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Daylight & Sunlight Assessments of a Proposed Residential Development at No.s 1-2 Ballymount Road Lwr, Walkinstown, Dublin 12.

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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

The proposed development consists of 8 no. apartments in 4 storeys over a commercial ground floor and all works described in statutory notices.

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 Module Architecture.

Impact on adjacent properties

There will be a small reduction to the available daylight and sunlight levels to the adjacent dwellings. The reduction will be minor and meets the recommendations of the BRE guidelines. There will be a minimal reduction in the available sunlight to the adjacent private adjacent amenity spaces. All areas assessed continue to meet or exceed the recommendations of the BRE guidelines.

Assessment of the quality of the proposed development.

BR209:2022 recommends assessment methods set out in BS EN 17037 for daylight provision. 100% of habitable rooms in the apartments achieve the Minimum Illuminance levels and Target illuminance levels. Overall the rooms will be bright well daylit spaces.

The Target and Minimum levels set out in BS EN17037:2018 does not take into account room use or make allowance for rooms that have a lesser requirement for daylight. The UK National Annex A1 sets out room specific minimum values to be achieved in the UK and Channel Islands. 100% of the rooms to the apartments achieve the minimum DF factor levels set out in BS EN17037:2018+A1 for Bedrooms 100lx (DF0.7%), Living Rooms 150lx (1%DF) and Kitchens and living spaces containing a Kitchen200lx (1.3%).

This scheme is well designed for sunlight, with 100% of units well exceeding the minimum recommended 1.5 direct sunlight hours. This meets the recommendations of the BRE guidelines (2022).

2. Methodology

2.1 Notes on the use of BRE guidance document BR209 (2022 3rd edition) - Site Layout Planning for Daylight and Sunlight.

Building Research Establishment (BRE) BR209: 2022 "Site Layout Planning for Daylight and Sunlight" (Third edition) was released in June 2022 and supersedes BR209: 2011 (Second edition). It is intended to be used with the interior daylight recommendations of BS EN 17037 British Standard Daylight in Buildings. BR209: 2022 is a comprehensive revision of the 2011 edition of Site Layout Planning for Daylight and Sunlight.

BR209: 2022 sets out 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 (CEN 17037:2018). 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(December 2021) with a UK National Annex for regional assessments. The daylight and sunlight assessment methods referenced in BR209: 2022 (third edition) 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.

BR209: 2022 updates guidance in two areas and they are summarised below:

Impact on daylight and sunlight to adjacent buildings.

This is broadly in line with the previous version of the BRE guidelines (2011) and the assessment methods are contained within BR 209:2022. 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. Clarity has been provided in a number of areas on the appropriate use of each assessment.

Interior daylight and sunlight to proposed buildings.

The BRE guidelines (2022) recommend the use of BS EN 17037:2018 for assessing the quality of interior spaces in proposed developments, this supersedes BS 8206-2:2008. BS EN 17037 sets out assessment methods for daylight provision and access to sunlight. The use of the Average Daylight Factor (ADF) assessment is no longer recommended. BS EN 17037 is based on the European standard EN 17037 and uses assessment methodologies not directly comparable to BS 8206-2.

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.

This Daylight and Sunlight assessment demonstrates compliance with the following documents:

- BR209 2022: Site Layout Planning for Daylight and Sunlight (Third edition).
- BS EN 17037:2018+A1 Daylight in Buildings
- IS EN 17037:2018 Daylight in Buildings

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."

This is accordance with the most relevant S.28 Ministerial Guidelines including Section 6.6 of the Sustainable Urban Housing: Design Standards for New Apartments (2020), and Section 3.2 of the Urban Development and Building Heights Guidelines for Planning Authorities (2018). Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities (2020) states that planning authorities should have regard to quantitative performance approaches to daylight provision outlined in guides like the BRE guide 'Site Layout Planning for Daylight and Sunlight' (2nd edition) or British Standard BS 8206-2: 2008 – 'Lighting for Buildings – Part 2: Code of Practice for Daylighting'. The 2018 Building height Guidelines state that "appropriate and reasonable regard" should be taken of quantitative performance approaches to daylight provision outlined in guides like the Building Research Establishment's 'Site Layout Planning for Daylight and Sunlight' (2nd edition) or BS 8206-2: 2008 – 'Lighting for Buildings – Part 2: Code of Practice for Daylighting. Section 12.3.4.2 of the 2022 Development Plan states that development shall be guided

by the principles of Site Layout Planning for Daylight and Sunlight, A guide to good practice (Building Research Establishment Report, 2011) and/or any updated, or subsequent guidance, in this regard and that a daylight analysis will be required for all proposed developments of 50+ units, or as otherwise required by the Planning Authority. BR209 2022 (3rd edition) and BS EN 17037 supersede and directly replace BR209 2011(second edition) and BS 8206-2:2018 and the assessment has regard to the standards for daylight and sunlight access in buildings (and the methodologies for assessment of same) in BR209 2022 (3rd edition) and BS EN 17037.

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.

2.2 Daylight to existing dwellings

For loss of daylight and sunlight to existing buildings BRE guidance document (2022) "Site layout planning for daylight and sunlight" BS EN 17037 Daylight in Buildings and IS EN 17037 Daylight in Buildings are used. The site is analysed in plan, section and building use. Windows and amenity areas are selected to test for impact from the proposed development.

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 25° 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.

For loss of light 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 BR209:2022 (third edition).

2.3 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 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 Eireann Sunlight Hours Data Set 1981-2010													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Average Sunlight Hours/ Day	1:54	2:45	3:36	5:32	6:44	6:40	5:17	5:13	4:16	3:17	2:10	1:44	
Average Sunlight Hours/ Month	58:54	77:00	111:36	166:00	208:44	200:00	163:47	161:43	128:00	101:47	65:00	53:44	1496.25
Total Available Sunlight Hours	252	265	358	412	488	485	496	451	375	320	250	248	4383
Probable Sunlight Hours Ratio	23.37%	29.06%	31.17%	40.29%	42.77%	41.24%	33.02%	35.86%	34.13%	31.81%	26.00%	21.67%	34.14%

Table 1: Average monthly sunlight hours recorded at Dublin Airport - Data set 1981-2010

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.

2.4 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 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 in A.2 that the

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%	Light yellow 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 was introduced prior to the publication of Sustainable Urban Housing: Design Standards for New Apartments in 2020 which has no reference to the new standard but in any event applies here.

