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Daylight & Sunlight Assessments of proposed modifications to the previously permitted Large-scale Residential Development on lands at 23-28 Prussia Street, Dublin 7

Applicant: **Randalswood Construction Ltd.**
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Contents:

1:	Introduction	3
2:	Methodology	6
3:	Site & Project Overview	11
4:	Daylight In Neighbouring Buildings	12
5:	Sunlight In Neighbouring Buildings	18
6:	Sunlight To Amenity In Neighbouring Properties	19
7:	Daylight Within The Proposed Development	21
8:	Sunlight Within The Proposed Development	23
9:	Sunlight To Amenity Within The Proposed Development	24
10:	Shadow Study	25

Appendix

A:	BS EN17037:2018+A1:2021 Minimum Room Specific Daylight Provision In Accordance With UK National Annex Table NA.1	41
B:	Supplementary Information IS/ BS EN17037:2018 Table A.1 Daylight Provision Room Results	43
C:	Sunlight Hours To Living Spaces Within The Proposed Development	45

1. Introduction

The proposed development is on lands at 23-28 Prussia Street, Dublin 7 (D07 X9X6, D07 FW30 & D07 PAF1), (located at the junction of Prussia Street and St. Joseph's Road, and bounded by No. 29 Prussia Street (Protected Structure) to the north, No. 22 Prussia Street to the south, and TU Dublin, Grangegorman Campus and boundary wall (Protected Structure) to the east). The development will consist of proposed modifications to the previously permitted Large-scale Residential Development (LRD) (permitted under planning permissions Reg. Ref. LRD6057/24-S3A and amended under Reg. Ref. WEBLRD6103/26-S3), including the provision of 10 no. additional apartment units (110 no. permitted units to now provide a total of 120 no. apartment units i.e. a total of 74 no. 1 beds, 43 no. 2 beds, 2 no. 3 beds, and 1 no. 4 bed) as follows: Modifications to Block C from a total of 53 no. permitted apartments comprising of 34 no. 1 beds and 19 no. 2 beds, in a permitted building ranging from 7-8 storeys in height, to now provide two additional storeys to this block, to provide for a total of 63 no. apartments comprising of 40 no. 1-beds and 23 no. 2-beds, with modifications to the unit mix of the permitted seventh floor, in a building now ranging from 7-10 storeys in height, and all apartments provided with private balconies/terraces to south, east and west elevations; 16 no. additional cycle parking spaces to now provide a total of 240 no. cycle parking spaces on site including spaces at undercroft, surface and on Prussia Street, and all associated site works necessary to facilitate the development.

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 C+W O'Brien Architects.

This report has been prepared by Ann Canning, an architect with a masters in energy retrofit technologies and a member of the Royal Institute of Architects of Ireland. Ann is an architect with in excess of 20 year experience, and a daylight and sunlight consultant for 7 years. She has worked on an extensive list of projects over the years varying in scale and location from restricted city sites to rural areas, throughout Ireland.

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

1.2.1 Daylight to Existing Neighbouring Properties

Analysis demonstrated in Section 4 shows the vast majority of windows retain a VSC in excess of 27% or are not reduced below 80% of the existing VSC value. The small number of windows which experience a minor to moderate reduction from the permitted development is equal in number and level of impact in the now proposed development. There is no significant change in VSC levels, as a measure of daylight, in neighbouring dwellings, from the permitted development to the proposed development. The proposed development meets the recommendations of the BRE guidelines BR209:2022.

1.2.2 Sunlight to Existing Neighbouring Properties

There are no relevant windows in the neighbouring properties; those that face towards the proposed development are not orientated within 90º of due south. Any reduction to available sunlight hours will be negligible.

An assessment was undertaken of all private amenity spaces in the existing housing, and the communal amenity spaces in the student accommodation development currently under construction. All private and communal amenity spaces will not be significantly changed from the permitted development or in the now proposed development. The proposed development meets the recommendations of the BRE guidelines (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 habitable rooms within the permitted and 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 BR209:2022.

1.3.2 Sunlight within the Proposed Development

In the entire development, both permitted and proposed 120 no. units 90.8% have a habitable room which achieves the minimum recommended 1.5 direct 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.

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

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. In both the permitted and proposed development, 95.2% of habitable rooms achieve Minimum Illuminance and 86.3% achieve Target Illuminance. The rooms will be bright and pleasant spaces.

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.

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

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 permitted and 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.

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.

In Appendix 16- Sunlight and Daylight, the Dublin City Development Plan 2022-28 references BR209:2011 Site Layout Planning for Daylight and Sunlight (2nd edition). It also states that 'If, over the coming years, a revised version of BR 209 is to be issued, the guidance within this new version will take precedence." It is considered that the guidance in the Development Plan has been superseded by BR209:2022 and therefore it is not necessary to assess the scheme against the recommendations in Appendix 16 also. All relevant assessments in this report have regard to the guidance in the BRE guidelines BR209:2022.

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. 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. 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 Irish edition is IS EN17037:2018+A1:2021.

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 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. These are Daylight Factor in Bedrooms (0.7% DF), Living Rooms (1% DF) and Kitchens and Living Spaces containing a Kitchen (1.3% DF). 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 M5 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 M1 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 M1: 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 M2 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 M2 : 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 M3 : 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 M4 : 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 M5 : 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. Site & Project Overview

The proposed development will consist of modifications to the previously permitted LRD (permitted under planning permissions Reg. Ref. LRD6057/24-S3A and Reg. Ref. WEBLRD6103/26-S3). The relevant aspect of this application to issues of daylight and sunlight is the modifications to Block C, which now ranges from 7-10 storeys in height.

The site is bound to the north by No. 29 Prussia Street, a protected structure, a three storey building. The use of this building is not known; in this report it is designated residential, (the most stringent use). The remainder of the northern boundary is with a student accommodation development, at 29b, 30 & 31 Prussia Street, which is currently under construction. All assessments in this document include these structures in the model.

The proposed development alters Block C, from 7 - 8 storeys to 7 - 10 storeys; there is no change to the permitted Blocks A & B. Block C is the furtherest away from Prussia Street and the neighbouring residential buildings. For consistency with the parent application and original daylight & sunlight report, the neighbouring structures that were previously assessed in a cumulative manner are selected for assessment in this report. It should be noted that software updates can account for minor variations in calculations.

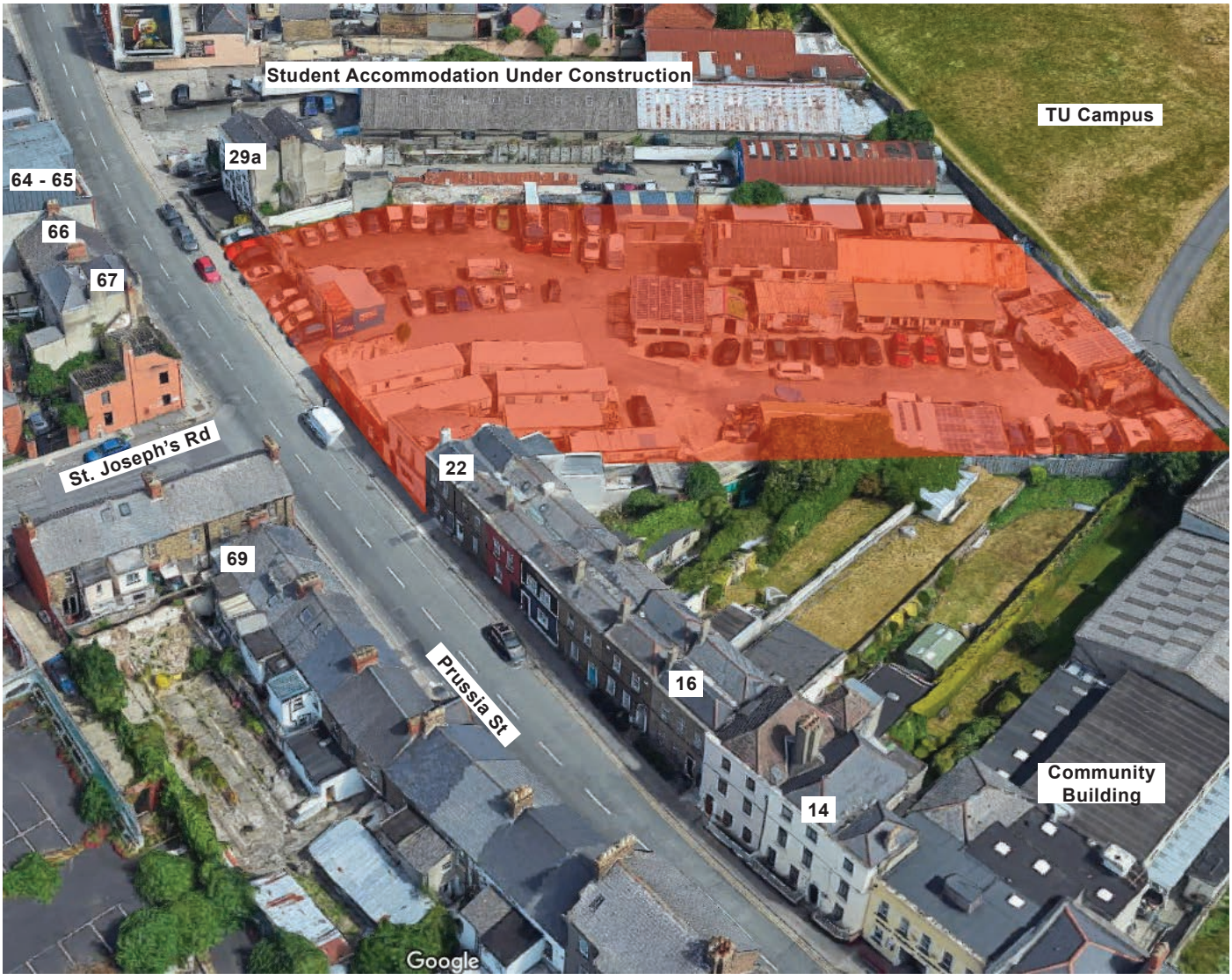


Figure 1: Indicative view of the site, taken from Google Maps.
Please refer to architectural drawings for statutory boundaries.

4. Daylight in Neighbouring Buildings

4.1 Detailed Assessment to Neighbouring Buildings

The BRE guidelines BR209:2022 recommend assessing the Vertical Sky Component (VSC) to neighbouring properties. The BRE guidelines recommends that if a window retains a VSC in excess of 27% with the proposed development in place then it will still receive enough daylight. If the existing VSC is below 27% or is reduced below 27% and below 0.8 times its former value then the diffuse light maybe adversely affected.

Test points representing windows in the neighbouring buildings assessed in the original daylight & sunlight report, of the parent planning permission, are indicated in Figures 2 - 6. The results are shown in Tables 1 - 5 below.

4.2 No.s 64- 67 Prussia Street



Figure 2: View of No.s 64- 67 Prussia Street locating windows assessed for VSC

Vertical Sky Component					
Location	Vertical Sky Component Recommended Value > 27%		Ratio: Proposal to Existing Recommended > 80%	Meets criteria if >27% VSC or <27% but >80% existing value	Comment
	Existing %	Proposed %			
1	31.2	25.2	80.8%	Y	Negligible
2	30.7	25.4	82.7%	Y	Negligible
3	11.2	8.5	75.2%	N	Minor Reduction
4	30.5	26.7	87.6%	Y	Negligible
5	29.0	25.9	89.4%	Y	Negligible
6	8.4	8.1	96.4%	Y	Negligible
7	27.3	25.2	92.4%	Y	Negligible
8	32.9	28.6	86.9%	Y	Negligible
9	32.5	28.7	88.2%	Y	Negligible
10	13.0	11.1	85.9%	Y	Negligible
11	32.9	30.4	92.3%	Y	Negligible
12	31.7	29.6	93.4%	Y	Negligible
13	10.4	10.1	96.9%	Y	Negligible
14	30.6	29.0	94.8%	Y	Negligible
15	34.9	32.4	92.8%	Y	Negligible
16	32.9	30.6	93.0%	Y	Negligible
17	35.6	34.3	96.5%	Y	Negligible
18	34.3	33.1	96.4%	Y	Negligible
19	34.2	33.1	96.6%	Y	Negligible
20	26.2	26.0	99.4%	Y	Negligible
21	32.8	31.9	97.1%	Y	Negligible

Vertical Sky Component					
Location	Vertical Sky Component Recommended Value > 27%		Ratio: Proposal to Existing Recommended > 80%	Meets criteria if >27% VSC or <27% but >80% existing value	Comment
	Existing %	Proposed %			
22	30.6	20.4	66.6%	N	Minor Reduction
23	32.5	24.4	75.1%	N	Minor Reduction
24	32.2	24.6	76.5%	N	Minor Reduction
25	31.8	25.0	78.6%	N	Minor Reduction
26	31.3	19.7	62.9%	N	Moderate Reduction
27	31.1	19.8	63.8%	N	Moderate Reduction
28	33.3	24.1	72.2%	N	Minor Reduction
29	33.0	24.3	73.8%	N	Minor Reduction
30	34.3	28.0	81.7%	Y	Negligible
31	34.1	28.3	82.9%	Y	Negligible

Table 1: Vertical Sky Component

4.2.1 Comment on the Potential Impact to No.s 64- 67 Prussia Street

There is no significant change in VSC levels, as a measure of daylight, in neighbouring dwellings, from the permitted development to the proposed development.

4.3 No.69 & 70 Prussia Street and No.1 & 2 St. Joseph's Road



Figure 3: View of No.69 & 70 Prussia Street and No.1 & 2 St. Joseph's Road locating windows assessed for VSC.

Vertical Sky Component					
Location	Vertical Sky Component Recommended Value > 27%		Ratio: Proposal to Existing Recommended > 80%	Meets criteria if >27% VSC or <27% but >80% existing value	Comment
	Existing %	Proposed %			
32	29.4	25.9	88.0%	Y	Negligible
33	33.8	29.7	88.0%	Y	Negligible
34	33.6	29.2	86.8%	Y	Negligible
35	29.3	27.1	92.4%	Y	Negligible
36	33.8	30.3	89.7%	Y	Negligible
37	33.9	30.7	90.5%	Y	Negligible
38	33.0	29.8	90.5%	Y	Negligible
39	34.6	31.8	91.9%	Y	Negligible
40	34.9	32.6	93.4%	Y	Negligible
41	34.1	32.3	94.9%	Y	Negligible
42	35.2	33.6	95.4%	Y	Negligible
43	35.5	34.2	96.3%	Y	Negligible

Table 2: Vertical Sky Component

4.3.1 Comment on the Potential Impact to No.69 & 70 Prussia Street and No.1 & 2 St. Joseph's Road

There is no significant change in VSC levels, as a measure of daylight, in neighbouring dwellings, from the permitted development to the proposed development.

4.4 No.18 - 22 Prussia Street



Figure 4: View of No.18 - 22 Prussia Street locating windows assessed for VSC

Vertical Sky Component					
Location	Vertical Sky Component Recommended Value > 27%		Ratio: Proposal to Existing Recommended > 80%	Meets criteria if >27% VSC or <27% but >80% existing value	Comment
	Existing %	Proposed %			
44	28.4	22.0	77.2%	N	* Minor Reduction
45	33.6	24.3	72.4%	N	* Minor Reduction
46	24.2	15.4	63.6%	N	* Moderate Reduction
47	24.0	19.4	80.9%	Y	Negligible
48	12.0	12.1	100.2%	Y	Negligible
49	34.0	26.7	78.4%	N	Minor Reduction
50	21.5	20.3	94.3%	Y	Negligible
51	23.2	18.9	81.2%	Y	Negligible
52	22.7	16.1	71.0%	N	Moderate Reduction
53	34.4	27.1	78.6%	Y	Negligible
54	26.8	19.6	73.2%	N	Minor Reduction
55	26.3	23.3	88.3%	Y	Negligible
56	35.8	29.9	83.6%	Y	Negligible
57	25.5	21.2	83.1%	Y	Negligible
58	35.9	30.2	84.0%	Y	Negligible
59	36.1	30.3	83.9%	Y	Negligible

* In joint ownership with the proposed development site.

