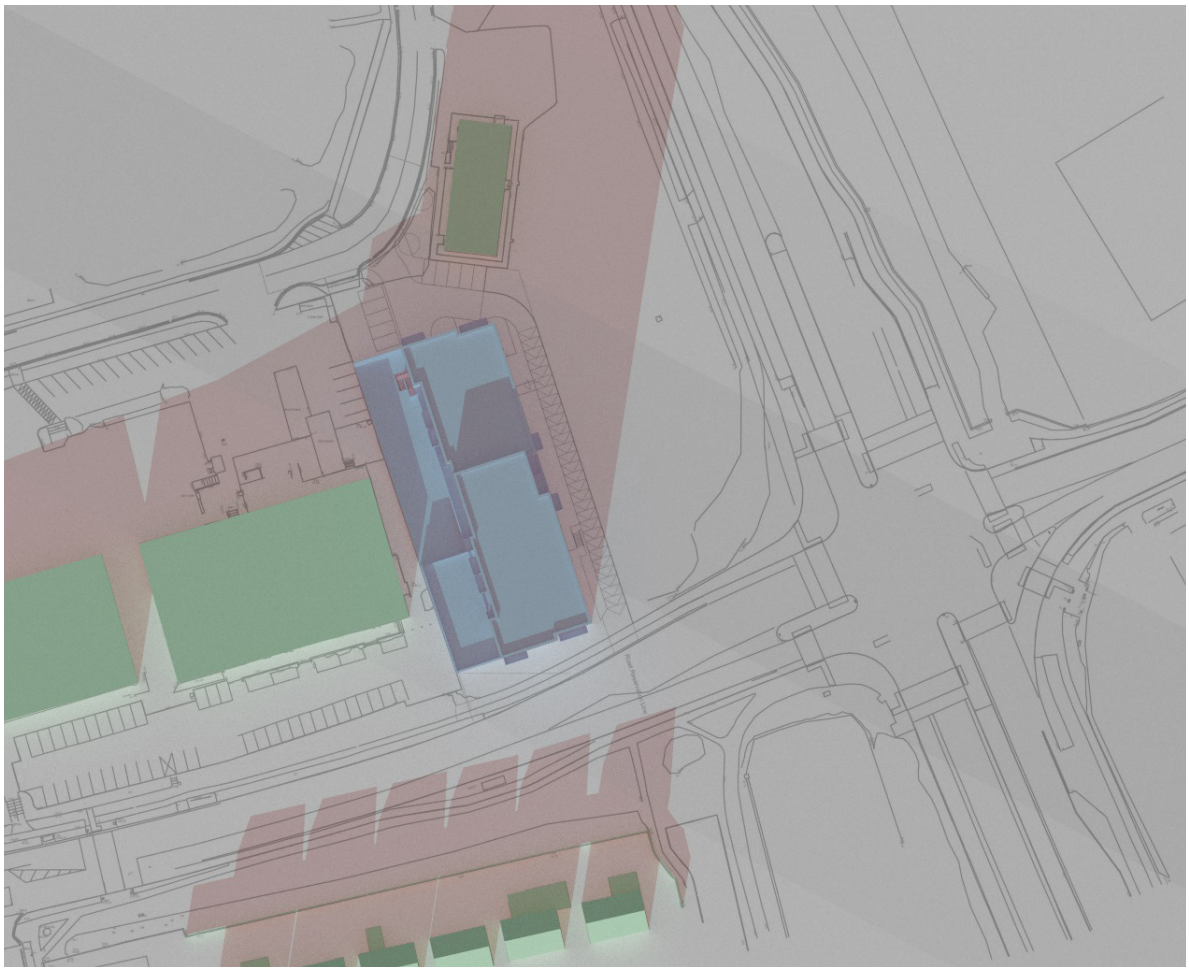
Proposed

Figure 18: Shadow diagrams 21 December 11:00 UTC

Existing

N



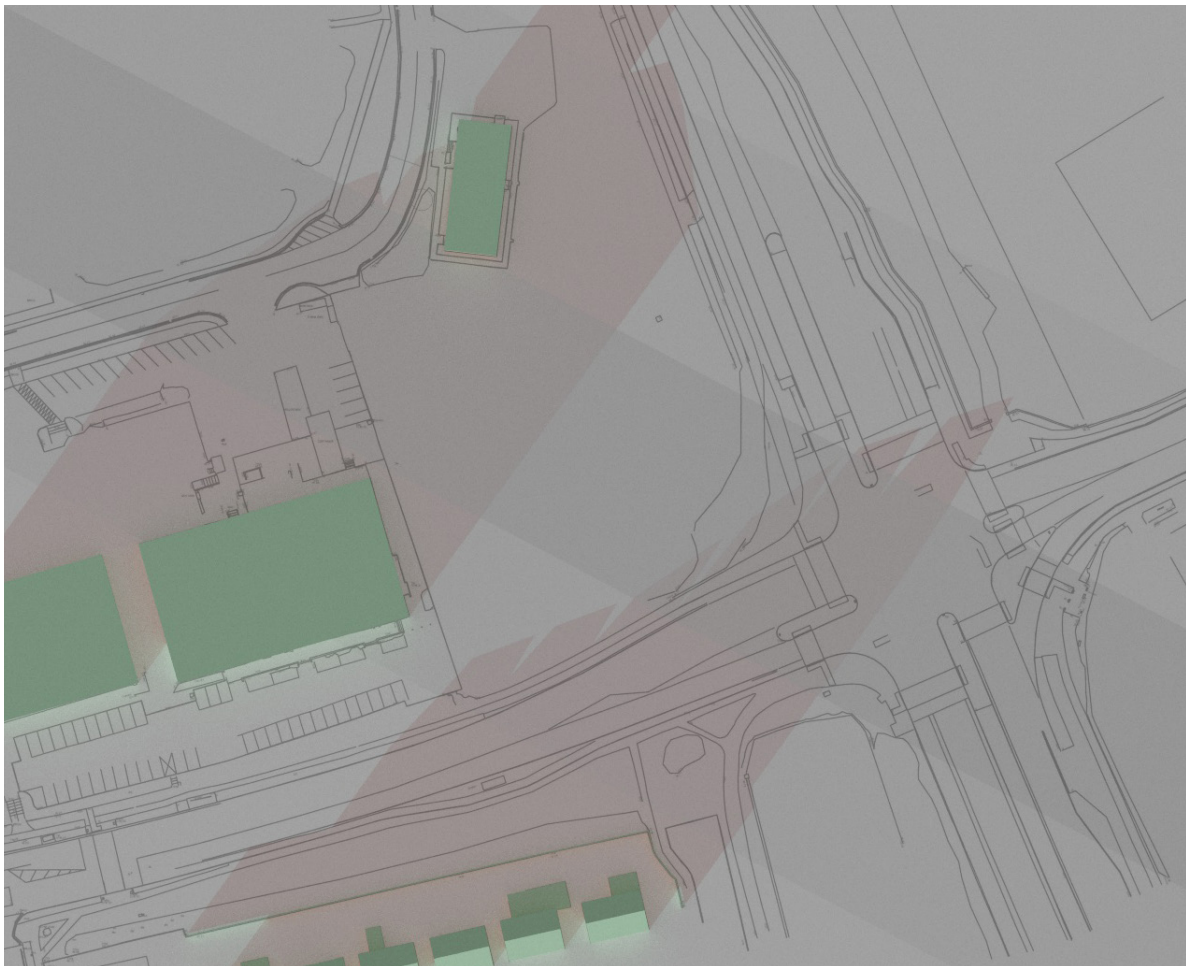


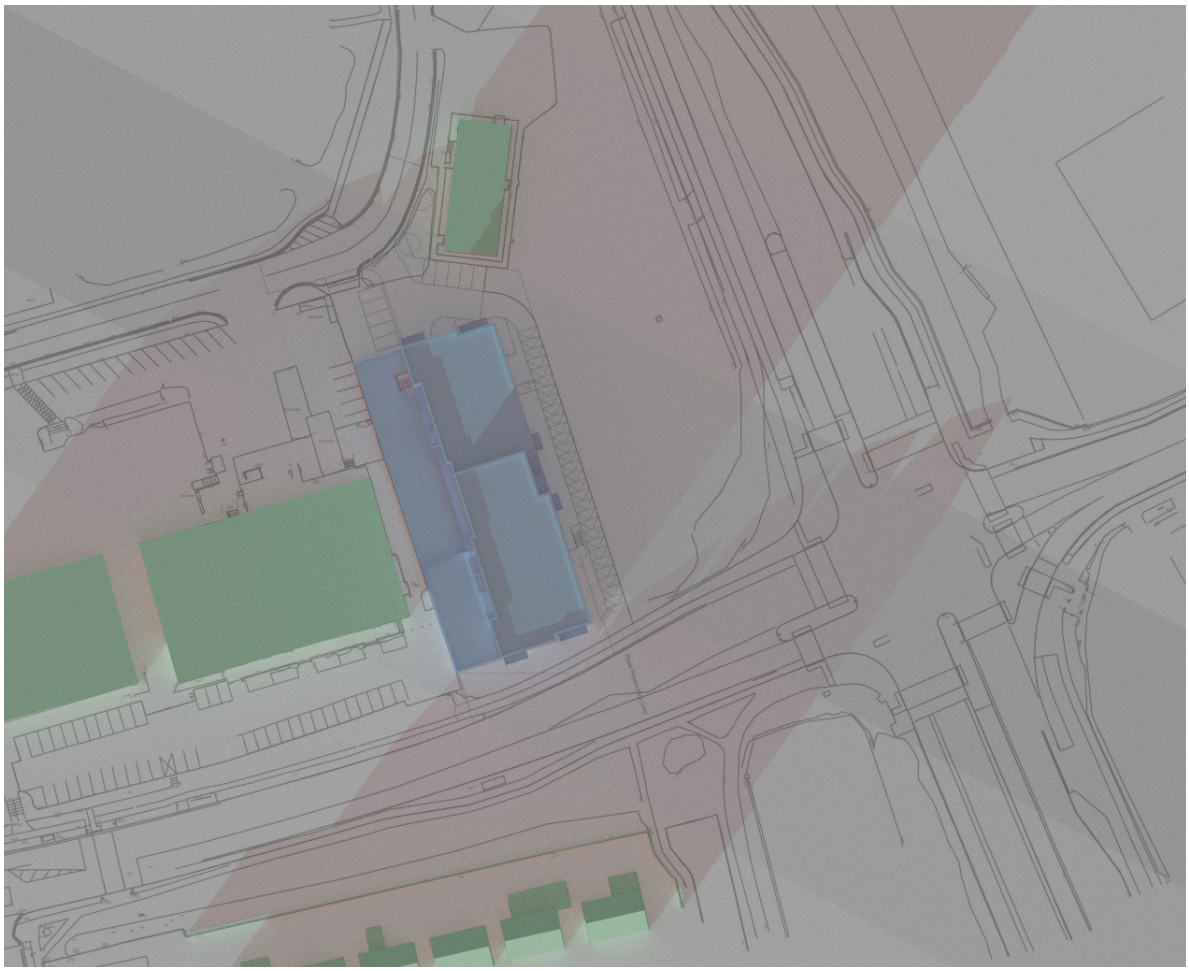
Proposed

Figure 19: Shadow diagrams 21 December 13:00 UTC

Existing

N