The 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 hard 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 3rd edition) 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	Target 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	Target 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 UN 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	0.7%
Living Room	150	1%
Kitchen	200	1.3%

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

2.5 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 be used for assessment with 21st March being the preferred date to use with a cloudless sky. 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.

2.6 Sunlight to gardens and open spaces

For calculations of sunlight analysis it is general practice to use March 21st. The BRE guidelines (2022) 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 Calculations of Trees & Hedges

Trees are not usually included in the assessments of impact, 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."*

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

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

3. Daylight to adjacent buildings.

3.1 Site Overview

The building is proposed to be constructed on the site of a commercial building, 'Paintworld' on Ballymount Road Lower, Dublin 12. The adjacent buildings are entirely commercial premises. There are cottage type dwellings opposite the proposed development, at Nos. 546 - 549 Ballymount Road Lower, which have been assessed as part of this report.

Figure 1: Aerial view of site, taken from Google Earth

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.

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 25° 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.

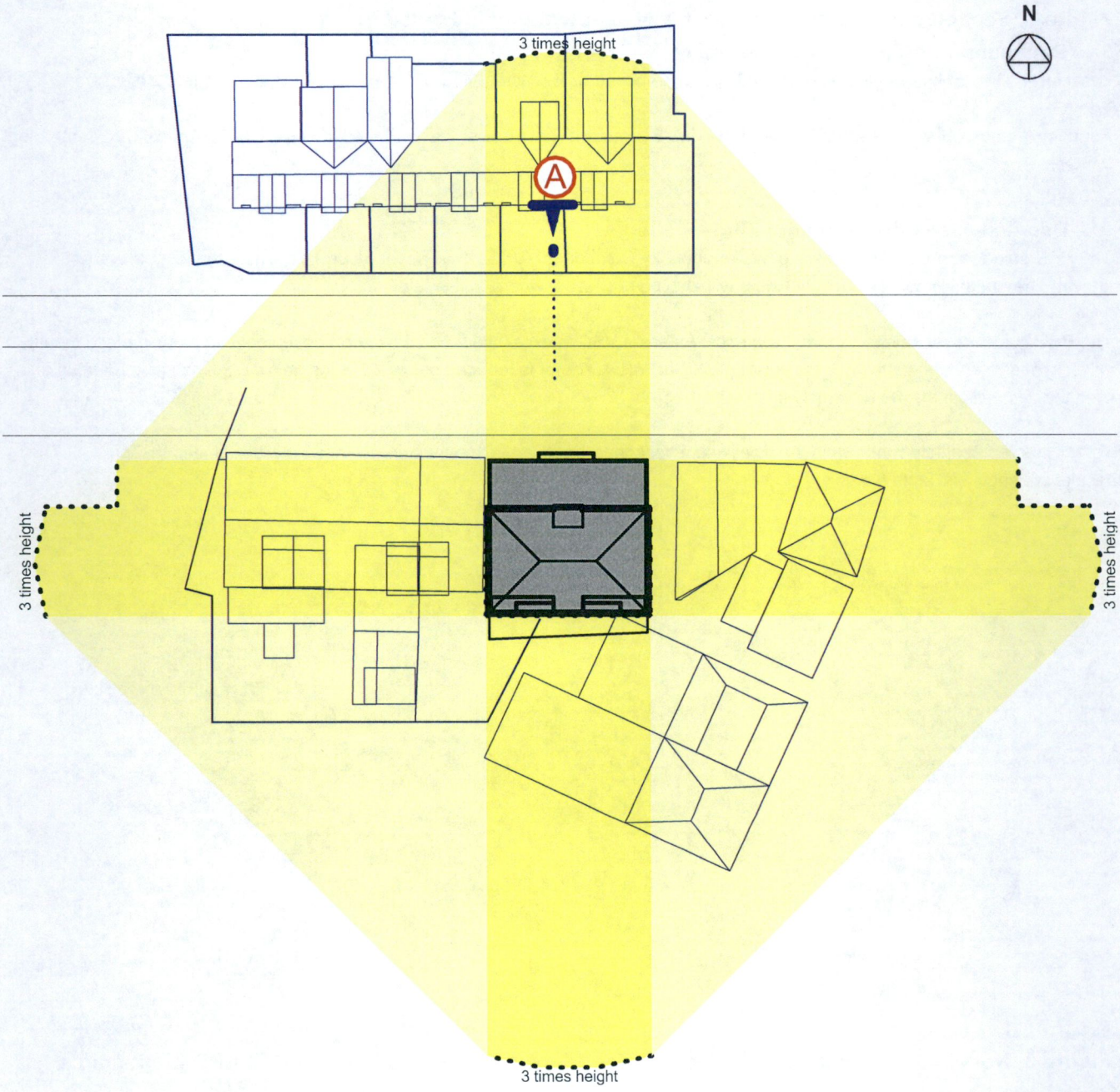
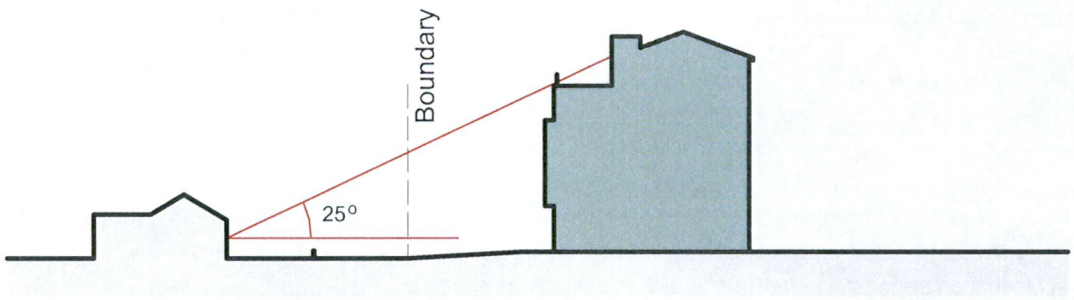


Figure 2: Proposed site plan showing the zone of influence (3 times the height of the proposed building) and direction of the window wall of adjacent residential properties.



Section through window wall at location A

Figure 4: Section perpendicular to window wall at location indicated in Figure 2.

3.3 Comment on preliminary assessment

Location A: The 25° line would be subtended by the proposed development, the windows are selected for further assessment.

For completeness all windows from in Nos 546 - 549 Ballymount Road Lower are assessed in detail for the Vertical Sky Component (VSC).