Table 3: Vertical Sky Component

4.4.1 Comment on the Potential Impact to No.18 - 22 Prussia Street

There is no significant change in VSC levels, as a measure of daylight, in neighbouring dwellings, from the permitted development to the proposed development.

4.5 No.14 - 17 Prussia Street



Figure 5: View of No.14 - 17 Prussia Street locating windows assessed for VSC

Vertical Sky Component					
Location	Vertical Sky Component Recommended Value > 27%		Ratio: Proposal to Existing Recommended > 80%	Meets criteria if >27% VSC or <27% but >80% existing value	Comment
	Existing %	Proposed %			
60	20.7	16.9	81.5%	Y	Negligible
61	20.7	18.7	90.4%	Y	Negligible
62	35.5	30.5	85.8%	Y	Negligible
63	35.8	31.3	87.4%	Y	Negligible
64	29.4	25.1	85.4%	Y	Negligible
65	32.8	27.0	82.3%	Y	Negligible
66	36.3	32.0	88.3%	Y	Negligible
67	35.1	31.1	88.4%	Y	Negligible
68	35.1	31.5	89.7%	Y	Negligible
69	22.0	20.5	93.2%	Y	Negligible
70	26.2	23.4	89.4%	Y	Negligible
71	11.2	10.8	96.2%	Y	Negligible
72	33.9	29.7	87.7%	Y	Negligible
73	35.2	31.7	89.9%	Y	Negligible
74	22.3	18.8	84.2%	Y	Negligible
75	22.1	20.0	90.4%	Y	Negligible
76	30.2	26.7	88.5%	Y	Negligible
77	28.6	25.3	88.7%	Y	Negligible
78	31.7	29.8	94.0%	Y	Negligible
79	36.7	33.5	91.3%	Y	Negligible
80	27.9	25.1	89.7%	Y	Negligible
81	35.8	33.2	92.7%	Y	Negligible

Table 4: Vertical Sky Component

4.5.1 Comment on the Potential Impact to No.14 - 17 Prussia Street

There is no significant change in VSC levels, as a measure of daylight, in neighbouring dwellings, from the permitted development to the proposed development.

4.6 No.29a Prussia Street

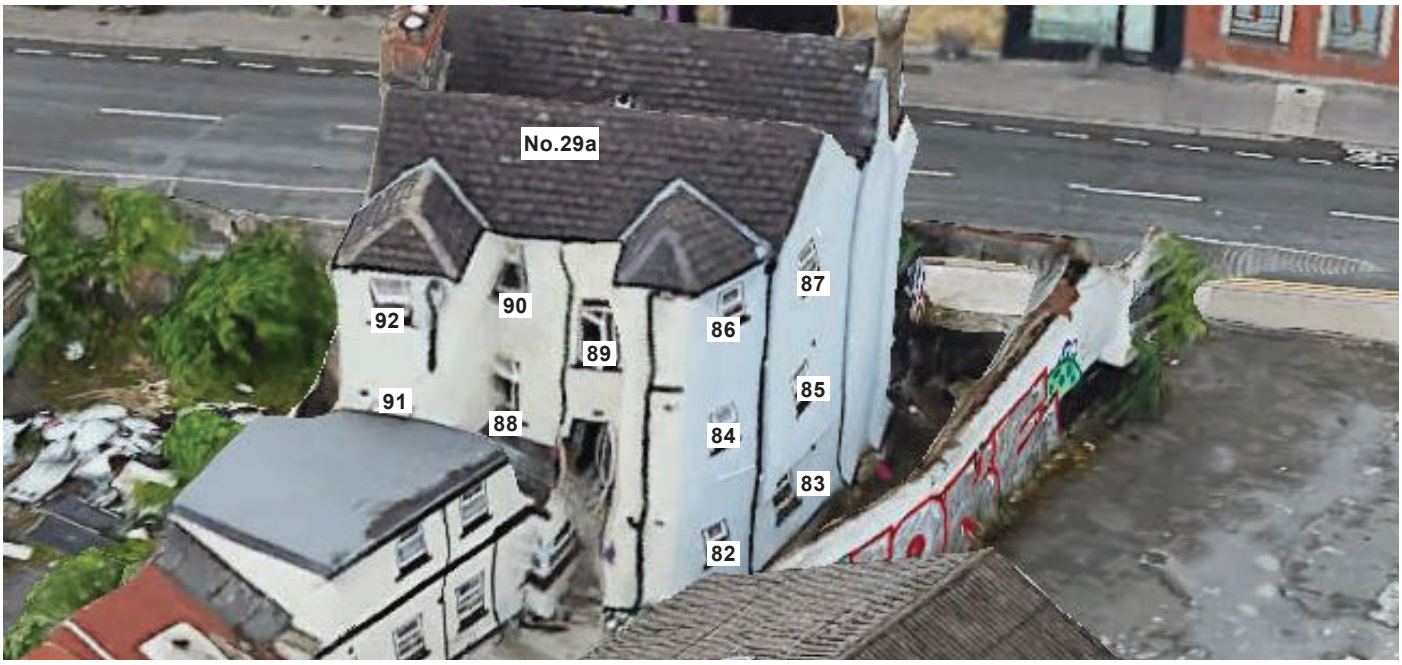


Figure 6: View of No 29a Prussia Street locating windows assessed for VSC.

Vertical Sky Component					
Location	Vertical Sky Component Recommended Value > 27%		Ratio: Proposal to Existing Recommended > 80%	Meets criteria if >27% VSC or <27% but >80% existing value	Comment
	Existing %	Proposed %			
82	18.7	18.7	100.0%	Y	Negligible
83	15.8	15.8	100.0%	Y	Negligible
84	21.5	21.5	100.0%	Y	Negligible
85	18.2	18.1	99.9%	Y	Negligible
86	24.5	24.5	100.0%	Y	Negligible
87	21.3	21.3	100.1%	Y	Negligible
88	10.7	10.7	100.0%	Y	Negligible
89	12.8	11.6	90.0%	Y	Negligible
90	16.4	16.4	100.0%	Y	Negligible
91	22.3	17.8	80.0%	Y	Negligible
92	25.0	21.2	85.0%	Y	Negligible

Table 5: Vertical Sky Component

4.6.1 Comment on the Potential Impact to No.14 - 17 Prussia Street

There is no significant change in VSC levels, as a measure of daylight, in neighbouring dwellings, from the permitted development to the proposed development.

4.7 Conclusion of Potential Impact to Existing Windows

The vast majority of windows retain a VSC in excess of 27% or are not reduced below 80% of the existing VSC value. The small number of windows which experience a minor to moderate reduction from the permitted development is equal in number and level of impact in the now proposed development.

The proposed development meets the recommendations of the BRE guidelines BR209:2022.

5. Sunlight in Neighbouring Buildings

5.1 Sunlight in Neighbouring Dwellings (Annual Probable Sunlight Hours)

The BRE guidelines BR209:2022 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.

5.2 Conclusion on Annual Probable Sunlight Hours (APSH)

No windows to the adjacent properties facing the proposed development are orientated within 90º of due south. As their direct access to sunlight does not exist as present and reduction to available sunlight hours will be negligible. The proposed development meets the recommendations of the BRE guidelines (2022).

6. 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 two hours sunlight on the 21st March. It also states that front gardens need not be assessed for 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.

6.1 Amenity Space to Neighbouring Properties

The neighbouring amenity spaces were assessed for a potential impact on their sun on the ground. Permitted and proposed developments are shown in generated analysis in Figure 7, the results are itemised in Table 6 below.

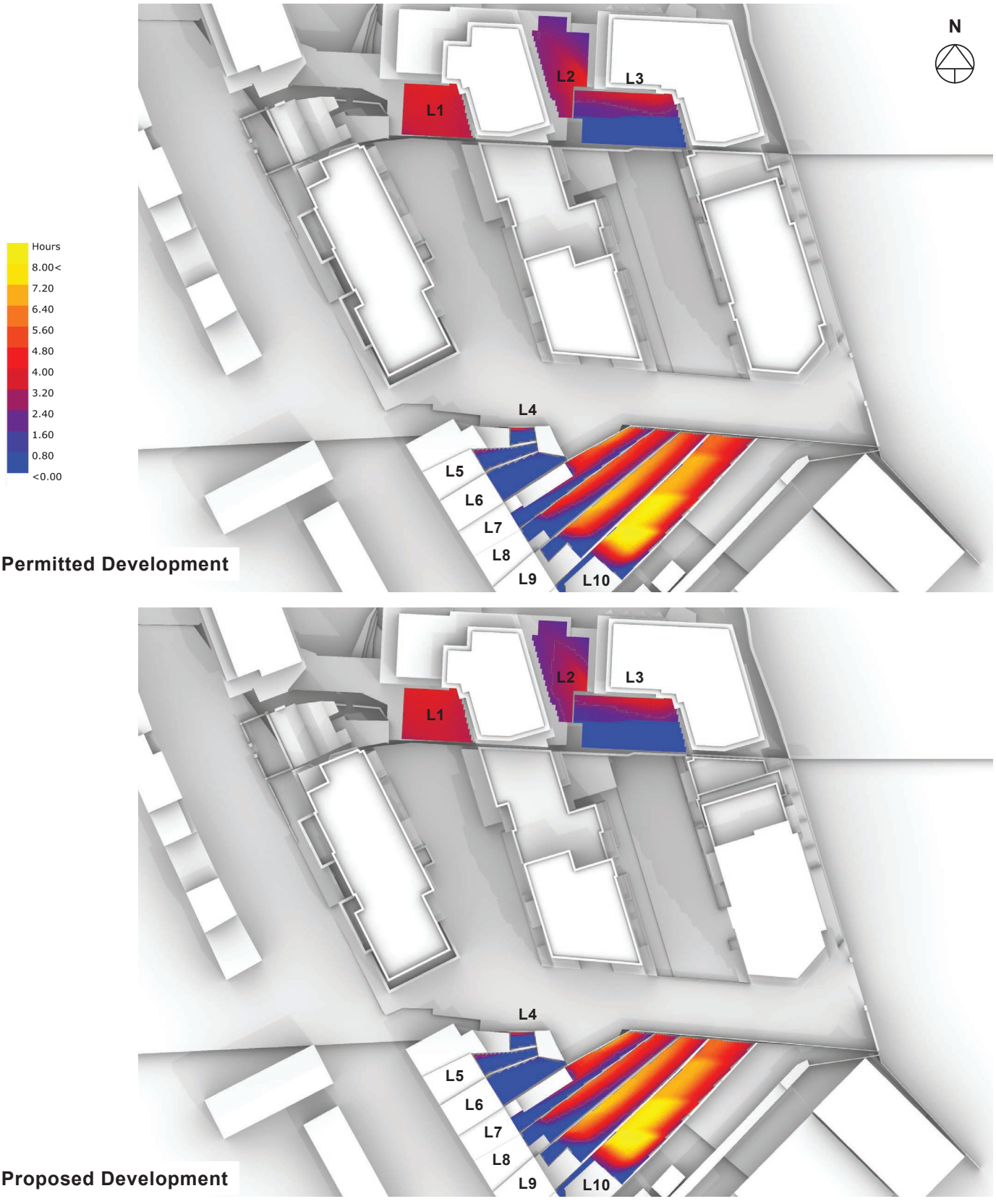


Figure 7: Permitted & Proposed radiation map of amenity areas, showing available sunlight on 21st March. The scale represents the sunlight received from 0 - 8 hours.

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% ratio
	Location	Permitted Development	Proposed Development	Proposed: Permitted	
L1	Student Acc	99.6%	99.6%	100.0%	Y
L2	Student Acc	67.8%	50.0%	73.7%	Y
L3	Student Acc	48.1%	38.6%	80.2%	Y
L4	16 Prussia St.	91.1	91.1	100%	Y
L5	17 Prussia St.	78.6	78.6	100%	Y
L6	18 Prussia St.	57.8	57.8	100%	Y
L7	19 Prussia St.	34.3	34.4	100%	Y
L8	20 Prussia St.	0	0	100%	Y
L9	21 Prussia St.	4	4	100%	Y
L10	22 Prussia St.	11.1	11.1	100%	Y

Table 6: Calculation of Sun on the Ground to Neighbouring Amenity Areas

6.2 Conclusion

An assessment was undertaken of all private amenity spaces in the existing housing, and the communal amenity spaces in the student accommodation development currently under construction. All private and communal amenity spaces will not be significantly changed from the permitted development or in the now proposed development. The proposed development meets the recommendations of the BRE guidelines (2022).

7. Daylight within the Proposed Development

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

7.1 Permitted Development with the Proposed Development: An Assessment for Daylight Provision BS EN 17037:2018+A1:2021

The permitted developments on Block A, B and the lower floors of Block C were re-assessed, together with the proposed floors on Block C to ensure they maintain compliance with daylight provision. These values are

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 7 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 8 below and a complete set of room results are shown in Appendix B.

7.1 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 lux
Permitted & Proposed Development	LKD	120	200	120	100.0%
	Bedrooms	171	100	171	100.0%
Total		291		291	100.0%

Table 7: Summary of room for Target Illuminance compliance with BS EN 17037:2018+A1:2021. Individual room results can be viewed in Appendix A.

7.2 Conclusion

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

7.3 Supplementary Information - Assessment for Daylight Provision IS EN 17037:2018+A1:2021

A summary of Minimum and Target Illuminance levels under IS EN 17037:2018+A1:2021 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
Permitted & Proposed Development	Target Illuminance	13.7%	23.0%	28.9%	34.4%	86.3%
	Minimum Illuminance	4.8%	32.6%	32.0%	30.6%	95.2%

Table 8: 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 95.2% of rooms achieving Minimum Illuminance and 86.3% 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 setting out room specific targets for dwellings; compliance for daylight within the development is presented in Section 7.2 above.

8. Sunlight within the Proposed Development

8.1 Sunlight Hours

The BRE guidelines BR209:2022 and EN 17037 (both IS & BS), 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 8: Extract from BR209:2022 Section 3 Sun-lighting: Diagram indicating sample floor plan to maximise units with a main living space facing south.

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						
Habitable Rm	120	83	69.2%	11	25	29	55	109	90.8%

Table 9: Summary of Results of Assessment of Sunlight Hours

8.2 Comment on EN 17037 Sunlight Hours

The BRE guidelines BR209:2022 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.

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 entire development, both permitted and proposed 120 no. units 90.8% have a habitable room which achieves the minimum recommended 1.5 direct sunlight hours.

8.3 Conclusion

This scheme is well designed for sunlight, with 90.8% 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.

9. 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 two hours sunlight on the 21st of March. It also states that front gardens need not be assessed for sunlight.

9.1 Sunlight to Amenity within the Proposed Development

The amenity areas within the permitted development have been re-assessed with the proposed development on Block C in the model to ensure they maintain compliance with a calculation of Sun on the Ground. Generated analysis is shown in Figure 9 and the results are set out in Table 10 below.