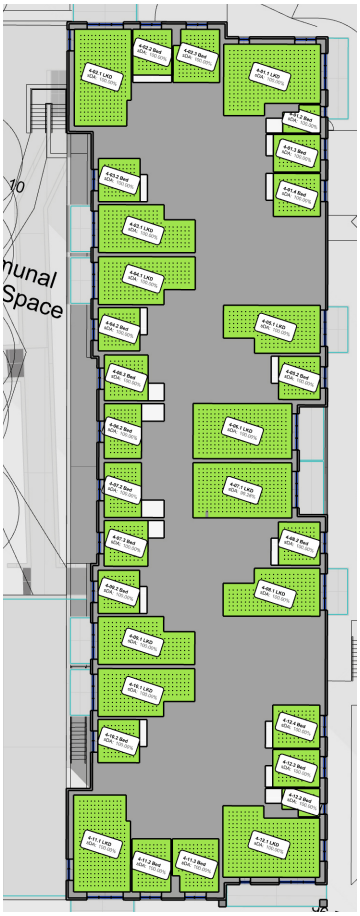




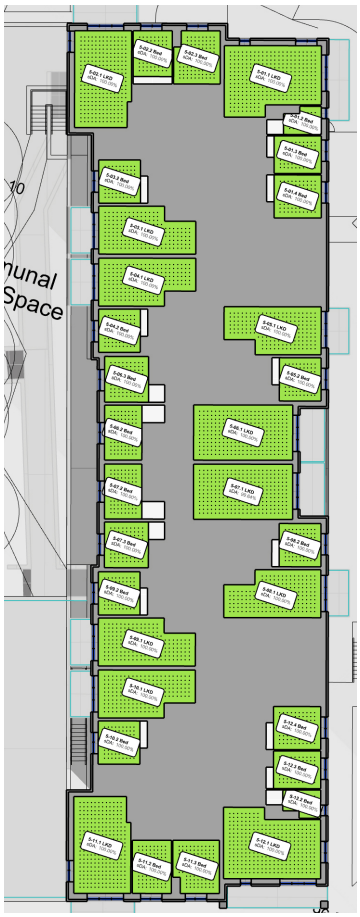
Proposed

Figure 20: Shadow diagrams 21 December 15:00 UTC

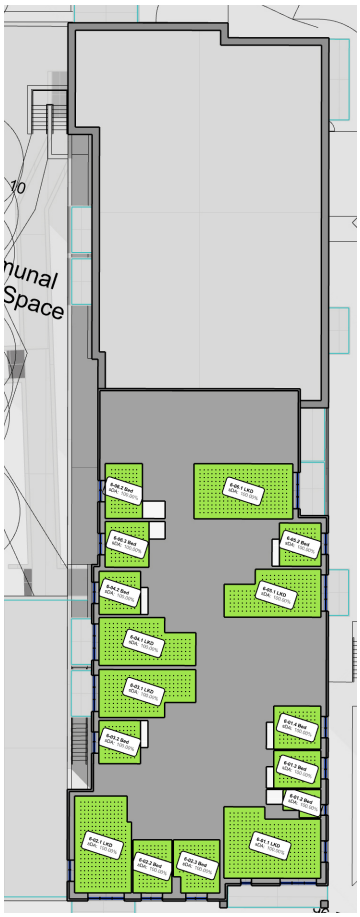
Appendix A -BS EN17037:2021+A1 Minimum room specific Daylight Provision in accordance with UK National Annex Table NA.1.