3.4 Detailed assessment to adjoining dwellings

The BRE guide recommends assessing the Vertical Sky Component (VSC) to adjacent properties, where the layouts are not known. The Annual Probable Sunlight Hours will also be assessed, where that is relevant.

The BRE guideline 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 dwellings at locations identified in the preliminary analysis are indicated in Figure 4. The results are shown in Table 6 below.

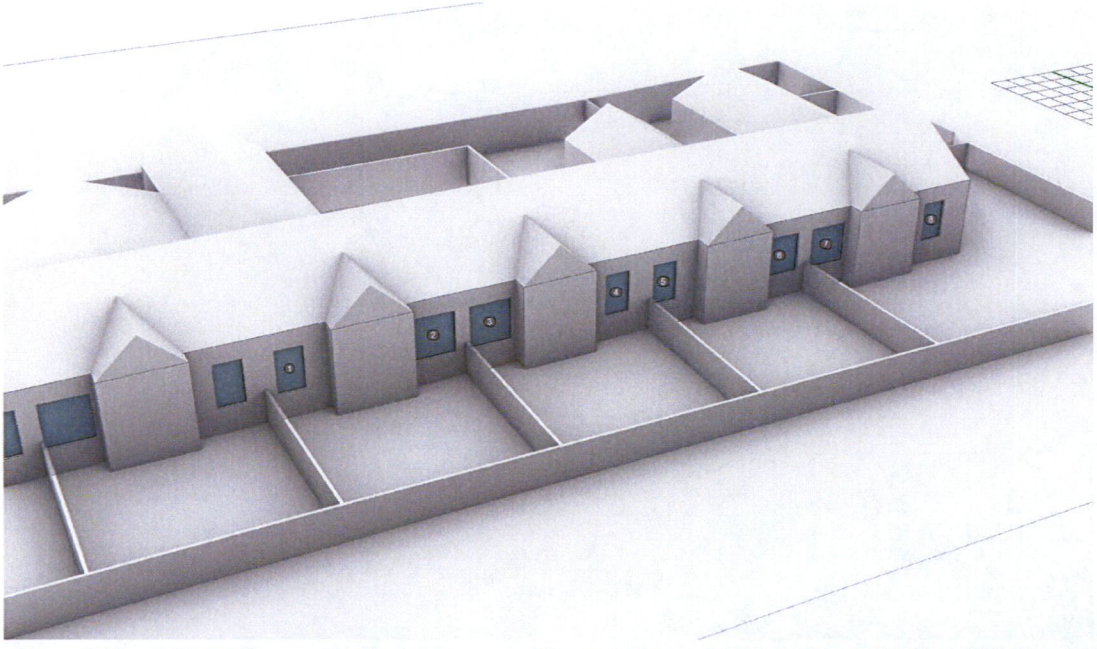


Figure 3: No.s 546 - 549 Ballymount Road Lower: View and model locating VSC & APSH test points.

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
	Existing %	Proposed %		
1	31.39	30.01	95.6%	Y
2	29.51	27.85	94.4%	Y
3	29.80	27.98	93.9%	Y
4	30.59	28.60	93.5%	Y
5	31.09	28.99	93.2%	Y
6	29.34	27.09	92.3%	Y
7	29.47	27.21	92.3%	Y
8	31.45	29.41	93.5%	Y

Table 6: Vertical sky component for windows in Cottages opposite development site.

3.6 Conclusion

There will be a minor reduction to the available daylight and sunlight to the windows facing the proposed development. All windows retain a VSC in excess of 27% or are not reduced below 80% of the existing VSC value and any potential loss of daylight light will be minimal.

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. Sunlight in Adjoining Residential Living Areas

4.1 Annual Probable Sunlight Hours

The BRE guidelines recommends assessing window walls for the APSH that face within 90° of due south. The guidelines state that *" In housing the main requirement for sunlight is livingrooms, 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."*

Typically main livingspaces are assessed for Sunlight. In the adjacent properties it is assumed that the rear facing rooms contain kitchens. The windows that face within 90° of due South were assessed. Their locations are indicated in Figure 4 above and the results are set out in Table 7.

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.

Annual Probable Sunlight Hours								
	APSH >25% Target			Sept 21 - Mar 21 PSH >5% Target			Meets criteria of >25% APSH and >5% WPSH Or <25% or <5% WPSH but >80% Existing Value	
Location ID	Existing	Proposed	Ratio	Existing	Proposed	Ratio		
	% of APSH	% of APSH	If less than 25% APSH Target >80%	% PSH	% PSH	If less than 5% WPSH Target >80%	APSH	WPSH
1	59.2%	56.6%	95.5%	21.8%	19.6%	89.9%	Y	Y
2	53.9%	50.7%	94.1%	19.5%	16.9%	86.4%	Y	Y
3	54.2%	51.1%	94.1%	19.8%	17.2%	86.7%	Y	Y
4	58.3%	54.7%	93.9%	20.8%	17.9%	85.8%	Y	Y
5	56.6%	53.4%	94.4%	19.9%	17.2%	86.7%	Y	Y
6	53.5%	49.1%	91.9%	19.1%	15.5%	81.1%	Y	Y
7	53.4%	50.1%	93.8%	19.5%	16.7%	86.0%	Y	Y
8	62.5%	59.1%	94.6%	22.0%	19.2%	87.2%	Y	Y

Table 7: Annual Probable Sunlight hours

In assessing the overall quality of light within a space it is important to note that sunlight is of lesser importance than good quality daylight. Direct sunlight is intermittent and a bright well lit living space is more desirable than a gloomy living space with spells of sunshine.

4.2 Discussion

All the windows assessed to main living spaces have an APSH percentage greater than the recommended 25% (414 hours) and 5% (75 hours) from 21 September to 21 March.

4.3 Conclusion

All windows assessed exceed the target values set out for sunlight. The proposed development meets the recommendations of the BRE guidelines.

5. Daylight to proposed apartments

5.1 Assessment for Daylight Provision IS EN 17037:2018 / BS EN 17037:2021+A1

All habitable rooms within the development were assessed for daylight provision by illuminance methods. Illuminance methods 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 use a climate file and take into account room orientation. They provide an accurate representation of the daylight provision to a specific room in the context of the proposed environment.

Compliance is demonstrated with a calculation of Daylight Provision under IS EN 17037:2018 and BS EN 17037:2021+A1 with the illuminance method and the results are presented in Tables 8 & 9 below. A complete set of room results are shown in both Appendix A and Appendix B for reference.