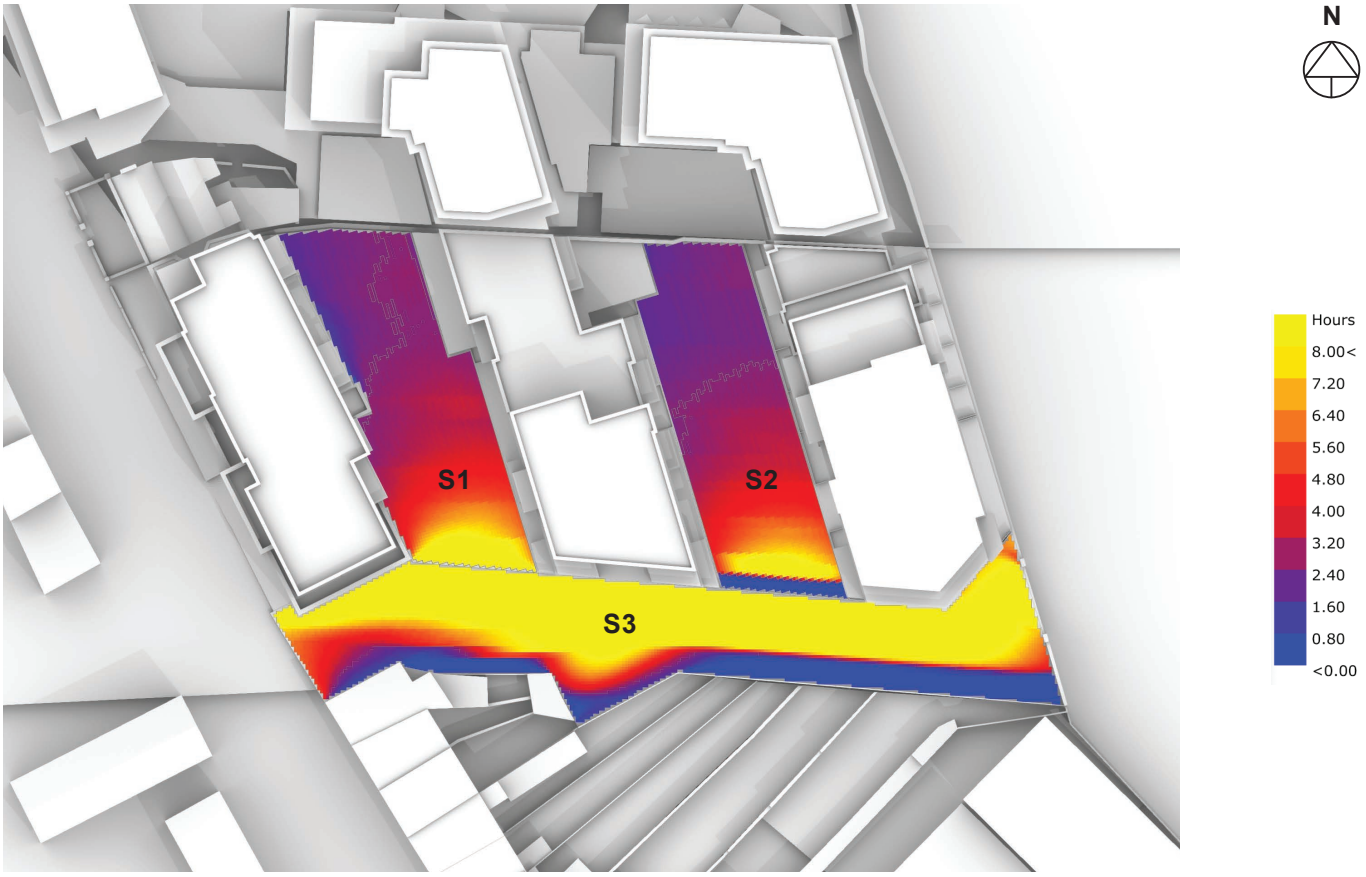


Figure 9: Radiation map of amenity within the proposed development, showing available sunlight on 21st March. The scale represents the sunlight received from 0 - 8 hours.

Sunlight on the ground - within development			
No.	Use	Proposed	Meets criteria of >50% area
S1	Communal Residential	75.4%	Yes
S2	Communal Residential	62.8%	Yes
S3	Public open space	76.8%	Yes

Table 10: Calculation of Sun on the Ground to amenity area within the proposed development.

9.2 Conclusion

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

10. Shadow Study

10.1 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.

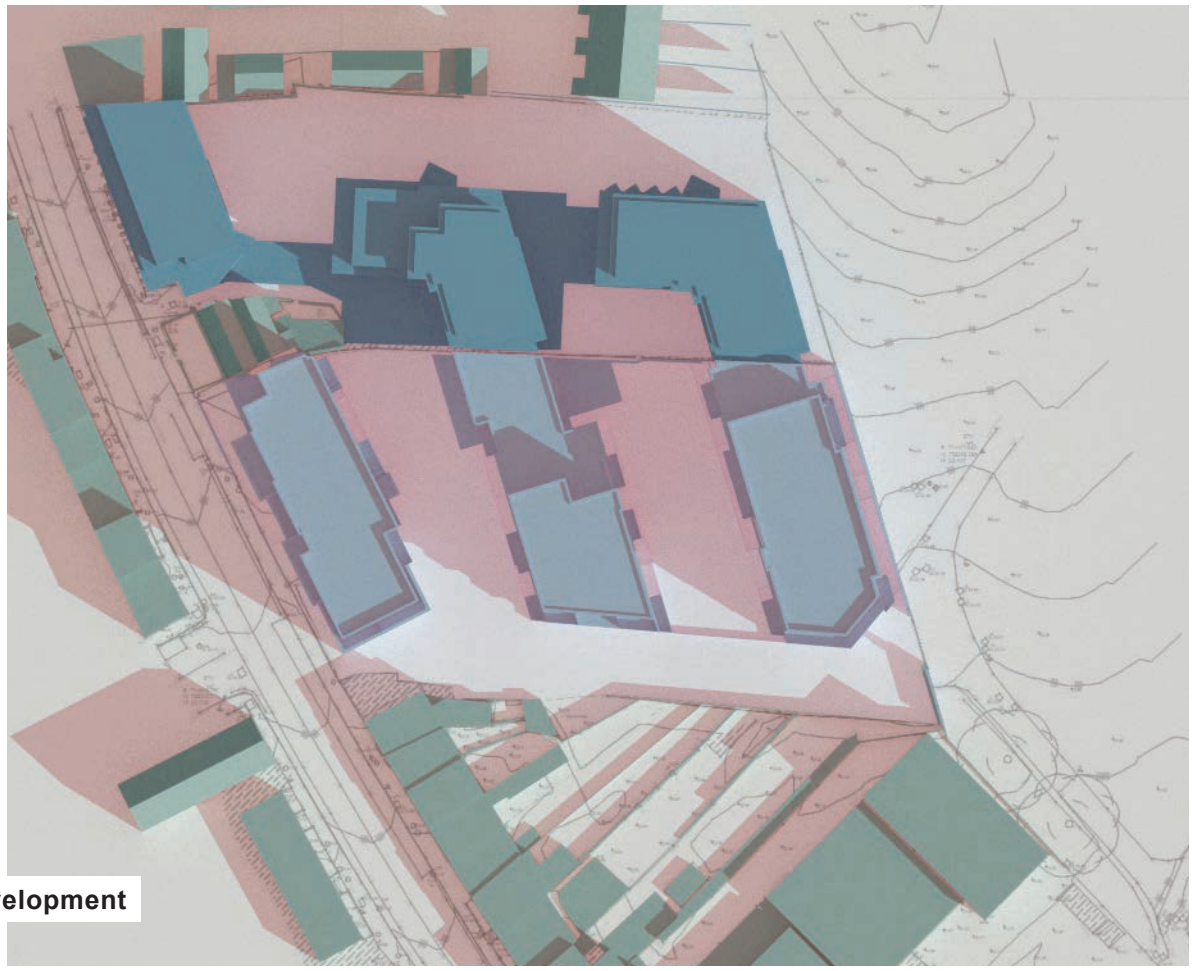
Equinox: between 8:30 and 17:30
Summer Solstice: Between 6:30 and 20:00
Winter Solstice: Between 10:30 and 14:00

Section 10.2 shows the permitted and proposed shadow diagrams for the Equinox on the 21st March at 2 hourly intervals during the day between 09:00 and 17:00.
Section 10.3 shows the permitted and proposed shadow diagrams for the Summer Solstice on the 21st June at 2 hourly intervals during the day between 09:00 and 19:00.
Section 10.4 shows the permitted and proposed shadow diagrams for the Winter Solstice on the 21st December at 2 hourly intervals during the day between 09:00 and 15:00.

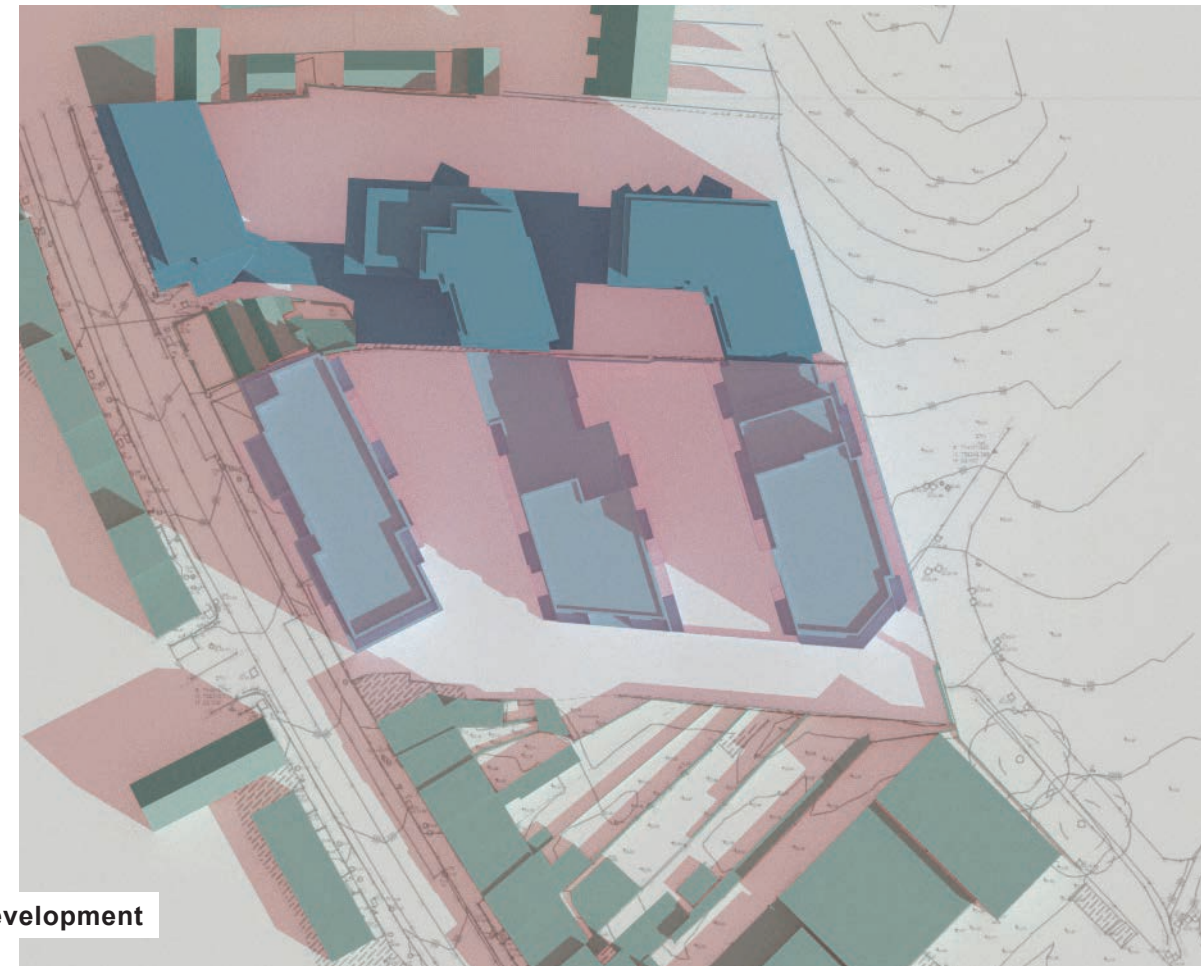
Shadow diagrams are a visual aid to understand where possible shading may occur. The use of shadow diagrams as an assessment method should be taken over the course of the day and not a specific time due to the transient nature of the sun and the shade caused by obstructions.