Third Floor



Fourth Floor



Fifth Floor

Ground Floor

First Floor

Second Floor

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

Minimum illuminance levels from BS EN17037:2018+A1:2021 - Table NA.1							
Space ID	Use	Area m2	Sensor Count	Target Lux	Mean Lux	% of grid target exceeded: Minimum 50% of grid	Meets Criteria
1-01.1	LKD	34.5	310	200	783	100.0%	Y
1-01.2	Bed	5.2	32	100	464	100.0%	Y
1-01.3	Bed	9.8	80	100	872	100.0%	Y
1-01.4	Bed	11.2	90	100	815	100.0%	Y
1-02.1	LKD	29.8	280	200	873	100.0%	Y
1-02.2	Bed	9.9	80	100	589	100.0%	Y
1-02.3	Bed	13.0	112	100	515	100.0%	Y
1-03.1	LKD	23.1	189	200	898	100.0%	Y
1-03.2	Bed	10.0	81	100	1319	100.0%	Y
1-04.1	LKD	23.1	189	200	902	100.0%	Y
1-04.2	Bed	10.0	81	100	1303	100.0%	Y
1-05.1	LKD	23.1	189	200	736	100.0%	Y
1-05.2	Bed	10.0	81	100	924	100.0%	Y
1-06.1	LKD	30.1	276	200	509	100.0%	Y
1-06.2	Bed	11.3	96	100	1157	100.0%	Y
1-06.3	Bed	11.1	90	100	1199	100.0%	Y
1-07.1	LKD	30.1	276	200	445	97.5%	Y
1-07.2	Bed	11.3	96	100	1152	100.0%	Y
1-07.3	Bed	11.1	90	100	1168	100.0%	Y
1-08.1	LKD	23.1	189	200	740	100.0%	Y
1-08.2	Bed	9.9	81	100	896	100.0%	Y
2-01.1	LKD	34.5	310	200	802	100.0%	Y
2-01.2	Bed	5.2	32	100	472	100.0%	Y
2-01.3	Bed	9.8	80	100	890	100.0%	Y
2-01.4	Bed	11.2	90	100	826	100.0%	Y
2-02.1	LKD	29.8	280	200	864	100.0%	Y
2-02.2	Bed	9.9	80	100	607	100.0%	Y
2-02.3	Bed	13.0	112	100	537	100.0%	Y
2-03.1	LKD	23.1	189	200	954	100.0%	Y
2-03.2	Bed	10.0	81	100	1376	100.0%	Y
2-04.1	LKD	23.1	189	200	978	100.0%	Y
2-04.2	Bed	10.0	81	100	1360	100.0%	Y
2-05.1	LKD	23.1	189	200	746	100.0%	Y
2-05.2	Bed	10.0	81	100	936	100.0%	Y
2-06.1	LKD	30.1	276	200	516	99.6%	Y
2-06.2	Bed	11.3	96	100	1213	100.0%	Y
2-06.3	Bed	11.1	90	100	1254	100.0%	Y
2-07.1	LKD	30.1	276	200	453	98.2%	Y
2-07.2	Bed	11.3	96	100	1225	100.0%	Y
2-07.3	Bed	11.1	90	100	1250	100.0%	Y
2-08.1	LKD	23.1	189	200	753	100.0%	Y
2-08.2	Bed	9.9	81	100	902	100.0%	Y
2-09.1	LKD	23.1	189	200	985	100.0%	Y
2-09.2	Bed	10.0	81	100	1374	100.0%	Y
2-10.1	LKD	23.1	189	200	1031	100.0%	Y
2-10.2	Bed	10.0	81	100	1462	100.0%	Y
2-11.1	LKD	29.8	280	200	1553	100.0%	Y
2-11.2	Bed	11.5	96	100	1461	100.0%	Y
2-11.3	Bed	13.0	112	100	1353	100.0%	Y
2-12.1	LKD	34.5	310	200	1316	100.0%	Y
2-12.2	Bed	5.2	32	100	645	100.0%	Y

Minimum illuminance levels from BS EN17037:2018+A1:2021 - Table NA.1							
Space ID	Use	Area m2	Sensor Count	Target Lux	Mean Lux	% of grid target exceeded: Minimum 50% of grid	Meets Criteria
2-12.3	Bed	9.8	80	100	923	100.0%	Y
2-12.4	Bed	11.2	90	100	858	100.0%	Y
3-01.1	LKD	34.5	310	200	817	100.0%	Y
3-01.2	Bed	5.2	32	100	466	100.0%	Y
3-01.3	Bed	9.8	80	100	893	100.0%	Y
3-01.4	Bed	11.2	90	100	829	100.0%	Y
3-02.1	LKD	29.8	280	200	860	100.0%	Y
3-02.2	Bed	9.9	80	100	624	100.0%	Y
3-02.3	Bed	13.0	112	100	551	100.0%	Y
3-03.1	LKD	23.1	189	200	981	100.0%	Y
3-03.2	Bed	10.0	81	100	1377	100.0%	Y
3-04.1	LKD	23.1	189	200	1014	100.0%	Y
3-04.2	Bed	10.0	81	100	1386	100.0%	Y
3-05.1	LKD	23.1	189	200	753	100.0%	Y
3-05.2	Bed	10.0	81	100	948	100.0%	Y
3-06.1	LKD	30.1	276	200	523	100.0%	Y
3-06.2	Bed	11.3	96	100	1243	100.0%	Y
3-06.3	Bed	11.1	90	100	1279	100.0%	Y
3-07.1	LKD	30.1	276	200	458	98.6%	Y
3-07.2	Bed	11.3	96	100	1254	100.0%	Y
3-07.3	Bed	11.1	90	100	1275	100.0%	Y
3-08.1	LKD	23.1	189	200	759	100.0%	Y
3-08.2	Bed	9.9	81	100	915	100.0%	Y
3-09.1	LKD	23.1	189	200	1001	100.0%	Y
3-09.2	Bed	10.0	81	100	1395	100.0%	Y
3-10.1	LKD	23.1	189	200	1032	100.0%	Y
3-10.2	Bed	10.0	81	100	1458	100.0%	Y
3-11.1	LKD	29.8	280	200	1559	100.0%	Y
3-11.2	Bed	11.5	96	100	1494	100.0%	Y
3-11.3	Bed	13.0	112	100	1371	100.0%	Y
3-12.1	LKD	34.5	310	200	1330	100.0%	Y
3-12.2	Bed	5.2	32	100	647	100.0%	Y
3-12.3	Bed	9.8	80	100	927	100.0%	Y
3-12.4	Bed	11.2	90	100	864	100.0%	Y
4-01.1	LKD	34.5	310	200	823	100.0%	Y
4-01.2	Bed	5.2	32	100	473	100.0%	Y
4-01.3	Bed	9.8	80	100	897	100.0%	Y
4-01.4	Bed	11.2	90	100	845	100.0%	Y
4-02.1	LKD	29.8	280	200	863	100.0%	Y
4-02.2	Bed	9.9	80	100	637	100.0%	Y
4-02.3	Bed	13.0	112	100	559	100.0%	Y
4-03.1	LKD	23.1	189	200	997	100.0%	Y
4-03.2	Bed	10.0	81	100	1380	100.0%	Y
4-04.1	LKD	23.1	189	200	1028	100.0%	Y
4-04.2	Bed	10.0	81	100	1394	100.0%	Y
4-05.1	LKD	23.1	189	200	754	100.0%	Y
4-05.2	Bed	10.0	81	100	952	100.0%	Y
4-06.1	LKD	30.1	276	200	524	100.0%	Y
4-06.2	Bed	11.3	96	100	1252	100.0%	Y
4-06.3	Bed	11.1	90	100	1282	100.0%	Y
4-07.1	LKD	30.1	276	200	462	99.3%	Y