Daylight provision Illuminance Method IS EN 17037:2018 / BS EN 17037:2021+A1						
		Below Target	Minimum	Medium	High	Percentage of rooms achieving Target
Apartments	Target Illuminance	0.00%	41.53%	19.30%	39.17%	100%
	Minimum Illuminance	0.00%	37.55%	23.28%	39.17%	100%

Table 8: 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 A

Additional assessment was carried out in accordance with the recommendations of BS EN 17037:2021+A1 (2021). The UK National Annex (A1) contains additional minimum room specific target values for dwellings in the UK. The 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 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 sets out room specific minimum values to be achieved in the UK and Channel Islands. All the rooms achieve the minimum illuminance levels set out in table NA.1 of BS EN17037:2021+A1. A complete set of room results are shown in Appendix B for reference.

Minimium daylight provision UK NA.1 - BS EN 17037:2021+A1					
	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
Apartment	LKD	8	200	8	100%
	Bedrooms	17	100	17	100%
Overall total		25		25	100%

Table 9: 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

5.2 Conclusion

100% of the habitable rooms achieve the Minimum Illuminance levels and 100% of habitable rooms achieve the Target illuminance levels set out in IS EN 17037:2018 Table A.1 and BS EN17037:2021+A1 Table A.1. Overall the rooms will be bright well daylit spaces.

100% of the Living, Dining, Kitchen and Bedroom spaces to the apartments achieve the BS EN17037:2021+A1 UK National Annex target values with all the main living / kitchen / dining spaces achieving the target 200 lux over 50% of the assessment grid. This is the minimum rooms specific values to be achieved.

6. Sunlight hours in all units.

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. Minimum 1.5h, Medium 3h and High 4h.

Table 10 below details the results per Living/ Kitchen/ Dining room, indicating if this room has a relevant South facing window.

Sunlight Hours - Apartments			
Unit ID	LKD window within 90° South	No. sunlight hours on 21st March	Compliance
A01.1	Yes	6.58	High
A02.1	Yes	6.58	High
A03.1	Yes	6.58	High
A04.1	Yes	6.58	High
A05.1	Yes	6.58	High
A06.1	Yes	6.58	High
A07.1	Yes	6.42	High
A08.1	Yes	6.42	High

Table 10: Sunlight Hours - Apartments

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. All 8 units have window to a Living room or Kitchen/ Dining room which faces within 90° South.

6.3 Conclusion

This scheme is well designed for sunlight, with 100% of units well exceeding the minimum recommended 1.5 direct sunlight hours. This meets the recommendations of the BRE guidelines (2022).

7. Sunlight to gardens and open 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.

7.1 Amenity space to neighbouring properties.

The private amenity to Nos 546 - 549 Ballymount Road are to the rear, North, of their properties. Although the BRE document states that front gardens need not be assessed for sunlight, for completeness, the front gardens of these houses has been assessed for any potential impact on their sun of the ground. The existing and proposed generated analysis are shown in Figure 5, the results are shown in Table 11 below.

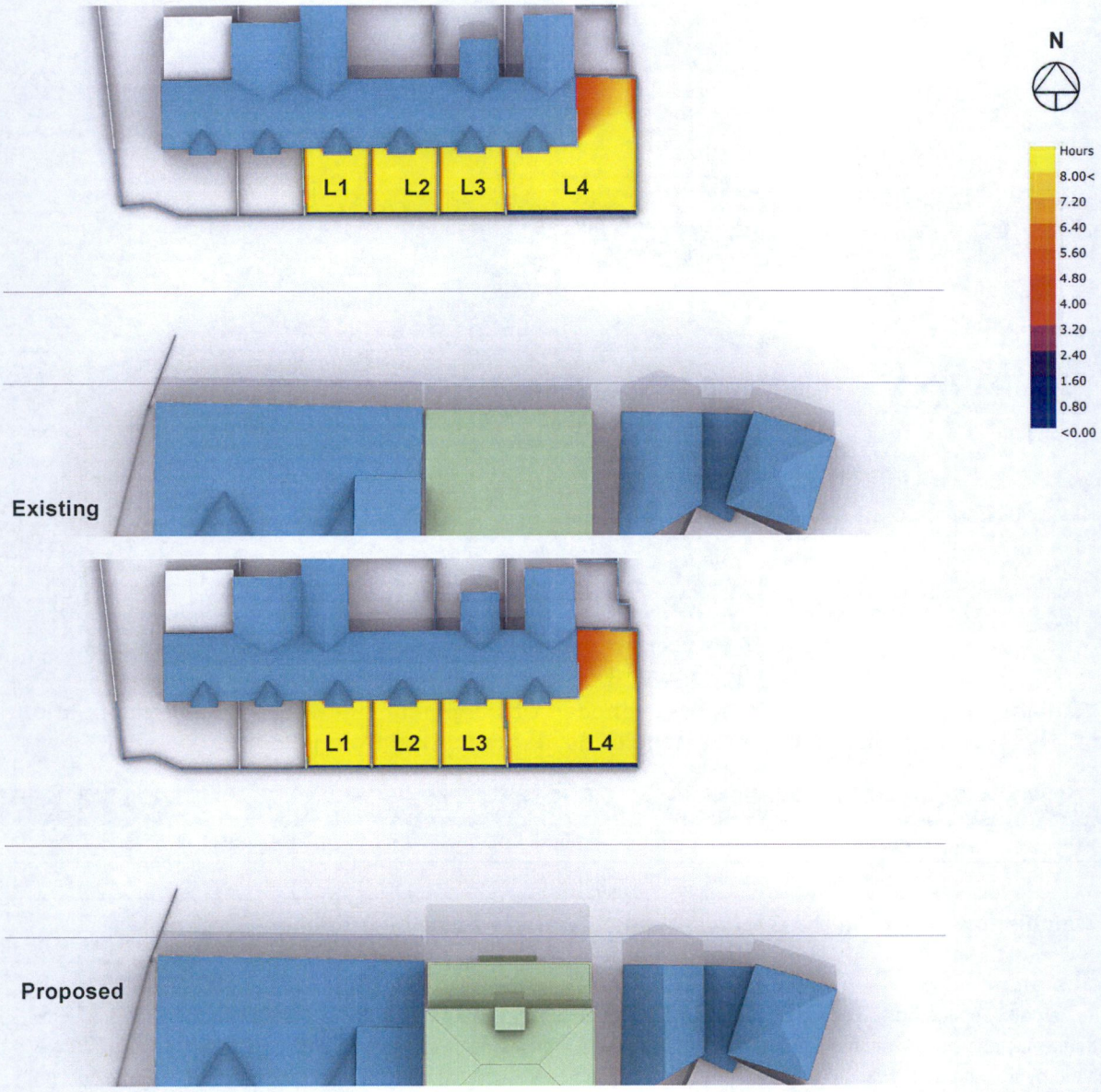


Figure 5: Existing & Proposed Radiation map of amenity areas, showing available sunlight on 21st March. The scale represents the percentage of daylight received from 0 - 8 hrs.