10.2 Shadow Casting diagrams March Equinox

N



Permitted Development



Proposed Development

Figure 10: Shadow diagrams 21 March 09:00 UTC

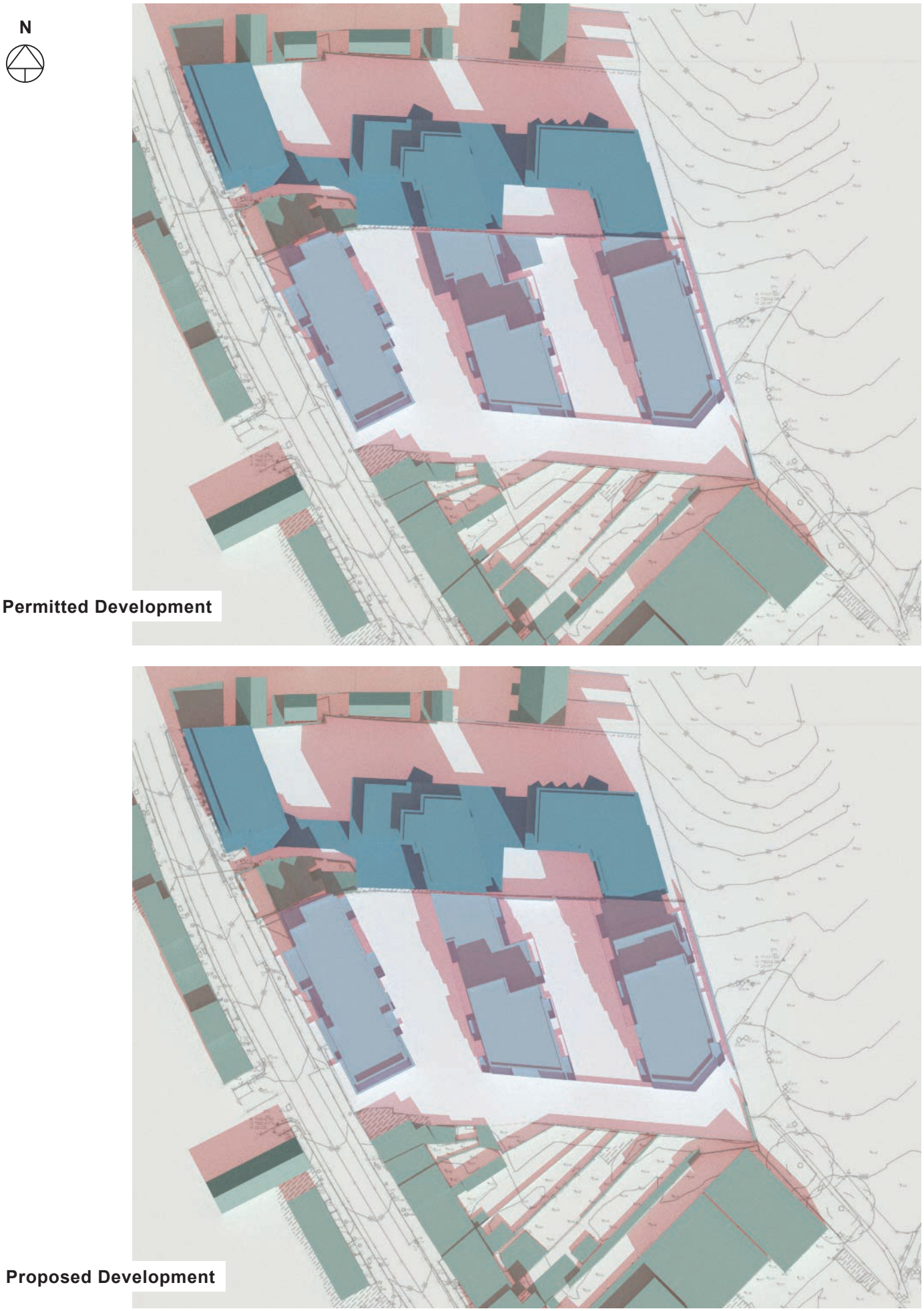
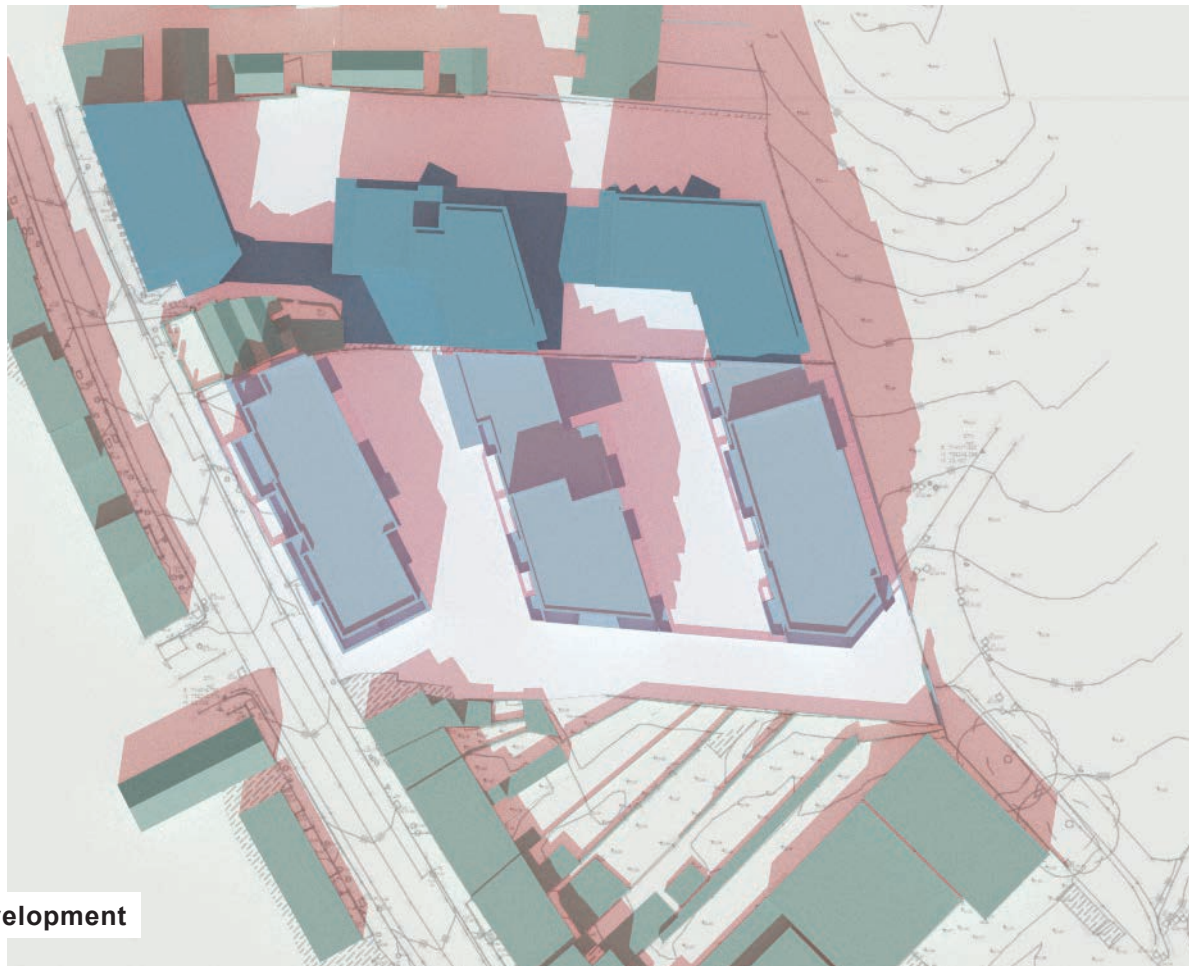
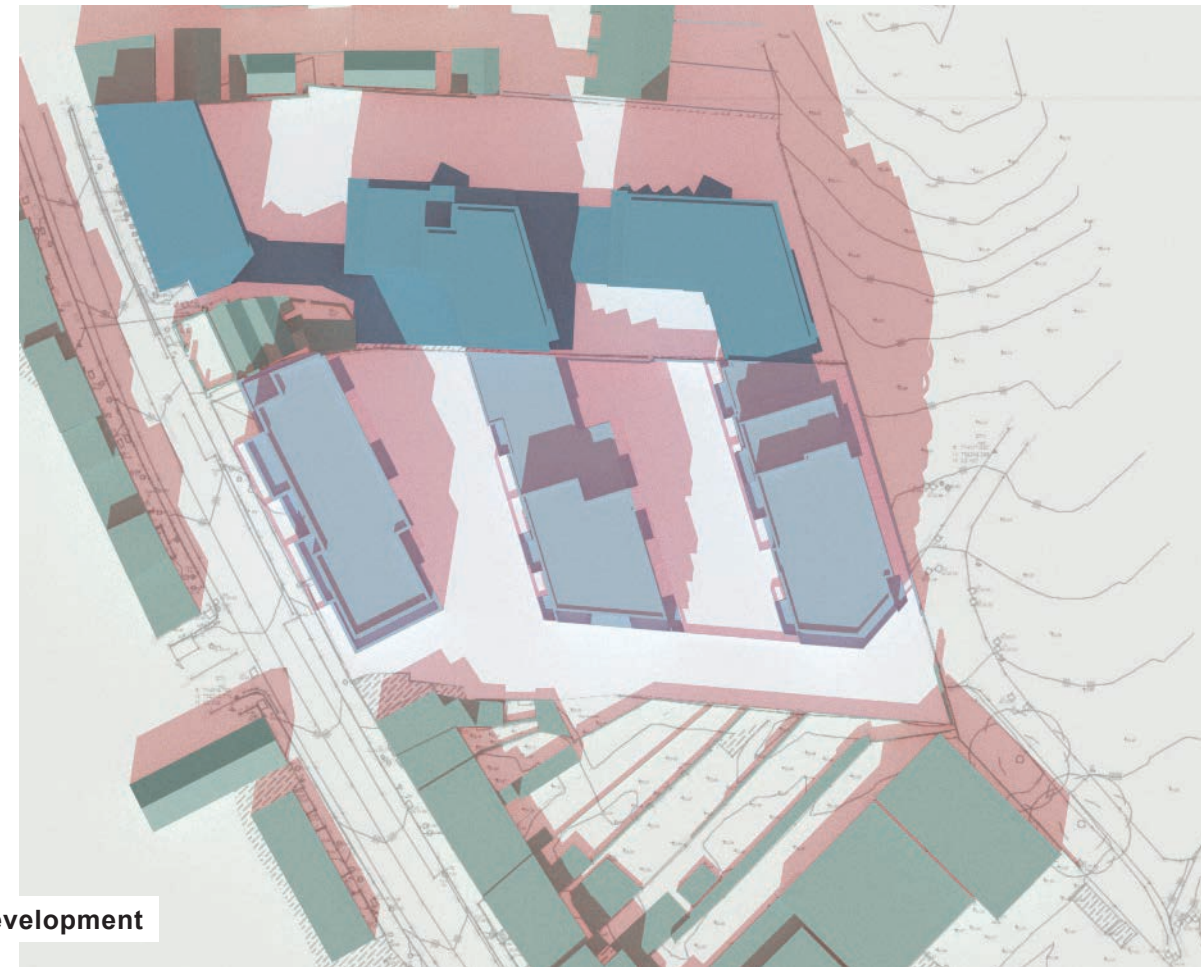


Figure 11: Shadow diagrams 21 March 11:00 UTC

N



Permitted Development



Proposed Development

Figure 12: Shadow diagrams 21 March 13:00 UTC

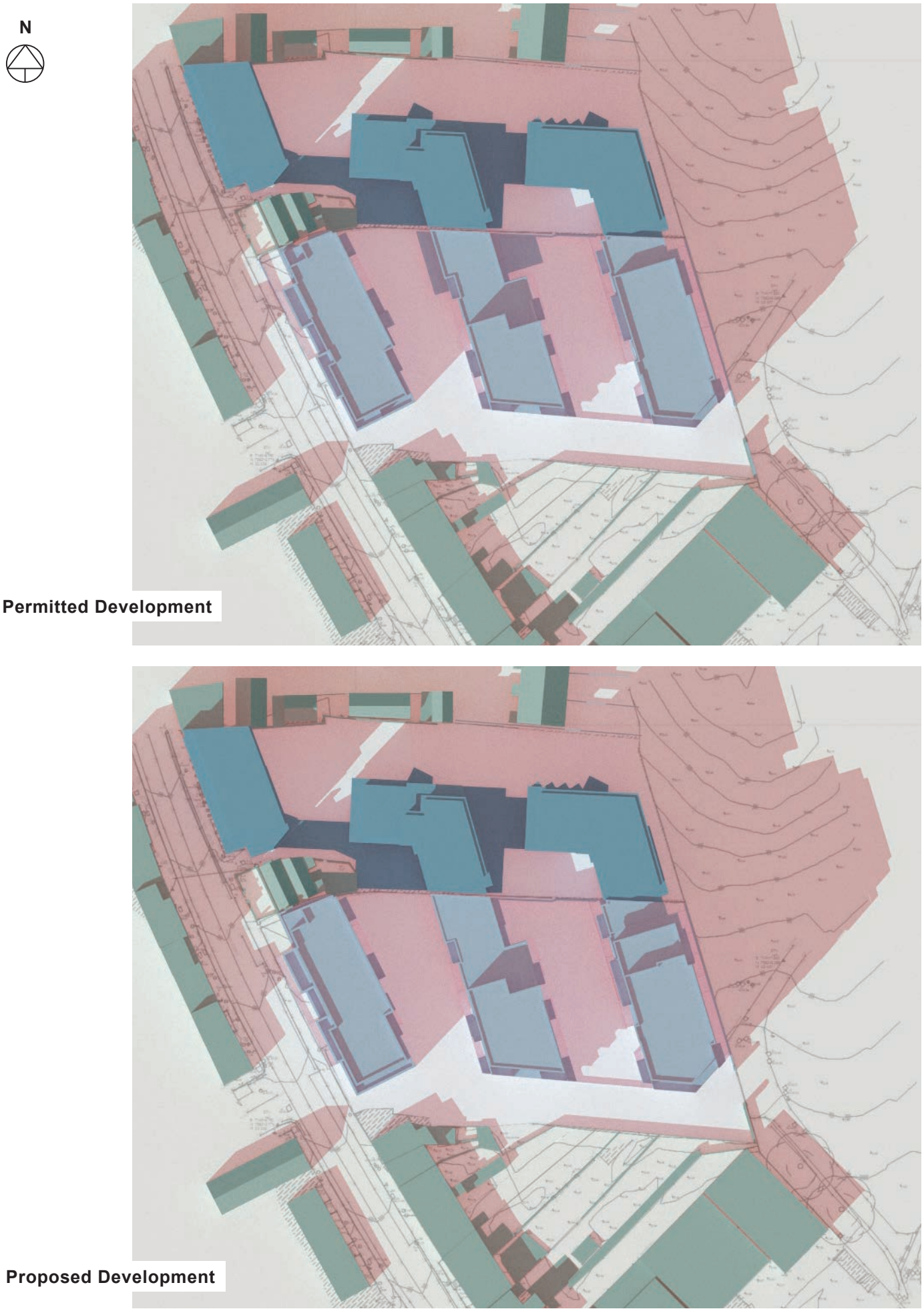
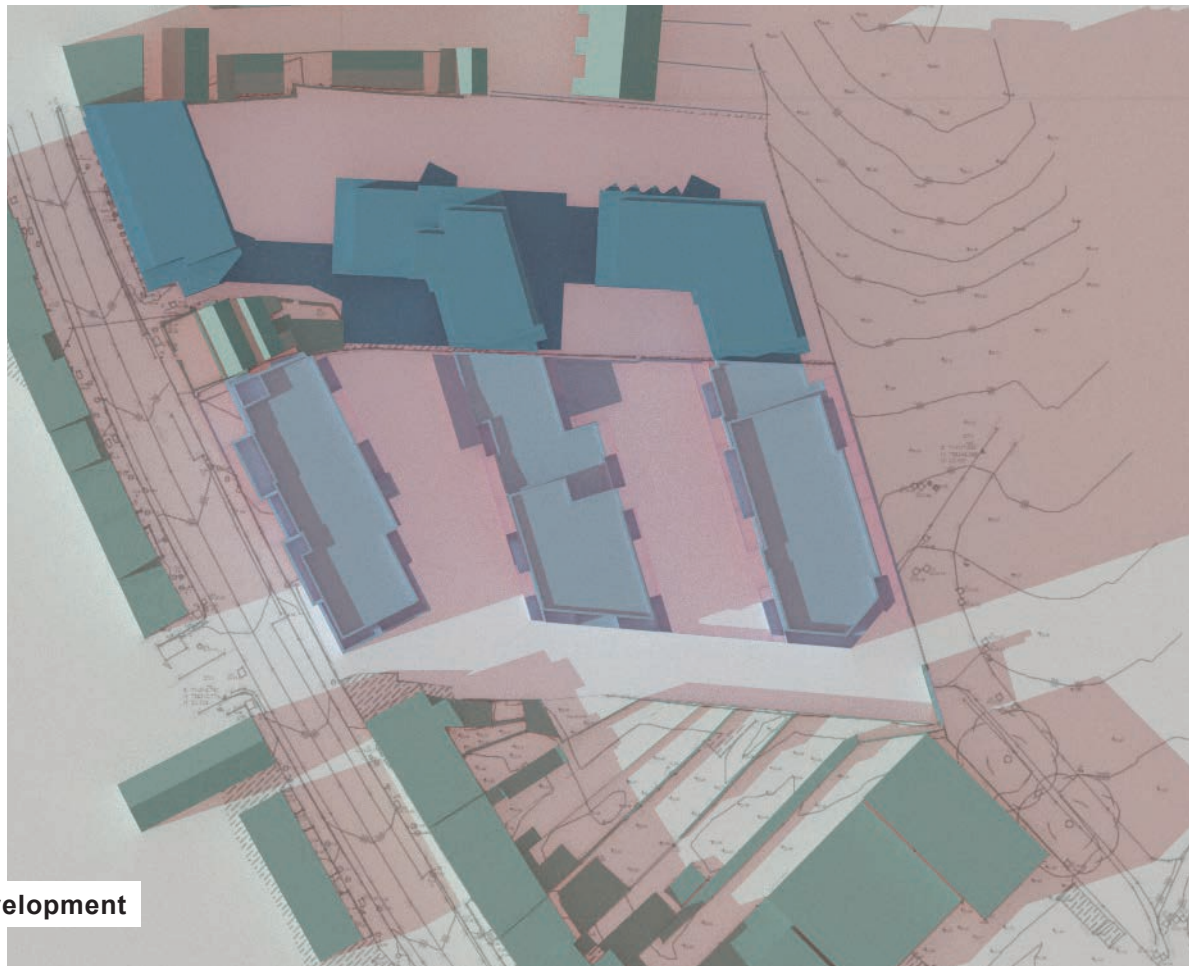