Minimum illuminance levels from BS EN17037:2018+A1:2021 - Table NA.1							
Space ID	Use	Area m2	Sensor Count	Target Lux	Mean Lux	% of grid target exceeded: Minimum 50% of grid	Meets Criteria
4-07.2	Bed	11.3	96	100	1269	100.0%	Y
4-07.3	Bed	11.1	90	100	1286	100.0%	Y
4-08.1	LKD	23.1	189	200	761	100.0%	Y
4-08.2	Bed	9.9	81	100	924	100.0%	Y
4-09.1	LKD	23.1	189	200	1016	100.0%	Y
4-09.2	Bed	10.0	81	100	1399	100.0%	Y
4-10.1	LKD	23.1	189	200	1039	100.0%	Y
4-10.2	Bed	10.0	81	100	1429	100.0%	Y
4-11.1	LKD	29.8	280	200	1555	100.0%	Y
4-11.2	Bed	11.5	96	100	1503	100.0%	Y
4-11.3	Bed	13.0	112	100	1385	100.0%	Y
4-12.1	LKD	34.5	310	200	1340	100.0%	Y
4-12.2	Bed	5.2	32	100	649	100.0%	Y
4-12.3	Bed	9.8	80	100	938	100.0%	Y
4-12.4	Bed	11.2	90	100	873	100.0%	Y
5-01.1	LKD	34.5	310	200	977	100.0%	Y
5-01.2	Bed	5.2	32	100	561	100.0%	Y
5-01.3	Bed	9.8	80	100	909	100.0%	Y
5-01.4	Bed	11.2	90	100	844	100.0%	Y
5-02.1	LKD	29.8	280	200	954	100.0%	Y
5-02.2	Bed	9.9	80	100	669	100.0%	Y
5-02.3	Bed	13.0	112	100	565	100.0%	Y
5-03.1	LKD	23.1	189	200	1347	100.0%	Y
5-03.2	Bed	10.0	81	100	1407	100.0%	Y
5-04.1	LKD	23.1	189	200	1356	100.0%	Y
5-04.2	Bed	10.0	81	100	1421	100.0%	Y
5-05.1	LKD	23.1	189	200	940	100.0%	Y
5-05.2	Bed	10.0	81	100	952	100.0%	Y
5-06.1	LKD	30.1	276	200	719	100.0%	Y
5-06.2	Bed	11.3	96	100	1262	100.0%	Y
5-06.3	Bed	11.1	90	100	1307	100.0%	Y
5-07.1	LKD	30.1	276	200	476	99.6%	Y
5-07.2	Bed	11.3	96	100	1283	100.0%	Y
5-07.3	Bed	11.1	90	100	1300	100.0%	Y
5-08.1	LKD	23.1	189	200	768	100.0%	Y
5-08.2	Bed	9.9	81	100	932	100.0%	Y
5-09.1	LKD	23.1	189	200	1031	100.0%	Y
5-09.2	Bed	10.0	81	100	1416	100.0%	Y
5-10.1	LKD	23.1	189	200	1051	100.0%	Y
5-10.2	Bed	10.0	81	100	1416	100.0%	Y
5-11.1	LKD	29.8	280	200	1558	100.0%	Y
5-11.2	Bed	11.5	96	100	1502	100.0%	Y
5-11.3	Bed	13.0	112	100	1385	100.0%	Y
5-12.1	LKD	34.5	310	200	1338	100.0%	Y
5-12.2	Bed	5.2	32	100	646	100.0%	Y
5-12.3	Bed	9.8	80	100	947	100.0%	Y
5-12.4	Bed	11.2	90	100	878	100.0%	Y

Minimum illuminance levels from BS EN17037:2018+A1:2021 - Table NA.1							
Space ID	Use	Area m2	Sensor Count	Target Lux	Mean Lux	% of grid target exceeded: Minimum 50% of grid	Meets Criteria
6-01.1	LKD	34.5	310	200	1412	100.0%	Y
6-01.2	Bed	5.2	32	100	654	100.0%	Y
6-01.3	Bed	9.8	80	100	945	100.0%	Y
6-01.4	Bed	11.2	90	100	875	100.0%	Y
6-02.1	LKD	29.8	280	200	1864	100.0%	Y
6-02.2	Bed	11.5	96	100	1562	100.0%	Y
6-02.3	Bed	13.0	112	100	1384	100.0%	Y
6-03.1	LKD	23.1	189	200	1378	100.0%	Y
6-03.2	Bed	10.0	81	100	1424	100.0%	Y
6-04.1	LKD	23.1	189	200	1385	100.0%	Y
6-04.2	Bed	10.0	81	100	1455	100.0%	Y
6-05.1	LKD	23.1	189	200	947	100.0%	Y
6-05.2	Bed	9.9	81	100	961	100.0%	Y
6-06.1	LKD	30.1	276	200	634	100.0%	Y
6-06.2	Bed	11.3	96	300	1301	100.0%	Y
6-06.3	Bed	11.1	90	100	1312	100.0%	Y

Table 10: Minimum Daylight Provision BS EN17037:2018+A1:2021 Table NA.1 compliance for habitable rooms