Sunlight on the ground - Adjacent properties				
No.	Existing	Proposed	Ratio of Proposed: Existing	Meets criteria of >50% area Or if <50% then target >80% Existing Value
	% Area receiving 2 hours sunlight on 21st March			
L1	100.0%	100.0%	100.0%	Meets criteria
L2	100.0%	100.0%	100.0%	Meets criteria
L3	100.0%	100.0%	100.0%	Meets criteria
L4	100.0%	100.0%	100.0%	Meets criteria

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

7.2 Conclusion

The amenity spaces to the gardens of the dwellings opposite will not perceive a reduction below the current sunlight levels on the 21st of march. All the gardens will exceed 2 hours sunlight over 50% of the amenity space. The proposed development meets the recommendations of the BRE guidelines for gardens and open spaces. The 21st March is selected to assess the amenity spaces based on the equal length of day to night and there maybe some minor additional shading in the winter months.

7.3 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 6 and the results are set out in Table 12 below.

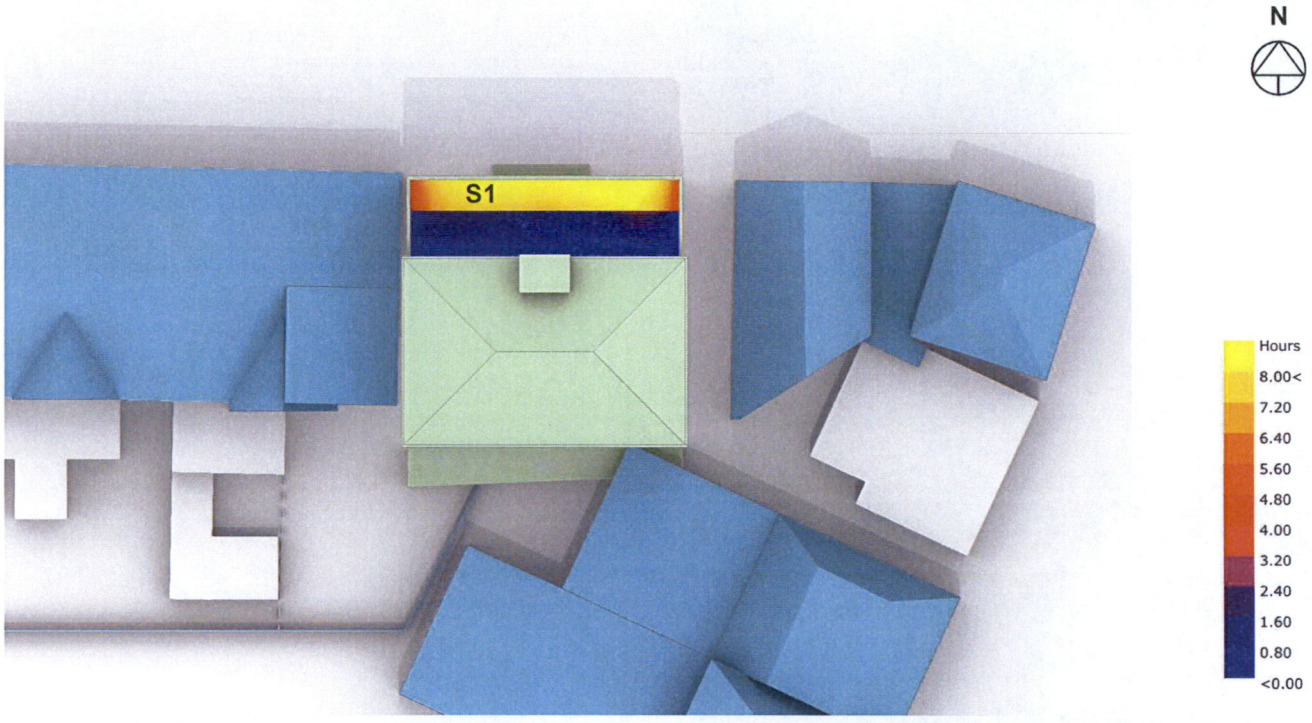


Figure 6: Radiation map of amenity within the Proposed Development, showing available sunlight on 21st March. The scale represents the percentage of daylight received from 0 - 8 hrs.

Sunlight on the ground - within development			
No.	Use	Proposed	Meets criteria of >50% area
S1	Communal Residential	39.2%	

Table 12: Calculation of Sun on the Ground to amenity area within the proposed development.

7.4 Conclusion

The communal amenity space has sun on the ground for 2 hours on 39.25% of it's area, on the 21st March. While this is below target the apartments and balconies in this development all achieve high levels of sunlight. The site is a restricted site and the form and layout is led by the site constraints. The floor is set back to the north to reduce and potential reduction in available sunlight and daylight to the neighbouring dwellings to the north. Additionally all the apartment units have a generous south facing balcony to the main living space.

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. 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.