Figure 13: Shadow diagrams 21 March 15:00 UTC



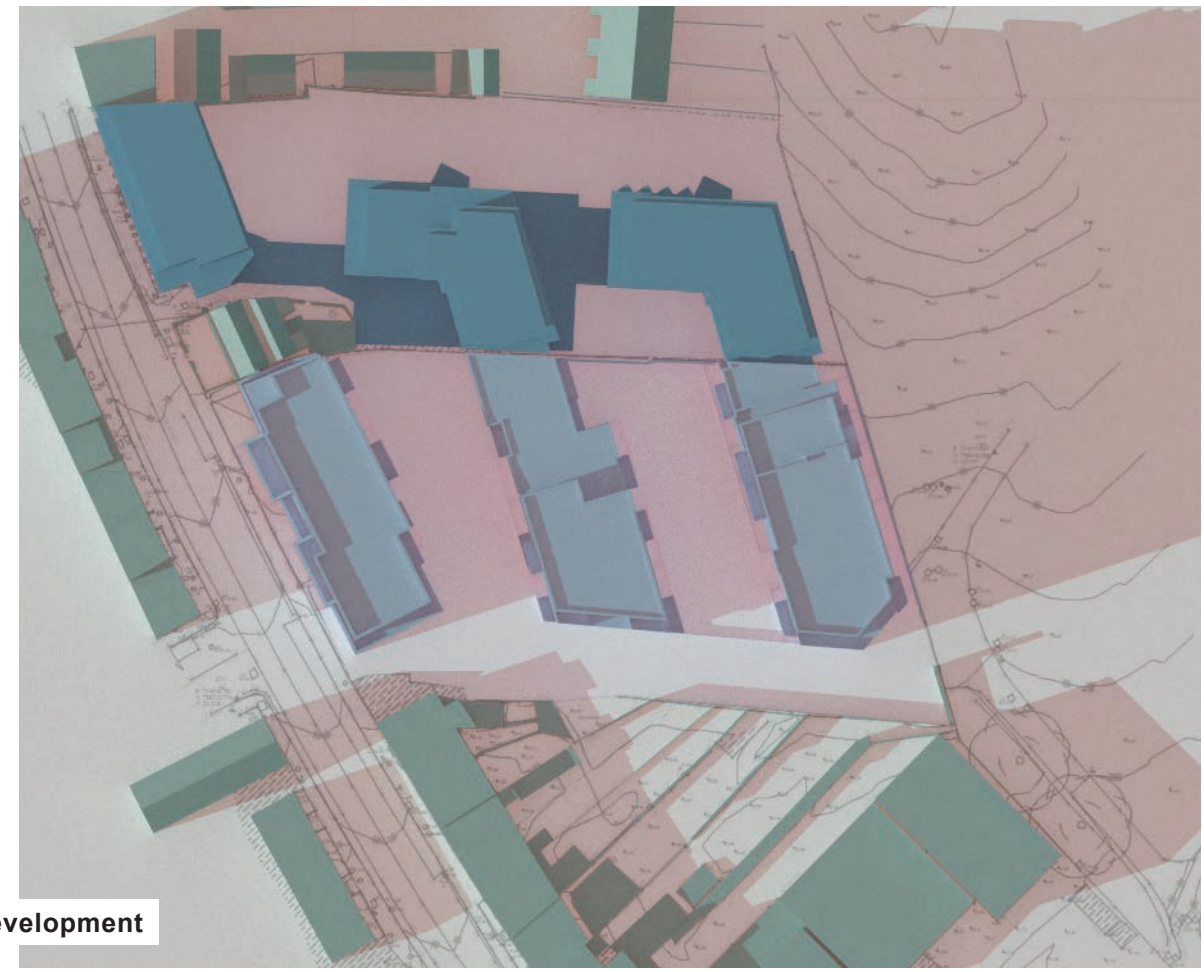
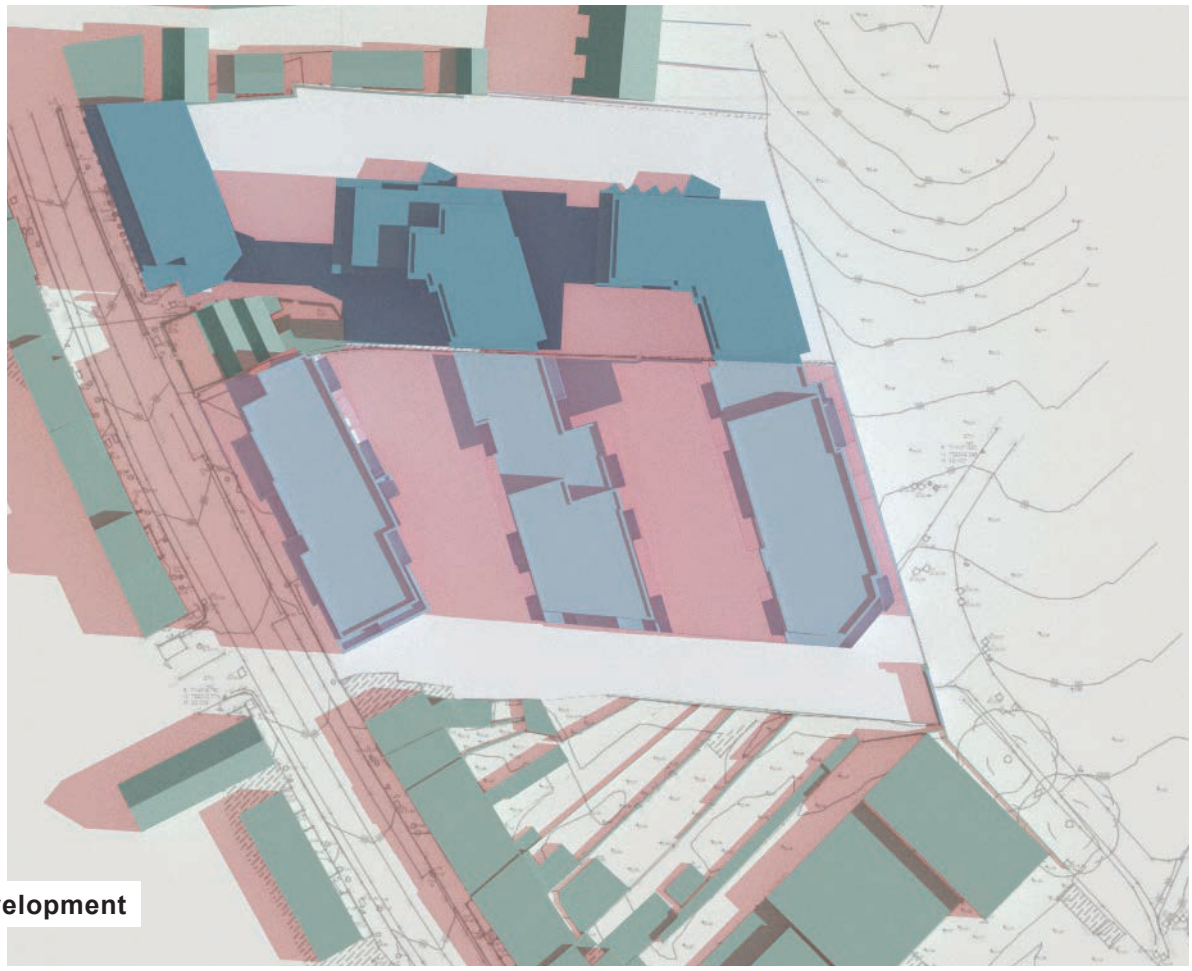


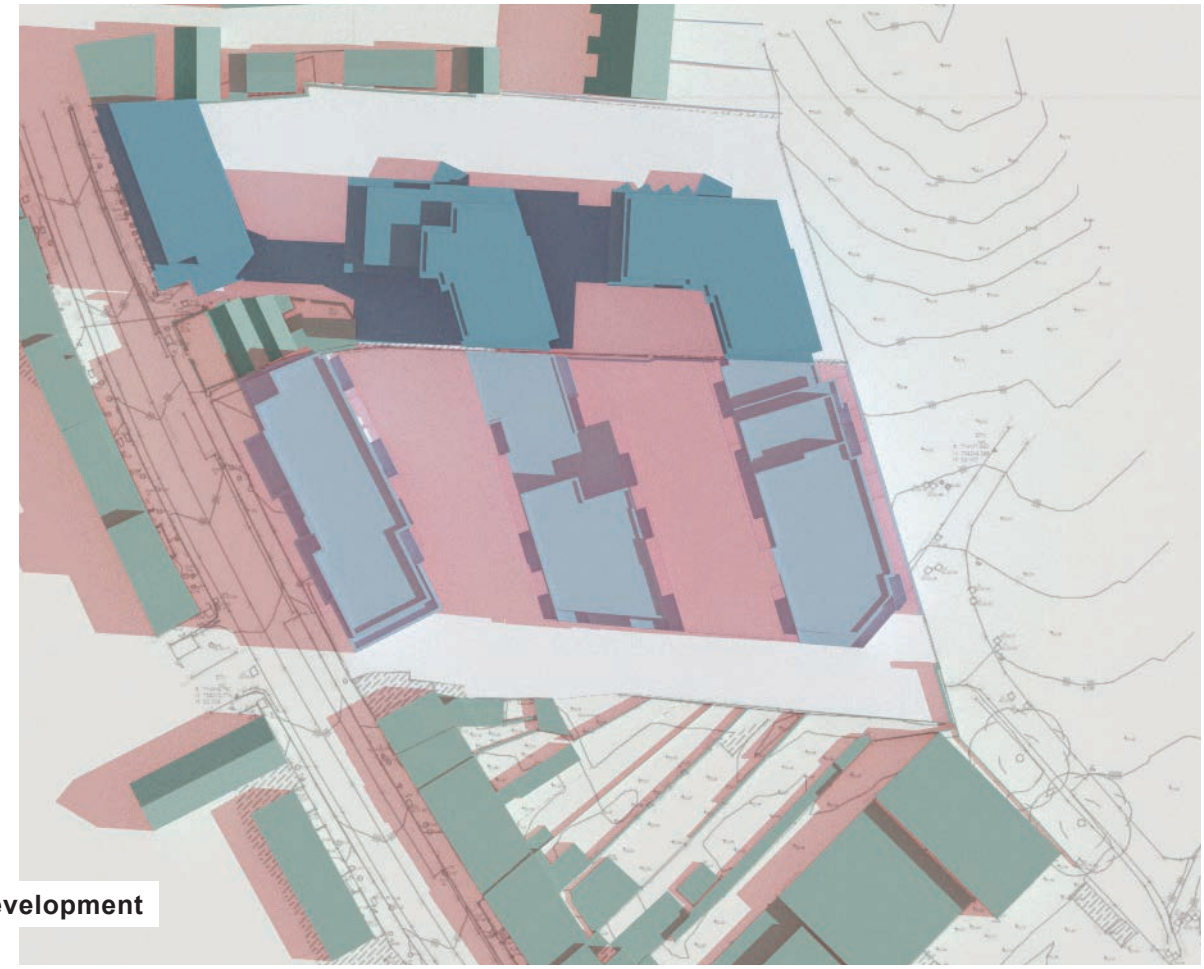
Figure 14: Shadow diagrams 21 March 17:00 UTC