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

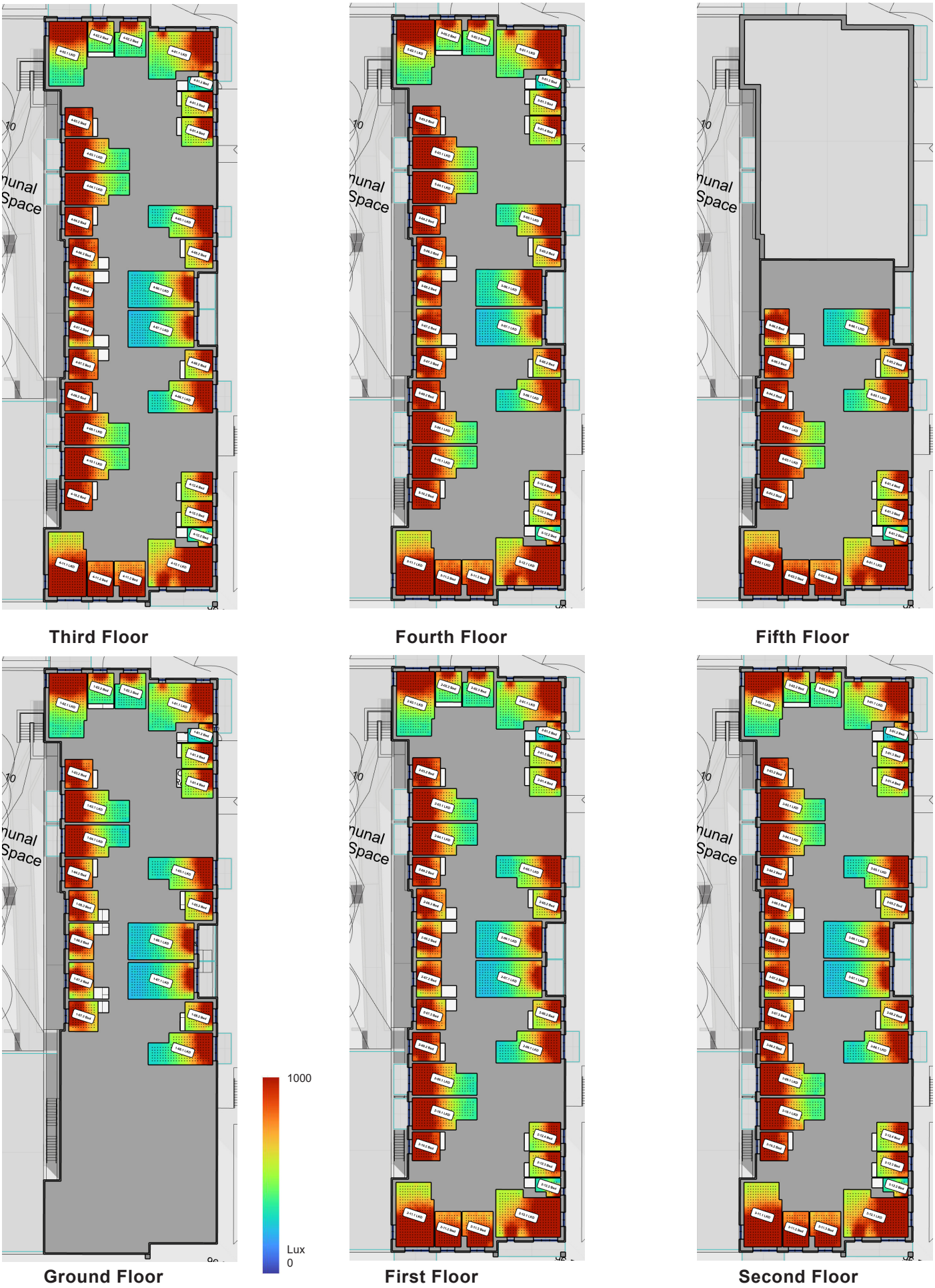


Figure 22: Daylight Provision and Annual Average Illuminance to all habitable rooms

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
1-01.1	LKD	34.5	310	Medium	71.0%	53.8%	36.0%	Medium	81.4%	53.4%	28.1%
1-01.2	Bed	5.2	32	Fail	46.6%	20.9%	11.2%	Minimum	73.8%	31.0%	11.3%
1-01.3	Bed	9.8	80	Medium	71.0%	53.7%	33.2%	Medium	84.3%	60.0%	36.9%
1-01.4	Bed	11.2	90	Minimum	67.4%	47.2%	26.4%	Medium	83.9%	58.1%	34.0%
1-02.1	LKD	29.8	280	Medium	69.3%	52.3%	33.3%	Medium	79.5%	50.0%	25.1%
1-02.2	Bed	9.9	80	Minimum	69.7%	49.9%	27.8%	Medium	84.1%	56.6%	33.2%
1-02.3	Bed	13.0	112	Minimum	61.0%	39.4%	10.1%	Medium	81.6%	50.7%	22.4%
1-03.1	LKD	23.1	189	Minimum	64.5%	47.1%	30.1%	Minimum	74.5%	37.6%	20.5%
1-03.2	Bed	10.0	81	Medium	73.2%	58.9%	42.8%	Medium	85.3%	64.9%	46.8%
1-04.1	LKD	23.1	189	Minimum	64.0%	46.7%	30.4%	Minimum	71.5%	33.0%	19.6%
1-04.2	Bed	10.0	81	Medium	72.0%	56.9%	41.1%	Medium	83.6%	61.1%	42.5%
1-05.1	LKD	23.1	189	Minimum	66.0%	45.3%	24.1%	Minimum	75.2%	37.1%	14.1%
1-05.2	Bed	10.0	81	Medium	71.4%	54.5%	34.1%	Medium	85.4%	63.4%	41.6%
1-06.1	LKD	30.1	276	Fail	49.1%	23.0%	11.8%	Minimum	70.7%	25.0%	8.9%
1-06.2	Bed	11.3	96	Medium	68.6%	52.3%	36.6%	Medium	81.8%	55.8%	36.1%
1-06.3	Bed	11.1	90	Medium	69.1%	52.9%	37.3%	Medium	82.9%	58.7%	39.3%
1-07.1	LKD	30.1	276	Fail	47.5%	19.5%	7.7%	Minimum	69.6%	21.3%	5.5%
1-07.2	Bed	11.3	96	Medium	67.5%	50.9%	35.3%	Medium	82.4%	56.6%	36.6%
1-07.3	Bed	11.1	90	Medium	68.9%	52.4%	36.5%	Medium	82.2%	55.9%	36.3%
1-08.1	LKD	23.1	189	Minimum	65.8%	44.9%	23.9%	Minimum	74.6%	34.8%	12.5%
1-08.2	Bed	9.9	81	Medium	71.1%	53.8%	32.9%	Medium	85.2%	62.7%	40.4%
2-01.1	LKD	34.5	310	Medium	71.4%	54.7%	37.2%	Medium	81.8%	54.5%	30.5%
2-01.2	Bed	5.2	32	Fail	49.3%	23.7%	11.9%	Minimum	73.5%	29.8%	11.2%
2-01.3	Bed	9.8	80	Medium	70.6%	53.6%	34.2%	Medium	84.6%	60.9%	39.7%
2-01.4	Bed	11.2	90	Minimum	67.9%	48.6%	28.3%	Medium	84.0%	59.5%	36.7%
2-02.1	LKD	29.8	280	Medium	69.4%	52.6%	33.5%	Medium	79.5%	50.5%	25.6%
2-02.2	Bed	9.9	80	Medium	70.4%	51.5%	30.7%	Medium	84.3%	57.4%	35.4%
2-02.3	Bed	13.0	112	Minimum	62.8%	41.5%	14.6%	Medium	82.7%	53.9%	28.6%
2-03.1	LKD	23.1	189	Medium	66.5%	50.8%	33.2%	Minimum	75.7%	42.1%	22.7%
2-03.2	Bed	10.0	81	Medium	74.0%	60.6%	45.8%	High	86.1%	67.5%	50.4%
2-04.1	LKD	23.1	189	Medium	66.7%	51.2%	34.2%	Minimum	75.1%	40.6%	23.0%
2-04.2	Bed	10.0	81	Medium	73.6%	59.8%	45.0%	Medium	85.3%	65.4%	48.7%
2-05.1	LKD	23.1	189	Minimum	66.6%	46.7%	25.9%	Minimum	75.0%	37.1%	14.0%
2-05.2	Bed	10.0	81	Medium	71.7%	55.1%	35.9%	Medium	85.8%	64.6%	43.4%
2-06.1	LKD	30.1	276	Minimum	50.3%	24.8%	12.0%	Minimum	71.1%	26.8%	8.9%
2-06.2	Bed	11.3	96	Medium	71.3%	56.2%	41.0%	Medium	83.1%	60.5%	41.9%
2-06.3	Bed	11.1	90	Medium	71.4%	56.4%	41.2%	Medium	84.2%	62.6%	44.6%
2-07.1	LKD	30.1	276	Fail	48.0%	21.0%	8.1%	Minimum	70.6%	24.2%	6.0%
2-07.2	Bed	11.3	96	Medium	70.8%	55.4%	39.7%	Medium	83.4%	60.0%	40.8%
2-07.3	Bed	11.1	90	Medium	71.8%	56.8%	41.6%	Medium	84.4%	62.8%	44.4%
2-08.1	LKD	23.1	189	Minimum	66.2%	46.4%	25.4%	Minimum	75.0%	37.4%	13.9%
2-08.2	Bed	9.9	81	Medium	71.6%	54.6%	35.0%	Medium	85.5%	63.6%	42.5%
2-09.1	LKD	23.1	189	Medium	67.0%	51.6%	34.8%	Minimum	74.8%	40.7%	21.3%
2-09.2	Bed	10.0	81	Medium	73.8%	60.4%	45.7%	Medium	85.5%	65.9%	49.0%
2-10.1	LKD	23.1	189	Medium	68.1%	52.2%	36.7%	Minimum	75.7%	42.9%	24.4%
2-10.2	Bed	10.0	81	Medium	75.2%	62.6%	49.0%	High	86.7%	69.7%	53.7%
2-11.1	LKD	29.8	280	High	74.6%	63.8%	53.1%	Medium	81.7%	60.4%	45.5%
2-11.2	Bed	11.5	96	Medium	71.2%	58.8%	46.1%	Medium	83.9%	63.2%	48.3%
2-11.3	Bed	13.0	112	Medium	67.7%	54.6%	41.0%	Medium	82.9%	61.3%	45.3%
2-12.1	LKD	34.5	310	Medium	72.3%	60.2%	47.6%	Medium	82.2%	60.0%	42.8%