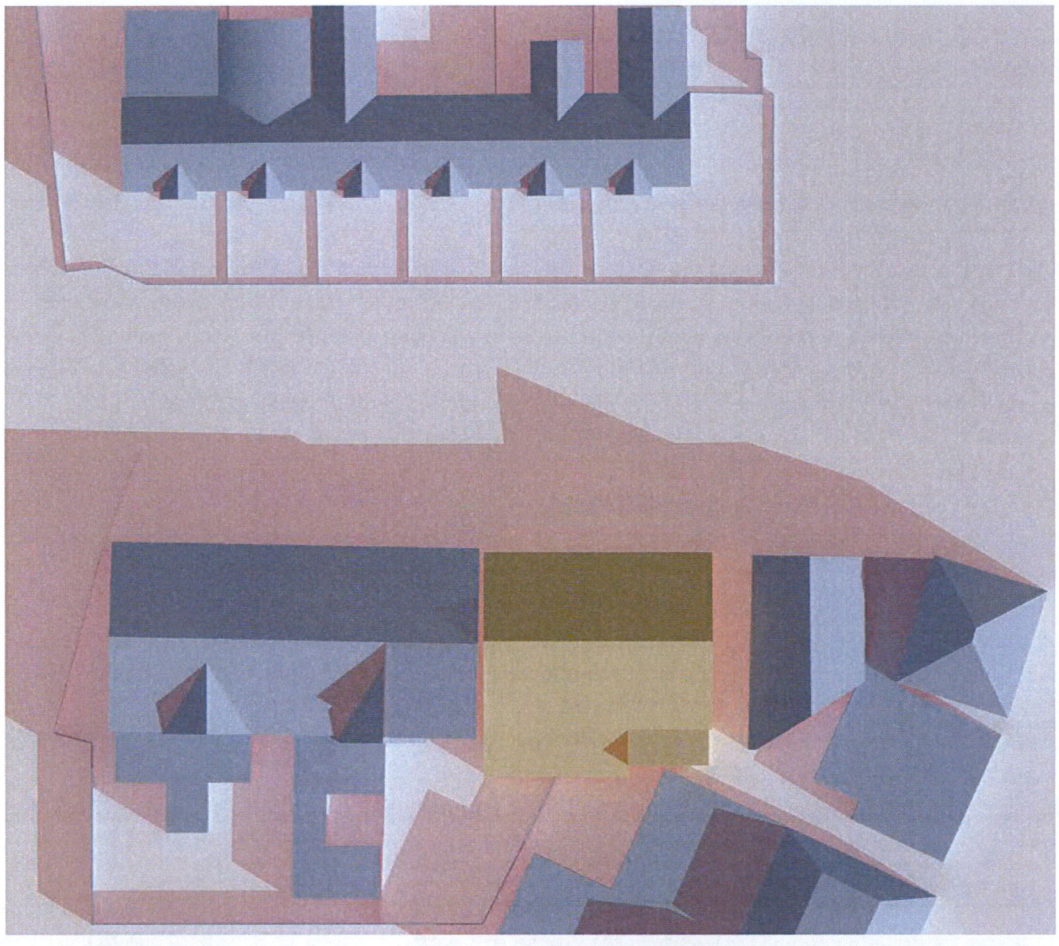
Equinox: between 8:30 and 17:30
Summer Solstice: Between 6:30 and 20:00
Winter Solstice: Between 10:30 and 14:00

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 Equinox on the 21st September at 2 hourly intervals during the day between 09:00 and 17:00.
Section 8.5 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.

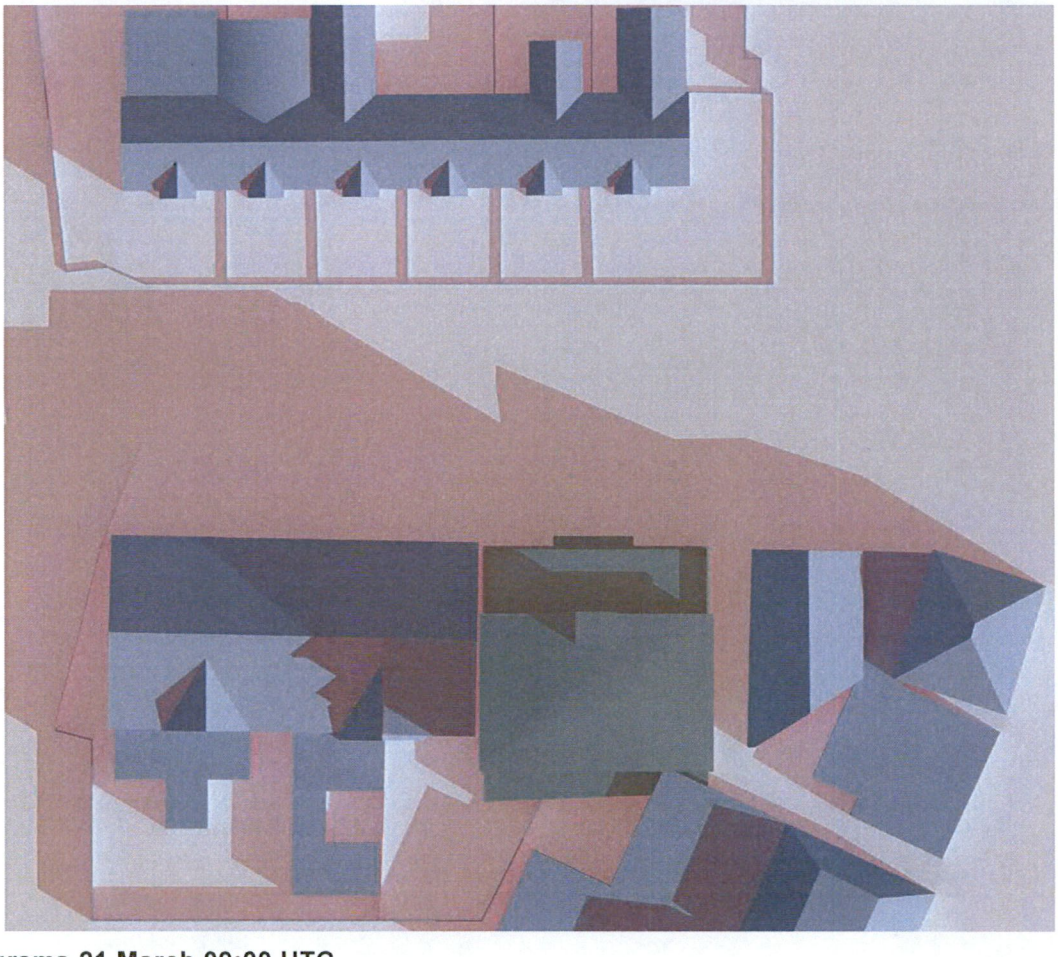
Shadow diagrams are a visual aid to understand where possible shading may occur. The use of shadow diagrams as an assessment method should be taken over the course of the day and not a specific time due to the transient nature of the sun and the shade caused by obstructions.