10.3 Shadow Casting diagrams June Solstice

N



Permitted Development



Proposed Development

Figure 15: Shadow diagrams 21 June 09.00 UTC +1

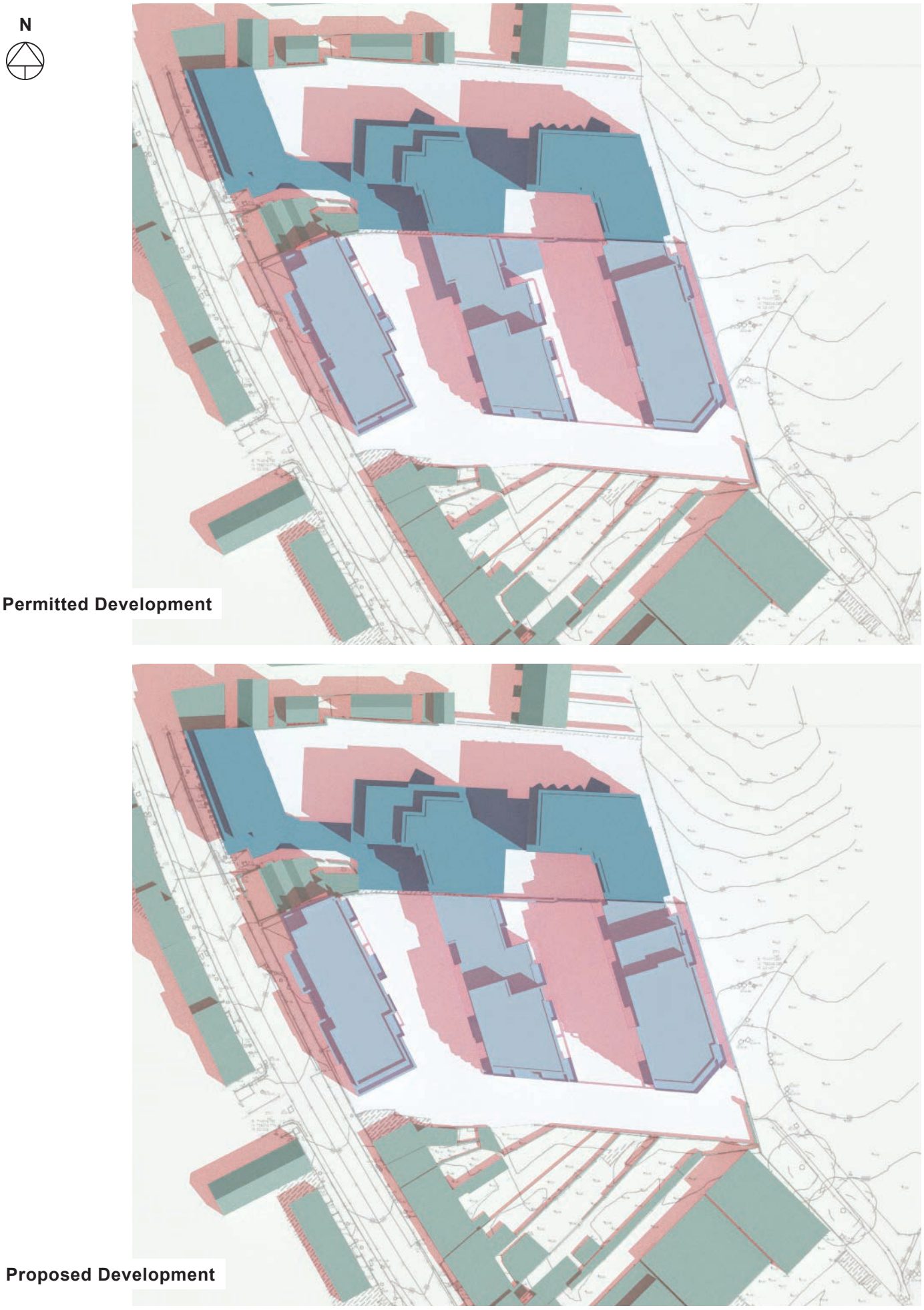


Figure 16: Shadow diagrams 21 June 11:00 UTC +1

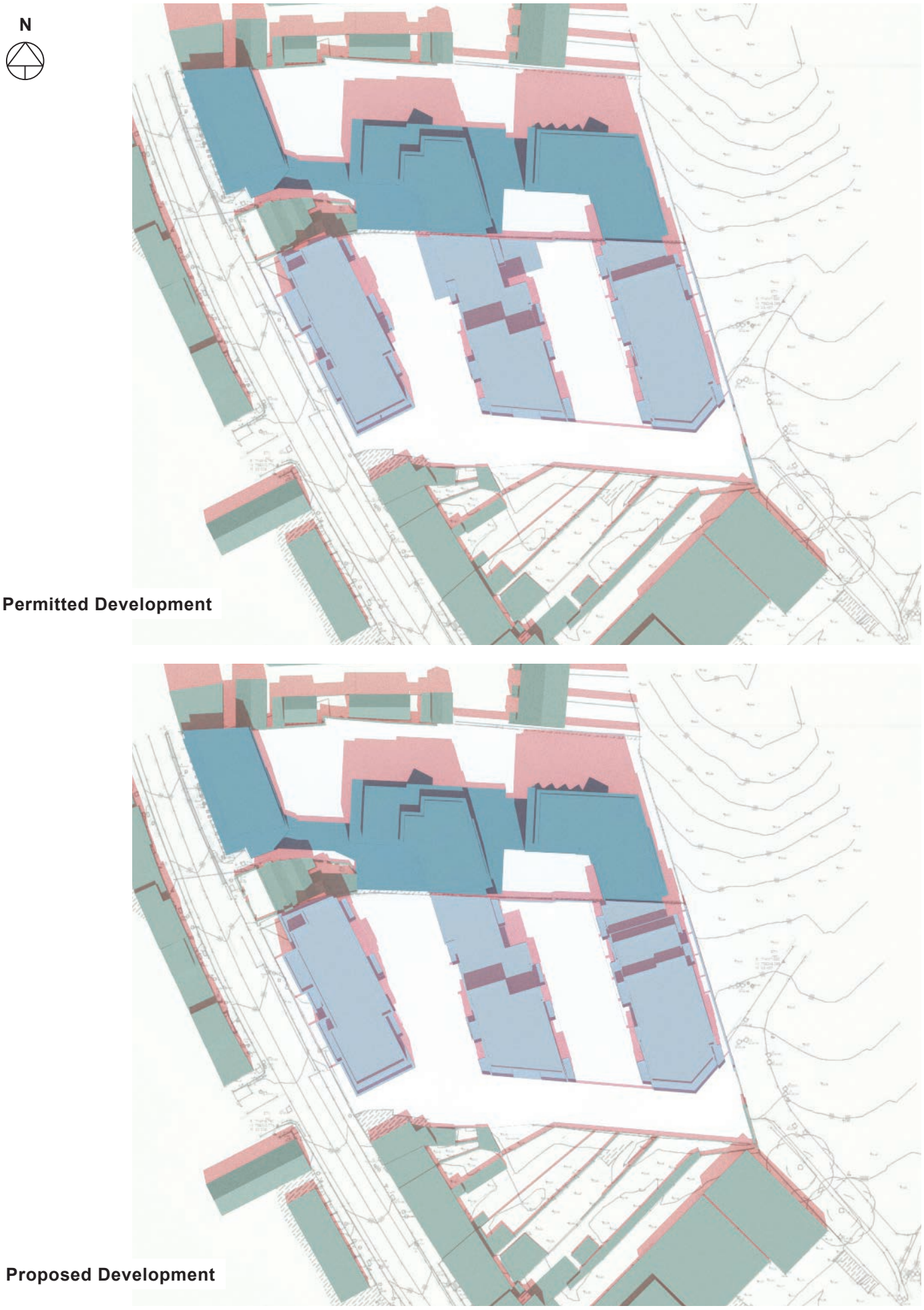


Figure 17: Shadow diagrams 21 June 13:00 UTC +1