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
2-12.2	Bed	5.2	32	Minimum	56.0%	32.0%	15.8%	Minimum	74.2%	32.9%	13.3%
2-12.3	Bed	9.8	80	Medium	71.2%	54.7%	35.3%	Medium	84.5%	61.4%	39.6%
2-12.4	Bed	11.2	90	Medium	69.8%	51.5%	31.7%	Medium	84.1%	59.4%	37.1%
3-01.1	LKD	34.5	310	Medium	71.3%	54.9%	37.7%	Medium	82.4%	55.0%	32.7%
3-01.2	Bed	5.2	32	Fail	48.8%	24.0%	11.9%	Minimum	72.8%	29.7%	10.7%
3-01.3	Bed	9.8	80	Medium	70.7%	53.6%	34.7%	Medium	84.5%	61.1%	39.9%
3-01.4	Bed	11.2	90	Minimum	68.4%	49.4%	29.9%	Medium	84.2%	59.5%	37.9%
3-02.1	LKD	29.8	280	Medium	69.7%	53.4%	34.9%	Medium	80.0%	51.5%	26.9%
3-02.2	Bed	9.9	80	Medium	70.8%	51.8%	31.9%	Medium	84.1%	57.5%	35.5%
3-02.3	Bed	13.0	112	Minimum	63.5%	42.3%	17.8%	Medium	82.9%	54.3%	30.1%
3-03.1	LKD	23.1	189	Medium	68.0%	52.6%	35.4%	Minimum	76.5%	44.7%	23.9%
3-03.2	Bed	10.0	81	Medium	74.2%	61.1%	46.5%	High	85.9%	67.1%	50.3%
3-04.1	LKD	23.1	189	Medium	68.1%	52.7%	36.4%	Minimum	76.5%	46.0%	26.1%
3-04.2	Bed	10.0	81	Medium	73.9%	60.5%	46.0%	High	85.9%	67.5%	51.2%
3-05.1	LKD	23.1	189	Minimum	66.7%	47.5%	26.8%	Minimum	75.3%	38.6%	14.2%
3-05.2	Bed	10.0	81	Medium	71.9%	55.8%	37.2%	Medium	85.9%	65.0%	44.6%
3-06.1	LKD	30.1	276	Minimum	50.8%	25.6%	12.0%	Minimum	71.2%	27.7%	8.8%
3-06.2	Bed	11.3	96	Medium	72.1%	58.2%	43.2%	Medium	84.1%	62.5%	45.0%
3-06.3	Bed	11.1	90	Medium	72.3%	58.3%	43.0%	Medium	84.7%	64.1%	46.5%
3-07.1	LKD	30.1	276	Fail	49.1%	22.5%	8.4%	Minimum	70.6%	24.9%	5.9%
3-07.2	Bed	11.3	96	Medium	72.4%	58.4%	43.2%	Medium	83.7%	61.5%	43.2%
3-07.3	Bed	11.1	90	Medium	72.9%	58.9%	43.4%	Medium	84.9%	64.8%	47.4%
3-08.1	LKD	23.1	189	Minimum	66.9%	47.7%	27.1%	Minimum	75.3%	38.8%	14.2%
3-08.2	Bed	9.9	81	Medium	71.4%	54.6%	35.9%	Medium	85.7%	64.5%	43.8%
3-09.1	LKD	23.1	189	Medium	68.2%	53.1%	36.5%	Minimum	77.0%	46.5%	25.5%
3-09.2	Bed	10.0	81	Medium	74.6%	61.8%	47.3%	High	85.9%	67.6%	51.0%
3-10.1	LKD	23.1	189	Medium	69.0%	53.7%	37.8%	Minimum	76.6%	46.4%	26.2%
3-10.2	Bed	10.0	81	Medium	75.2%	62.8%	49.1%	High	86.3%	69.3%	53.5%
3-11.1	LKD	29.8	280	High	74.8%	64.1%	53.1%	Medium	82.1%	61.6%	47.1%
3-11.2	Bed	11.5	96	Medium	71.9%	59.7%	47.0%	Medium	84.3%	64.4%	49.7%
3-11.3	Bed	13.0	112	Medium	68.7%	55.7%	42.2%	Medium	83.3%	62.6%	47.2%
3-12.1	LKD	34.5	310	Medium	72.9%	61.1%	49.3%	Medium	82.3%	60.5%	43.7%
3-12.2	Bed	5.2	32	Minimum	56.7%	33.9%	17.1%	Minimum	74.3%	33.7%	13.2%
3-12.3	Bed	9.8	80	Medium	72.6%	56.6%	38.8%	Medium	84.7%	61.6%	40.7%
3-12.4	Bed	11.2	90	Medium	69.8%	52.2%	32.4%	Medium	84.4%	60.3%	38.4%
4-01.1	LKD	34.5	310	Medium	71.6%	55.5%	38.6%	Medium	82.4%	55.1%	32.2%
4-01.2	Bed	5.2	32	Fail	49.8%	24.3%	11.5%	Minimum	73.8%	32.0%	11.6%
4-01.3	Bed	9.8	80	Medium	70.7%	53.9%	36.0%	Medium	84.7%	61.9%	41.0%
4-01.4	Bed	11.2	90	Medium	69.3%	51.1%	31.8%	Medium	84.1%	59.2%	37.7%
4-02.1	LKD	29.8	280	Medium	69.5%	53.2%	34.2%	Medium	79.8%	51.5%	26.9%
4-02.2	Bed	9.9	80	Medium	70.5%	51.6%	32.2%	Medium	84.5%	59.2%	37.0%
4-02.3	Bed	13.0	112	Minimum	63.7%	42.7%	18.5%	Medium	83.0%	54.8%	31.5%
4-03.1	LKD	23.1	189	Medium	68.3%	53.4%	36.8%	Minimum	76.7%	45.7%	25.1%
4-03.2	Bed	10.0	81	Medium	74.4%	61.3%	46.7%	High	85.8%	66.8%	50.6%
4-04.1	LKD	23.1	189	Medium	69.1%	54.2%	38.1%	Minimum	77.2%	47.3%	27.4%
4-04.2	Bed	10.0	81	Medium	74.3%	61.5%	47.3%	High	86.0%	67.6%	51.6%
4-05.1	LKD	23.1	189	Minimum	66.6%	47.6%	26.9%	Minimum	75.3%	39.1%	14.4%
4-05.2	Bed	10.0	81	Medium	71.6%	55.3%	37.3%	Medium	85.8%	65.0%	44.8%
4-06.1	LKD	30.1	276	Minimum	51.3%	26.7%	12.1%	Minimum	71.7%	28.8%	9.1%
4-06.2	Bed	11.3	96	Medium	72.5%	58.8%	44.2%	Medium	84.2%	63.2%	46.0%