8.2 Shadow Casting diagrams March Equinox

N



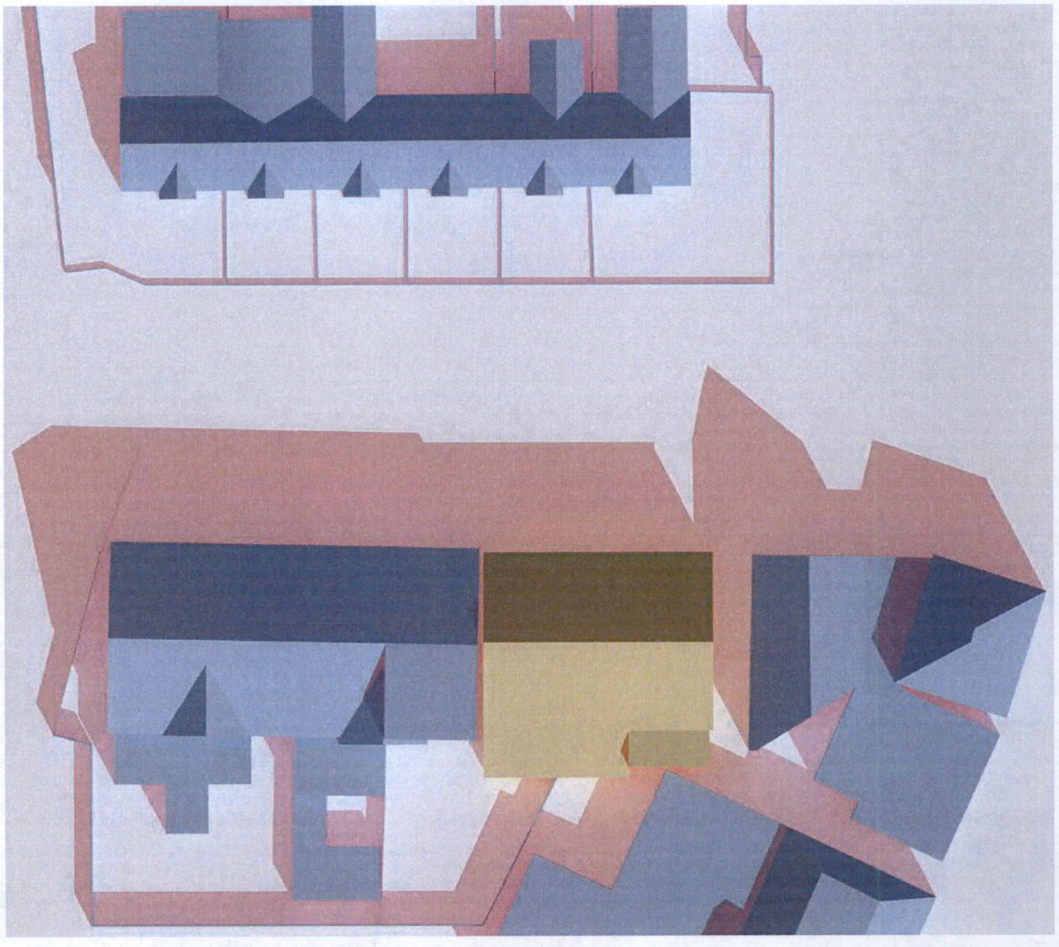
Existing



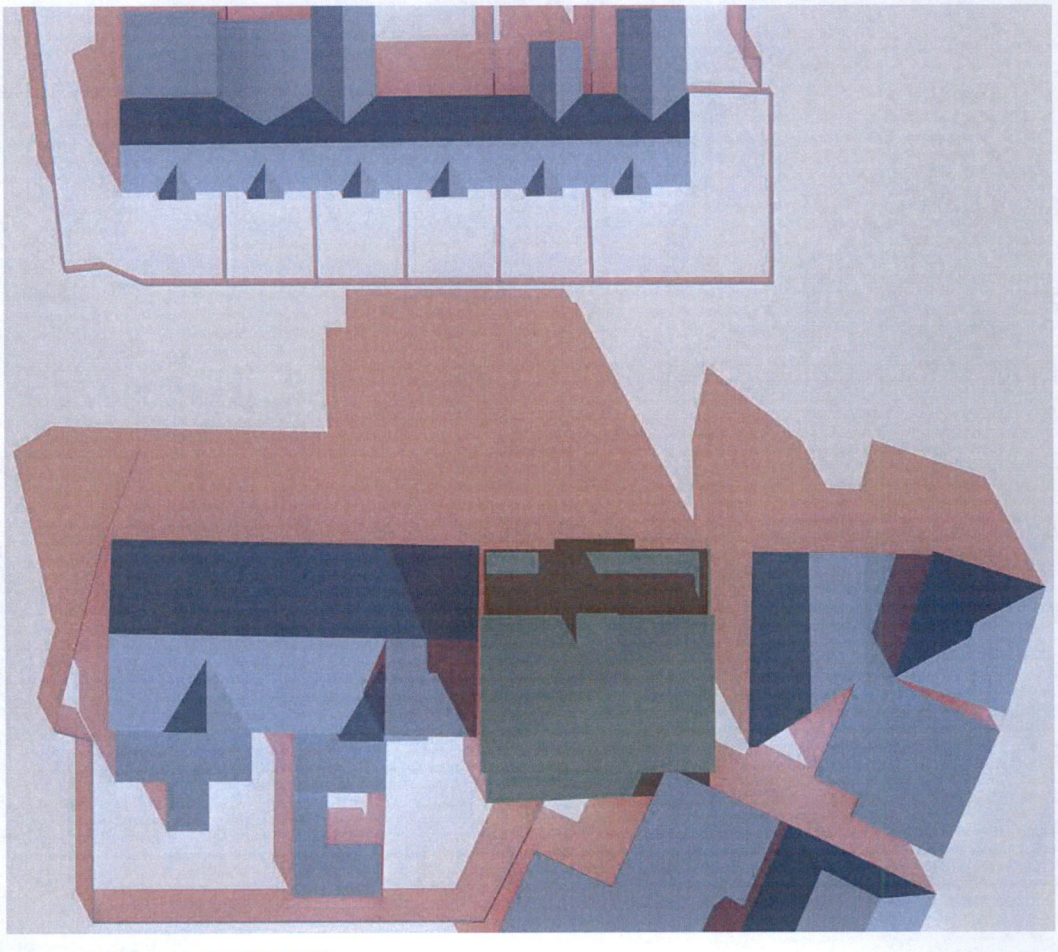
Proposed

Figure 7: Shadow diagrams 21 March 09:00 UTC