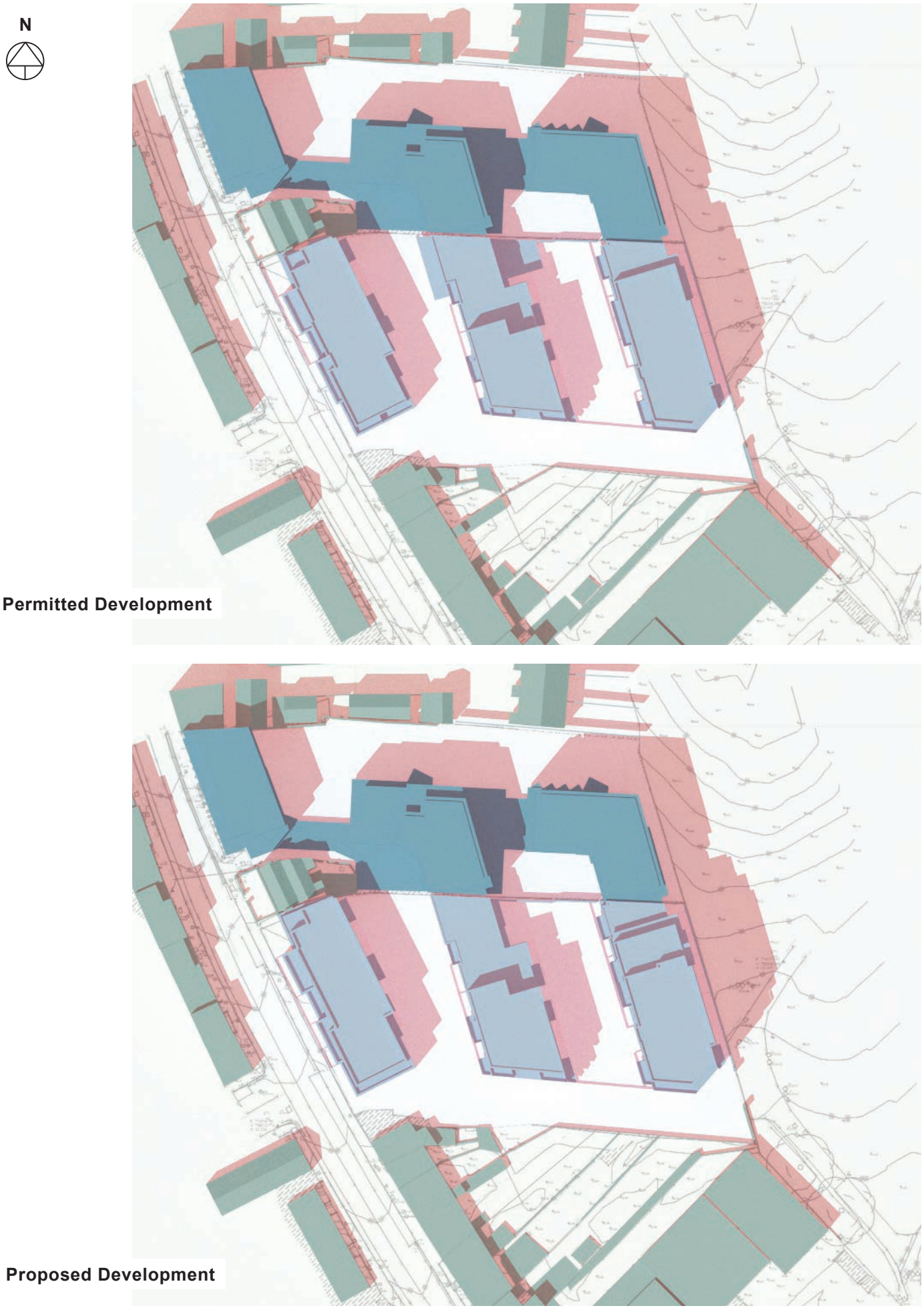


Figure 18: Shadow diagrams 21 June 15:00 UTC +1

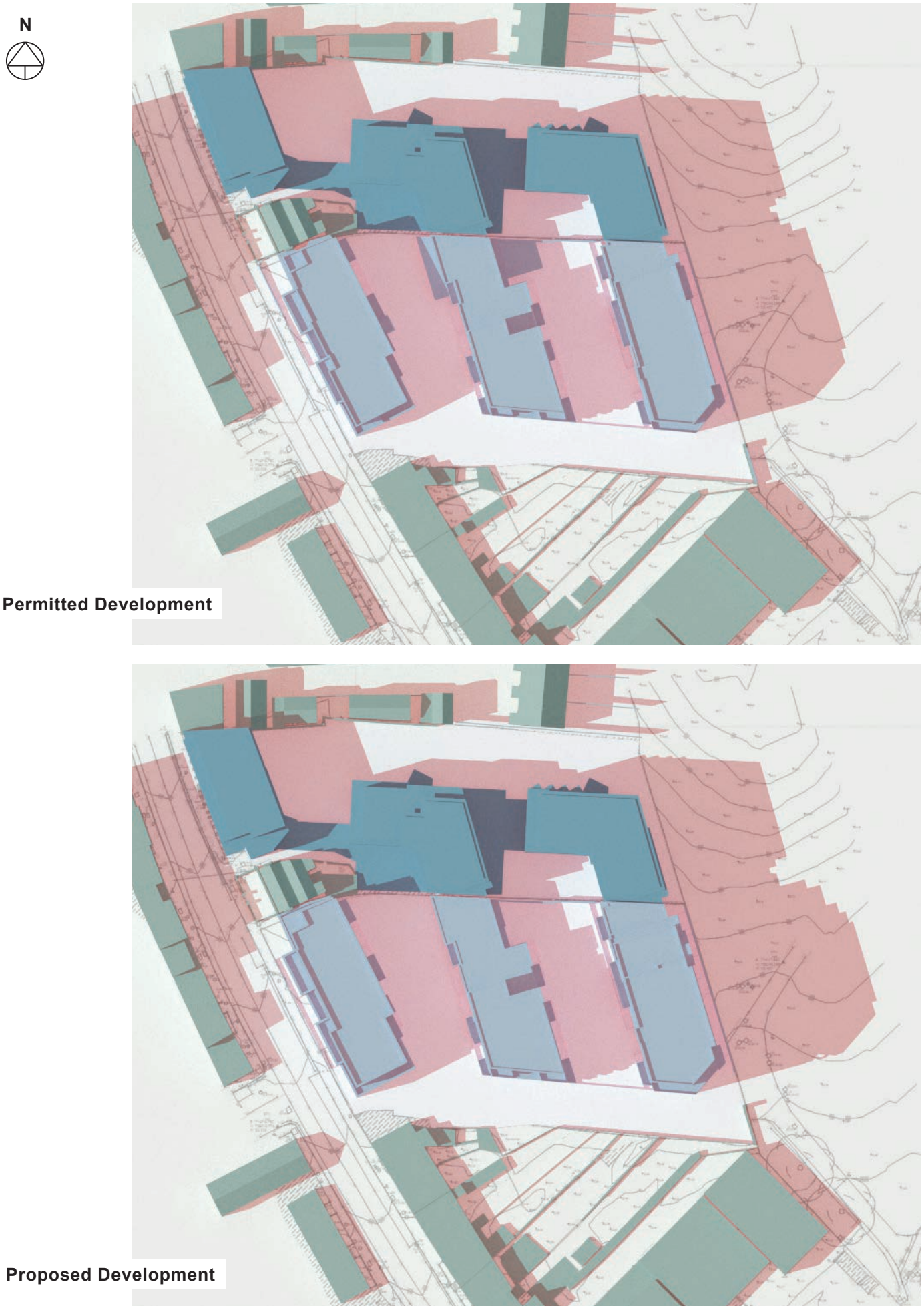


Figure 19: Shadow diagrams 21 June 17:00 UTC +1

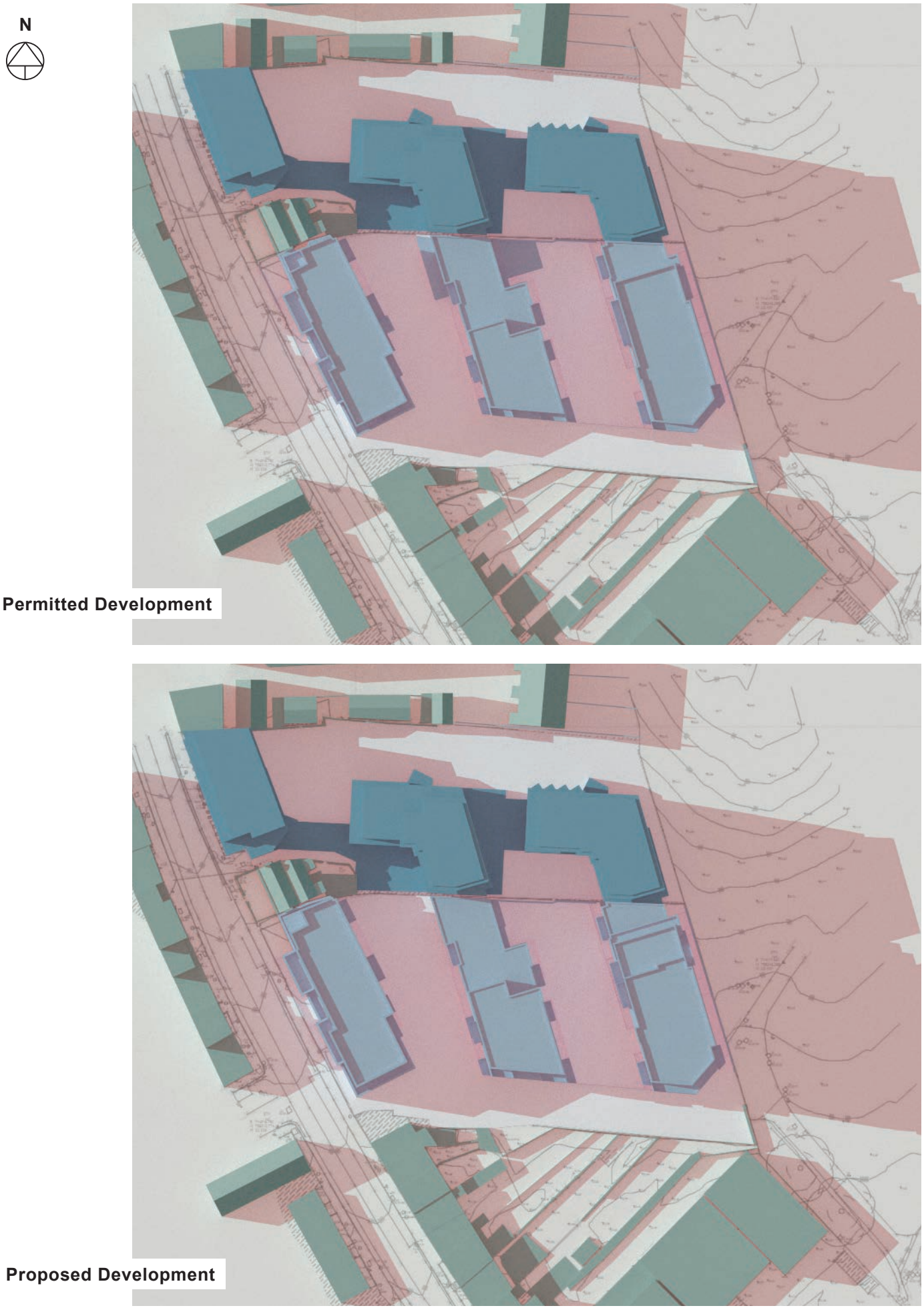
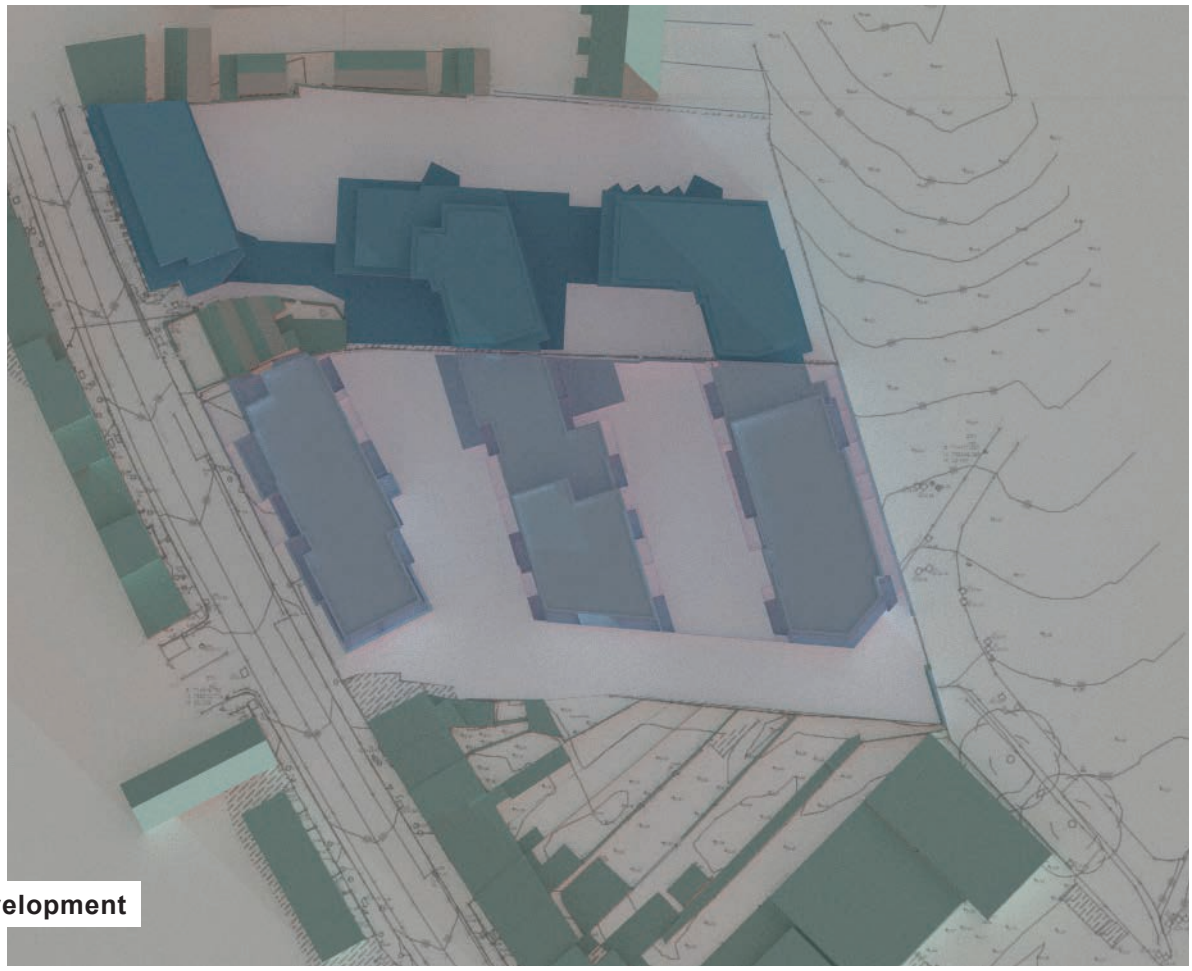
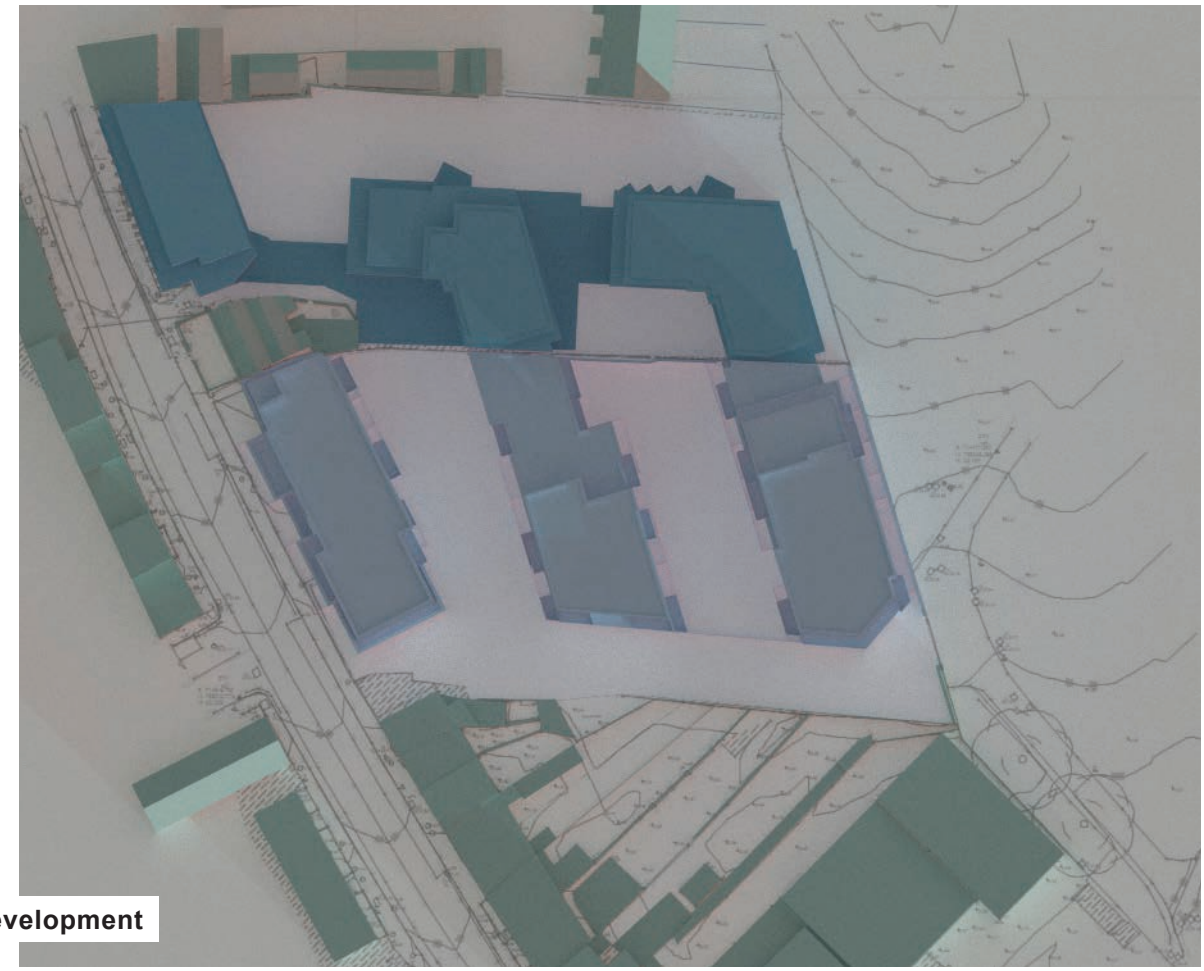