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
4-06.3	Bed	11.1	90	Medium	72.5%	58.7%	43.7%	Medium	84.9%	64.8%	48.1%
4-07.1	LKD	30.1	276	Minimum	50.0%	23.3%	8.3%	Minimum	70.8%	25.8%	6.0%
4-07.2	Bed	11.3	96	Medium	72.7%	59.1%	44.5%	Medium	84.6%	63.8%	45.5%
4-07.3	Bed	11.1	90	Medium	72.9%	58.9%	44.1%	Medium	85.0%	65.4%	48.9%
4-08.1	LKD	23.1	189	Minimum	67.2%	48.4%	28.5%	Minimum	75.2%	38.9%	13.3%
4-08.2	Bed	9.9	81	Medium	71.9%	55.5%	37.6%	Medium	85.5%	63.7%	43.3%
4-09.1	LKD	23.1	189	Medium	69.2%	54.2%	38.3%	Minimum	77.9%	49.2%	28.2%
4-09.2	Bed	10.0	81	Medium	74.7%	62.0%	47.9%	High	86.2%	68.7%	52.5%
4-10.1	LKD	23.1	189	Medium	70.0%	55.2%	39.8%	Minimum	77.3%	47.9%	28.0%
4-10.2	Bed	10.0	81	Medium	74.8%	62.2%	48.3%	High	86.2%	69.0%	53.3%
4-11.1	LKD	29.8	280	High	74.8%	64.1%	53.2%	Medium	82.1%	61.4%	46.8%
4-11.2	Bed	11.5	96	Medium	72.1%	60.2%	47.5%	High	84.5%	64.9%	50.4%
4-11.3	Bed	13.0	112	Medium	68.8%	56.0%	42.9%	Medium	83.7%	63.2%	48.0%
4-12.1	LKD	34.5	310	Medium	72.7%	60.8%	48.2%	Medium	82.3%	60.7%	44.1%
4-12.2	Bed	5.2	32	Minimum	57.4%	34.9%	18.6%	Minimum	75.3%	38.0%	14.0%
4-12.3	Bed	9.8	80	Medium	71.7%	55.8%	38.2%	Medium	84.9%	62.6%	41.7%
4-12.4	Bed	11.2	90	Medium	69.8%	52.2%	32.5%	Medium	84.3%	60.8%	39.5%
5-01.1	LKD	34.5	310	Medium	73.5%	58.1%	42.1%	Medium	83.5%	58.1%	37.5%
5-01.2	Bed	5.2	32	Minimum	56.4%	33.2%	15.3%	Minimum	75.9%	37.6%	14.0%
5-01.3	Bed	9.8	80	Medium	70.9%	54.4%	36.8%	Medium	84.9%	62.5%	42.4%
5-01.4	Bed	11.2	90	Medium	69.5%	51.6%	32.1%	Medium	84.2%	60.2%	38.9%
5-02.1	LKD	29.8	280	Medium	72.1%	56.4%	39.7%	Medium	82.0%	54.7%	31.0%
5-02.2	Bed	9.9	80	Medium	71.8%	54.1%	35.8%	Medium	84.8%	60.5%	39.3%
5-02.3	Bed	13.0	112	Minimum	64.6%	44.2%	20.3%	Medium	83.3%	55.2%	32.3%
5-03.1	LKD	23.1	189	Medium	73.2%	59.5%	44.6%	Medium	78.7%	50.9%	29.9%
5-03.2	Bed	10.0	81	Medium	74.8%	62.0%	47.8%	High	86.0%	67.8%	52.1%
5-04.1	LKD	23.1	189	Medium	72.9%	59.4%	44.9%	Medium	79.0%	51.9%	31.5%
5-04.2	Bed	10.0	81	Medium	74.8%	62.5%	48.8%	High	86.3%	69.1%	53.5%
5-05.1	LKD	23.1	189	Medium	69.9%	52.5%	33.8%	Minimum	77.8%	44.5%	18.8%
5-05.2	Bed	10.0	81	Medium	72.4%	56.4%	39.1%	Medium	85.9%	65.3%	45.5%
5-06.1	LKD	30.1	276	Minimum	58.6%	36.3%	18.4%	Minimum	75.0%	37.9%	15.1%
5-06.2	Bed	11.3	96	Medium	72.9%	59.4%	45.1%	Medium	84.0%	63.3%	46.5%
5-06.3	Bed	11.1	90	Medium	73.3%	59.8%	45.5%	Medium	85.2%	65.6%	49.2%
5-07.1	LKD	30.1	276	Minimum	51.1%	24.4%	8.5%	Minimum	71.6%	27.2%	6.7%
5-07.2	Bed	11.3	96	Medium	73.2%	59.9%	45.7%	Medium	84.2%	63.2%	45.6%
5-07.3	Bed	11.1	90	Medium	73.5%	59.9%	45.7%	Medium	85.1%	65.5%	49.3%
5-08.1	LKD	23.1	189	Minimum	67.5%	48.8%	28.5%	Minimum	75.3%	38.5%	14.0%
5-08.2	Bed	9.9	81	Medium	72.4%	56.5%	38.7%	Medium	85.8%	64.9%	44.6%
5-09.1	LKD	23.1	189	Medium	70.0%	55.6%	40.0%	Minimum	77.7%	49.4%	28.6%
5-09.2	Bed	10.0	81	Medium	74.7%	62.3%	48.7%	High	86.6%	69.8%	54.5%
5-10.1	LKD	23.1	189	Medium	70.2%	55.5%	40.1%	Minimum	77.2%	47.6%	27.5%
5-10.2	Bed	10.0	81	Medium	74.7%	62.4%	48.2%	High	86.3%	69.3%	53.9%
5-11.1	LKD	29.8	280	High	74.8%	64.0%	53.1%	Medium	82.3%	61.7%	47.1%
5-11.2	Bed	11.5	96	Medium	71.9%	60.0%	47.5%	High	84.5%	65.1%	51.1%
5-11.3	Bed	13.0	112	Medium	69.5%	56.3%	43.4%	Medium	83.4%	62.8%	47.5%
5-12.1	LKD	34.5	310	Medium	72.9%	61.0%	49.6%	Medium	82.4%	61.0%	44.5%
5-12.2	Bed	5.2	32	Minimum	58.7%	37.1%	18.7%	Minimum	75.5%	37.7%	13.8%
5-12.3	Bed	9.8	80	Medium	72.7%	56.8%	39.7%	Medium	85.1%	63.2%	42.9%
5-12.4	Bed	11.2	90	Medium	70.3%	53.3%	34.7%	Medium	84.2%	59.9%	38.9%

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
6-01.1	LKD	34.5	310	High	73.3%	61.7%	50.4%	Medium	82.9%	61.6%	46.0%
6-01.2	Bed	5.2	32	Minimum	57.6%	35.2%	17.2%	Minimum	74.6%	35.6%	12.4%
6-01.3	Bed	9.8	80	Medium	73.3%	57.6%	40.8%	Medium	85.0%	62.9%	42.6%
6-01.4	Bed	11.2	90	Medium	70.4%	53.4%	35.3%	Medium	84.2%	59.8%	39.2%
6-02.1	LKD	29.8	280	High	76.5%	65.6%	56.1%	High	83.1%	63.3%	50.0%
6-02.2	Bed	11.5	96	Medium	72.7%	60.9%	48.6%	High	84.8%	65.4%	51.8%
6-02.3	Bed	13.0	112	Medium	69.5%	56.4%	43.5%	Medium	83.7%	63.1%	48.1%
6-03.1	LKD	23.1	189	Medium	73.5%	60.1%	45.9%	Medium	79.1%	51.9%	31.1%
6-03.2	Bed	10.0	81	Medium	75.1%	62.7%	48.7%	High	86.1%	68.8%	53.3%
6-04.1	LKD	23.1	189	Medium	73.5%	60.1%	46.0%	Medium	80.0%	53.5%	32.7%
6-04.2	Bed	10.0	81	High	75.5%	63.6%	50.3%	High	86.6%	70.3%	54.9%
6-05.1	LKD	23.1	189	Medium	69.8%	52.6%	33.7%	Minimum	77.4%	43.9%	18.9%
6-05.2	Bed	9.9	81	Medium	72.3%	56.3%	39.1%	Medium	85.7%	64.3%	44.2%
6-06.1	LKD	30.1	276	Minimum	57.5%	35.0%	14.1%	Minimum	75.2%	36.7%	10.9%
6-06.2	Bed	11.3	96	Medium	73.9%	60.9%	47.0%	Medium	84.3%	63.5%	46.0%
6-06.3	Bed	11.1	90	Medium	73.2%	59.7%	45.6%	High	85.6%	66.5%	50.8%

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

Appendix C - Sunlight Hours for Living Spaces

Sunlight Hours			
Unit ID	LKD window within 90° South	No. sunlight hours on 21st March	BRE recommendation
1-01.1	No	3.0	Medium
1-02.1	Yes	5.4	High
1-03.1	Yes	4.5	High
1-04.1	Yes	5.8	High
1-05.1	No	4.0	High
1-06.1	No	2.8	Minimum
1-07.1	No	1.5	Minimum
1-08.1	No	4.0	High
2-01.1	No	3.0	Medium
2-02.1	Yes	5.4	High
2-03.1	Yes	4.5	High
2-04.1	Yes	5.8	High
2-05.1	No	4.0	High
2-06.1	No	2.8	Minimum
2-07.1	No	1.5	Minimum
2-08.1	No	4.0	High
2-09.1	Yes	4.0	High
2-10.1	Yes	5.3	High
2-11.1	Yes	6.8	High
2-12.1	Yes	4.8	High
3-01.1	No	3.0	Medium
3-02.1	Yes	5.4	High
3-03.1	Yes	4.5	High
3-04.1	Yes	5.8	High
3-05.1	No	4.0	High
3-06.1	No	2.8	Minimum
3-07.1	No	1.5	Minimum
3-08.1	No	4.0	High
3-09.1	Yes	4.5	High
3-10.1	Yes	5.8	High
3-11.1	Yes	6.8	High
3-12.1	Yes	4.8	High
4-01.1	No	3.0	Medium
4-02.1	Yes	5.4	High
4-03.1	Yes	4.5	High
4-04.1	Yes	5.8	High
4-05.1	No	4.0	High
4-06.1	No	2.8	Minimum
4-07.1	No	1.5	Minimum
4-08.1	No	4.0	High
4-09.1	Yes	4.5	High
4-10.1	Yes	5.8	High
4-11.1	Yes	6.8	High
4-12.1	Yes	4.8	High

Sunlight Hours			
Unit ID	LKD window within 90° South	No. sunlight hours on 21st March	BRE recommendation
5-01.1	No	4.0	High
5-02.1	Yes	5.4	High
5-03.1	Yes	6.0	High
5-04.1	Yes	6.0	High
5-05.1	No	4.0	High
5-06.1	No	2.8	Minimum
5-07.1	No	1.5	Minimum
5-08.1	No	4.0	High
5-09.1	Yes	4.5	High
5-10.1	Yes	5.8	High
5-11.1	Yes	6.8	High
5-12.1	Yes	4.8	High
6-01.1	Yes	5.8	High
6-02.1	Yes	8.8	High
6-03.1	Yes	6.0	High
6-04.1	Yes	6.0	High
6-05.1	No	4.0	High
6-06.1	No	1.5	Minimum

Table 12: Sunlight hours to living spaces