Figure 20: Shadow diagrams 21 June 19:00 UTC +1

10.4 Shadow Casting diagrams December Solstice



Permitted Development



Proposed Development

Figure 21: Shadow diagrams 21 December 09:00 UTC

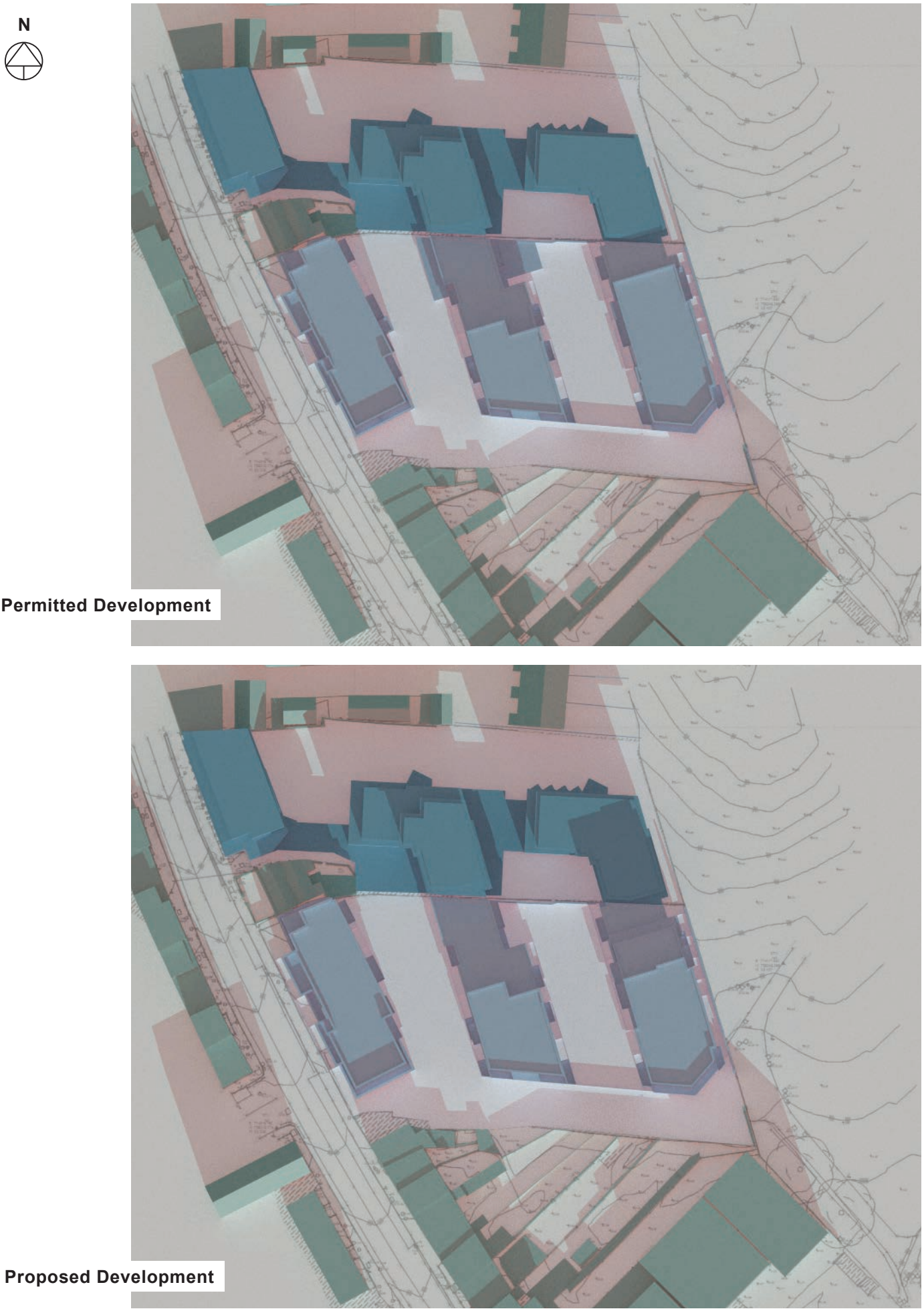


Figure 22: Shadow diagrams 21 December 11:00 UTC

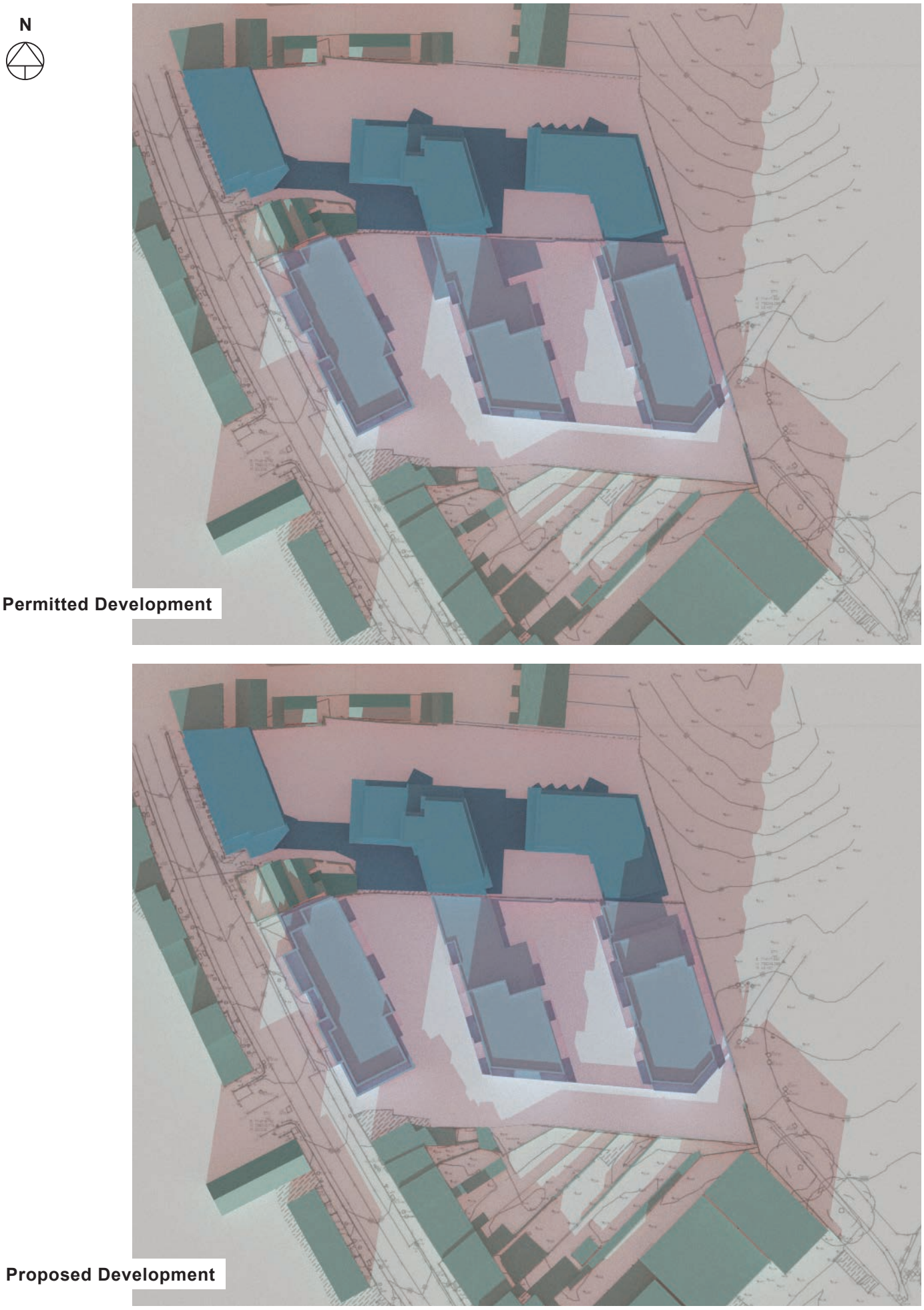


Figure 23: Shadow diagrams 21 December 13:00 UTC

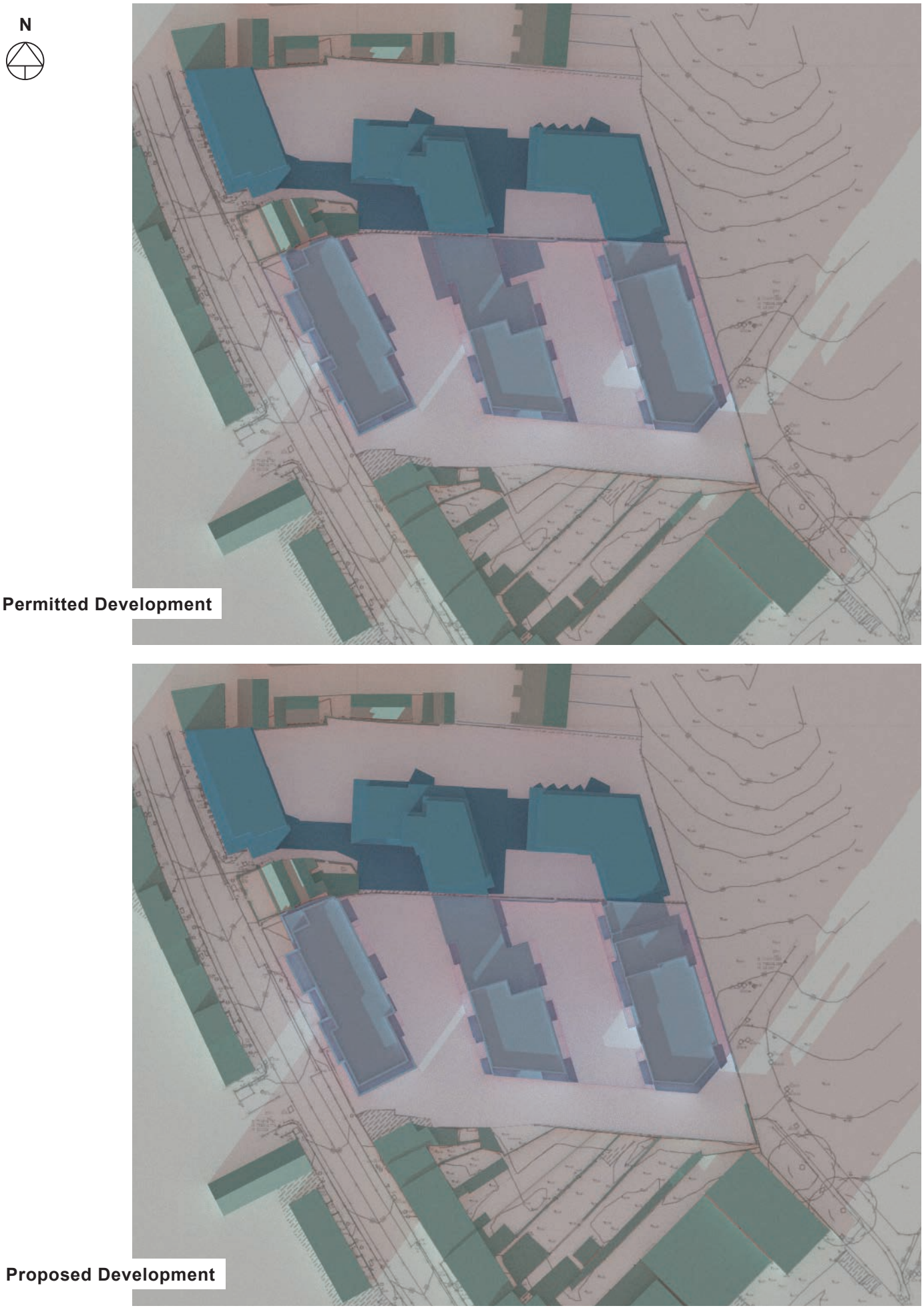


Figure 24: Shadow diagrams 21 December 15:00 UTC

Appendix A - BS EN17037:2018+A1:2021 Minimum Room Specific Daylight Provision in Accordance with UK National Annex Table NA.1.

Block C



Seventh Floor **Eighth Floor** **Ninth Floor**

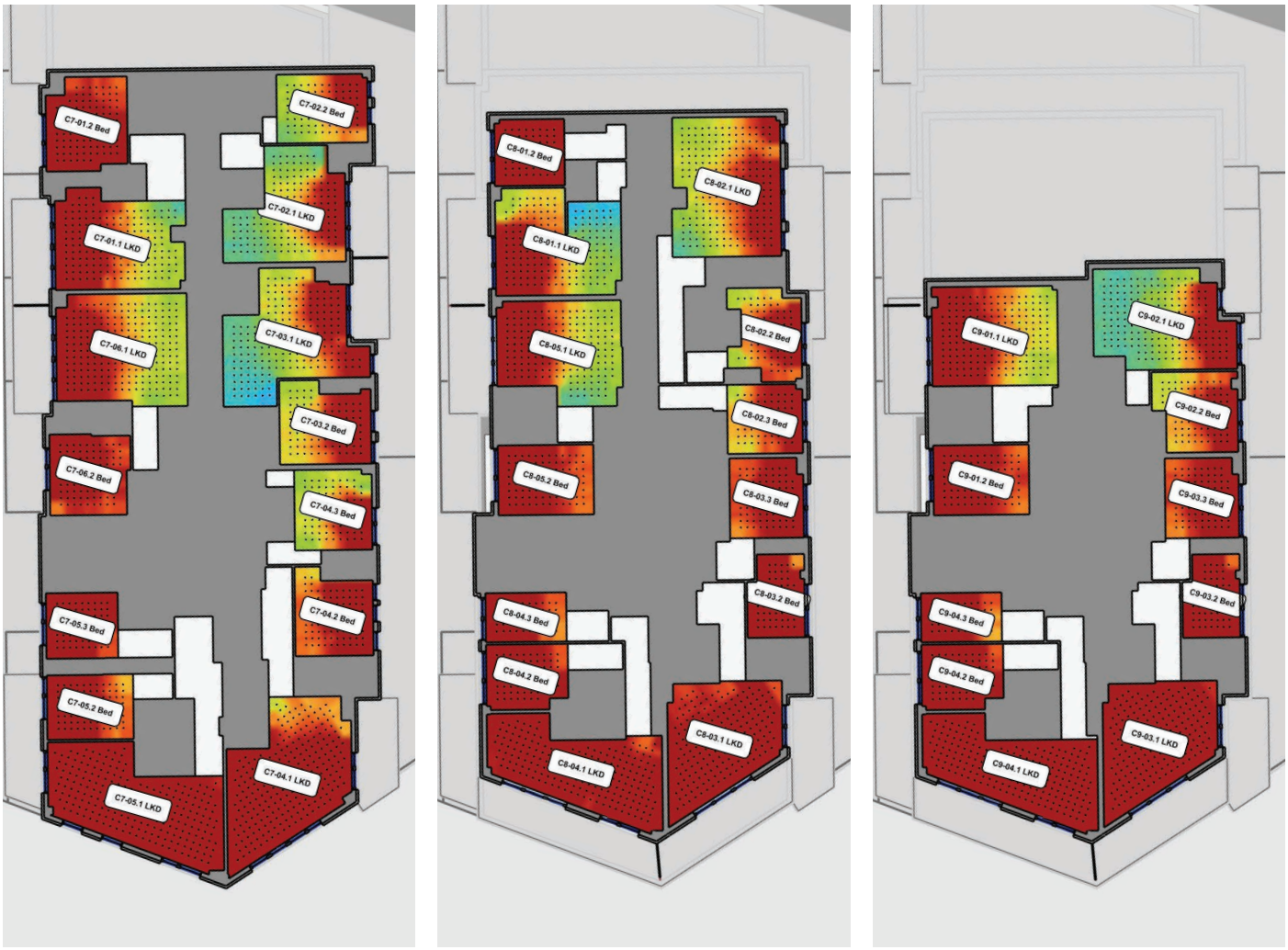
Figure 25: Floors 7 - 9 of Block C
Plans indicating Daylight Provision to BS EN17037:2018+A1:2021

Floors 7 - 9 of Block C 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
C7-01.1	LKD	21.4	185	200	1019	100.0%	Y
C7-01.2	Bed	13.1	108	100	1791	100.0%	Y
C7-02.1	LKD	20.5	175	200	692	100.0%	Y
C7-02.2	Bed	11.4	88	100	880	100.0%	Y
C7-03.1	LKD	25.0	210	200	748	99.0%	Y
C7-03.2	Bed	12.8	96	100	1100	100.0%	Y
C7-04.1	LKD	27.9	245	200	1998	100.0%	Y
C7-04.2	Bed	11.4	94	100	1331	100.0%	Y
C7-04.3	Bed	11.3	89	100	957	100.0%	Y
C7-05.1	LKD	28.0	234	200	2559	100.0%	Y
C7-05.2	Bed	10.2	88	100	1571	100.0%	Y
C7-05.3	Bed	8.6	72	100	1906	100.0%	Y
C7-06.1	LKD	25.9	241	200	975	100.0%	Y
C7-06.2	Bed	11.5	94	100	1587	100.0%	Y
C8-01.1	LKD	22.8	194	200	1008	96.4%	Y
C8-01.2	Bed	8.5	64	100	2149	100.0%	Y
C8-02.1	LKD	27.1	242	200	881	100.0%	Y
C8-02.2	Bed	10.6	77	100	1171	100.0%	Y
C8-02.3	Bed	9.4	72	100	1198	100.0%	Y
C8-03.1	LKD	22.5	191	200	1548	100.0%	Y
C8-03.2	Bed	8.2	61	100	1854	100.0%	Y
C8-03.3	Bed	10.6	88	100	1473	100.0%	Y
C8-04.1	LKD	24.1	204	200	1700	100.0%	Y
C8-04.2	Bed	9.4	75	100	2053	100.0%	Y
C8-04.3	Bed	7.3	50	100	1771	100.0%	Y
C8-05.1	LKD	21.7	193	200	943	100.0%	Y
C8-05.2	Bed	12.2	96	100	1596	100.0%	Y
C9-01.1	LKD	22.7	205	200	1341	100.0%	Y
C9-01.2	Bed	12.2	96	100	1619	100.0%	Y
C9-02.1	LKD	23.4	209	200	681	100.0%	Y
C9-02.2	Bed	11.5	96	100	1101	100.0%	Y
C9-03.1	LKD	22.5	191	200	2168	100.0%	Y
C9-03.2	Bed	8.2	61	100	1858	100.0%	Y
C9-03.3	Bed	10.6	88	100	1479	100.0%	Y
C9-04.1	LKD	23.9	212	200	2729	100.0%	Y
C9-04.2	Bed	9.4	75	100	2060	100.0%	Y
C9-04.3	Bed	7.3	50	100	1789	100.0%	Y

Table 11: 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

Block C



Seventh Floor **Eighth Floor** **Ninth Floor**

Figure 26: Floors 7 - 9 of Block C
Daylight Provision and Annual Average Illuminance to all Habitable Rooms



Floors 7 - 9 of Block C 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
C7-01.1	LKD	21.4	185	Medium	71.3%	56.9%	42.1%	Medium	81.4%	56.9%	35.0%
C7-01.2	Bed	13.1	108	High	79.3%	68.9%	58.0%	High	87.3%	73.4%	59.2%
C7-02.1	LKD	20.5	175	Minimum	65.8%	47.4%	25.5%	Minimum	79.5%	48.8%	20.5%
C7-02.2	Bed	11.4	88	Medium	69.3%	52.8%	35.7%	Medium	82.5%	57.1%	36.3%
C7-03.1	LKD	25.0	210	Minimum	65.9%	47.6%	26.5%	Minimum	73.9%	33.5%	7.5%
C7-03.2	Bed	12.8	96	Medium	73.7%	59.2%	44.0%	Medium	84.6%	63.5%	44.7%
C7-04.1	LKD	27.9	245	High	81.3%	73.5%	63.1%	High	85.5%	68.8%	53.6%
C7-04.2	Bed	11.4	94	High	79.9%	68.7%	56.2%	High	87.7%	72.9%	58.1%
C7-04.3	Bed	11.3	89	Medium	68.4%	51.9%	35.2%	Medium	82.7%	57.8%	36.2%
C7-05.1	LKD	28.0	234	High	83.3%	76.7%	67.5%	High	88.8%	78.4%	67.3%
C7-05.2	Bed	10.2	88	High	77.9%	66.7%	53.9%	High	86.3%	68.5%	53.8%
C7-05.3	Bed	8.6	72	High	80.8%	72.5%	61.2%	High	87.8%	73.8%	60.4%
C7-06.1	LKD	25.9	241	Medium	68.1%	53.6%	37.0%	Medium	81.4%	57.3%	37.4%
C7-06.2	Bed	11.5	94	High	78.1%	67.1%	55.2%	High	87.2%	72.9%	58.3%
C8-01.1	LKD	22.8	194	Medium	67.5%	50.8%	32.5%	Minimum	69.9%	28.6%	11.3%
C8-01.2	Bed	8.5	64	High	82.2%	74.6%	64.1%	High	88.3%	76.2%	63.4%
C8-02.1	LKD	27.1	242	Medium	71.4%	55.5%	37.2%	Medium	83.4%	59.2%	37.2%
C8-02.2	Bed	10.6	77	Medium	76.9%	63.5%	49.1%	Medium	84.7%	64.7%	46.2%
C8-02.3	Bed	9.4	72	High	77.3%	64.2%	50.0%	High	85.5%	66.7%	50.0%
C8-03.1	LKD	22.5	191	High	79.5%	69.6%	58.4%	High	87.4%	74.0%	60.6%
C8-03.2	Bed	8.2	61	High	83.7%	76.3%	65.8%	High	89.2%	77.8%	65.5%
C8-03.3	Bed	10.6	88	High	79.4%	68.2%	55.5%	High	88.1%	74.7%	60.6%
C8-04.1	LKD	24.1	204	High	78.2%	67.9%	57.1%	High	86.6%	72.4%	59.4%
C8-04.2	Bed	9.4	75	High	81.7%	73.7%	63.4%	High	87.8%	74.7%	61.3%
C8-04.3	Bed	7.3	50	High	79.5%	69.2%	58.0%	High	86.1%	68.2%	53.9%
C8-05.1	LKD	21.7	193	Medium	66.8%	52.1%	35.3%	Medium	79.4%	52.5%	30.3%
C8-05.2	Bed	12.2	96	High	78.8%	68.1%	56.4%	High	87.1%	71.4%	57.0%
C9-01.1	LKD	22.7	205	Medium	72.1%	57.7%	42.7%	Medium	82.6%	59.6%	41.0%
C9-01.2	Bed	12.2	96	High	78.6%	67.7%	56.3%	High	87.2%	72.4%	58.1%
C9-02.1	LKD	23.4	209	Minimum	58.9%	37.6%	17.6%	Minimum	77.8%	43.8%	16.1%
C9-02.2	Bed	11.5	96	Medium	74.8%	60.4%	45.5%	Medium	85.1%	65.3%	47.4%
C9-03.1	LKD	22.5	191	High	82.2%	74.7%	64.7%	High	88.5%	77.0%	64.7%
C9-03.2	Bed	8.2	61	High	83.5%	75.9%	65.5%	High	89.5%	78.5%	66.8%
C9-03.3	Bed	10.6	88	High	79.5%	68.6%	56.1%	High	88.1%	74.4%	60.2%
C9-04.1	LKD	23.9	212	High	82.9%	75.5%	66.6%	High	88.7%	77.5%	66.9%
C9-04.2	Bed	9.4	75	High	81.9%	74.2%	63.8%	High	87.9%	74.8%	61.8%
C9-04.3	Bed	7.3	50	High	79.4%	69.0%	58.2%	High	86.3%	69.0%	54.9%

Table 12: Daylight provision individual values for all habitable rooms to IS EN 17037:2018+A1:2021

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

Sunlight Hours Apartments Block C				
Unit ID	Room Use	Habitable room window within 90° south	No. sunlight hours on 21st March	EN17037:2018 Level of exposure to sunlight
C7-01.1	LKD	Yes	4.3	High
C7-02.1	LKD	No	3.1	Medium
C7-03.1	LKD	Yes	3.6	Medium
C7-04.1	LKD	Yes	7.9	High
C7-05.1	LKD	Yes	9.9	High
C7-06.1	LKD	Yes	4.3	High
C8-01.1	LKD	Yes	4.3	High
C8-02.1	LKD	No	3.1	Medium
C8-03.1	LKD	Yes	5.0	High
C8-04.1	LKD	Yes	8.7	High
C8-05.1	LKD	Yes	4.3	High
C9-01.1	LKD	No	4.3	High
C9-02.1	LKD	Yes	7.8	High
C9-03.1	LKD	Yes	10.7	High
C9-04.1	LKD	Yes	6.4	High

Table 13: Sunlight Hours