N



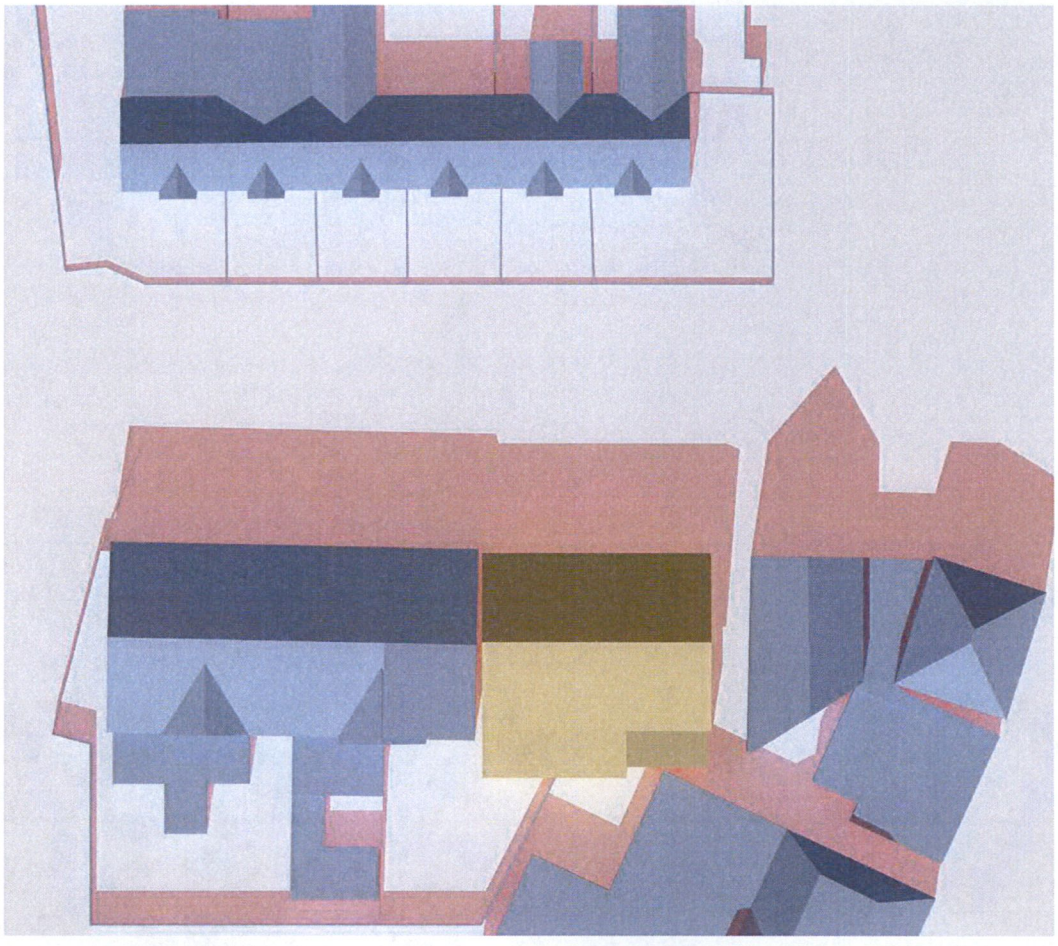
Existing



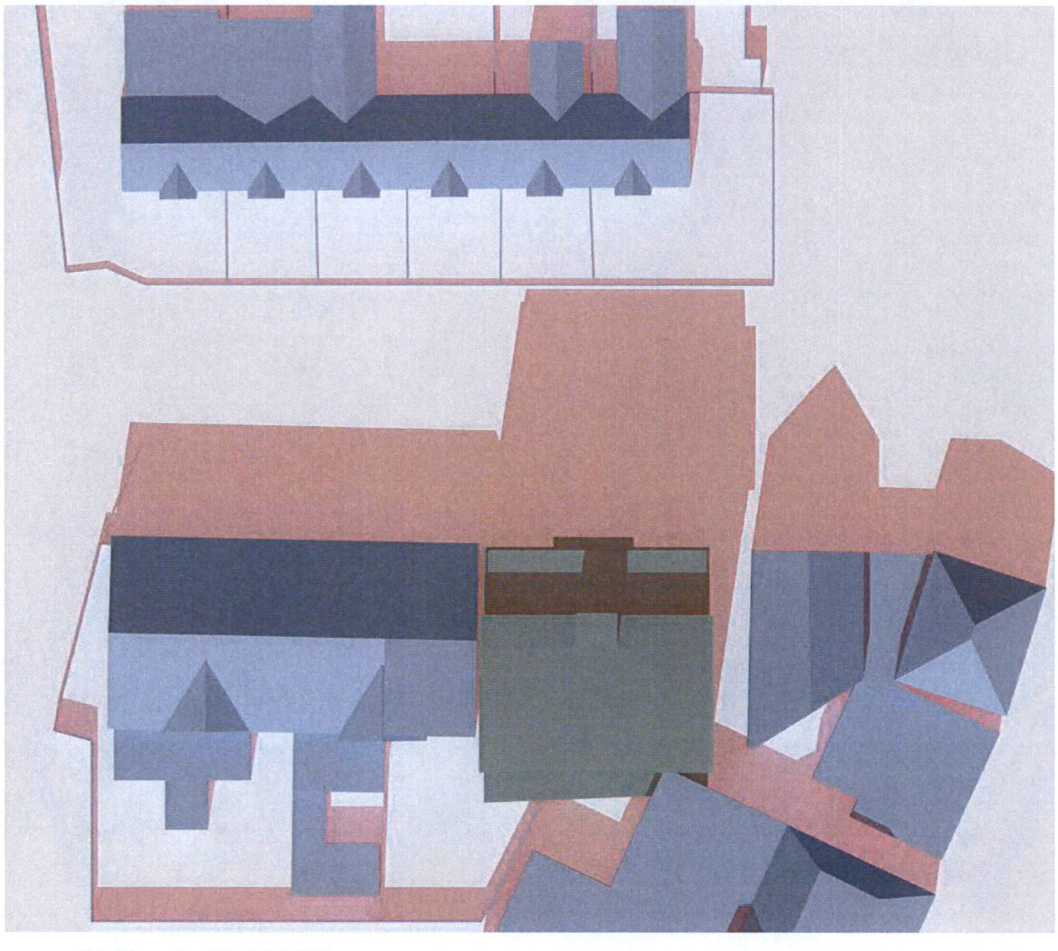
Proposed

Figure 8: Shadow diagrams 21 March 11:00 UTC

N



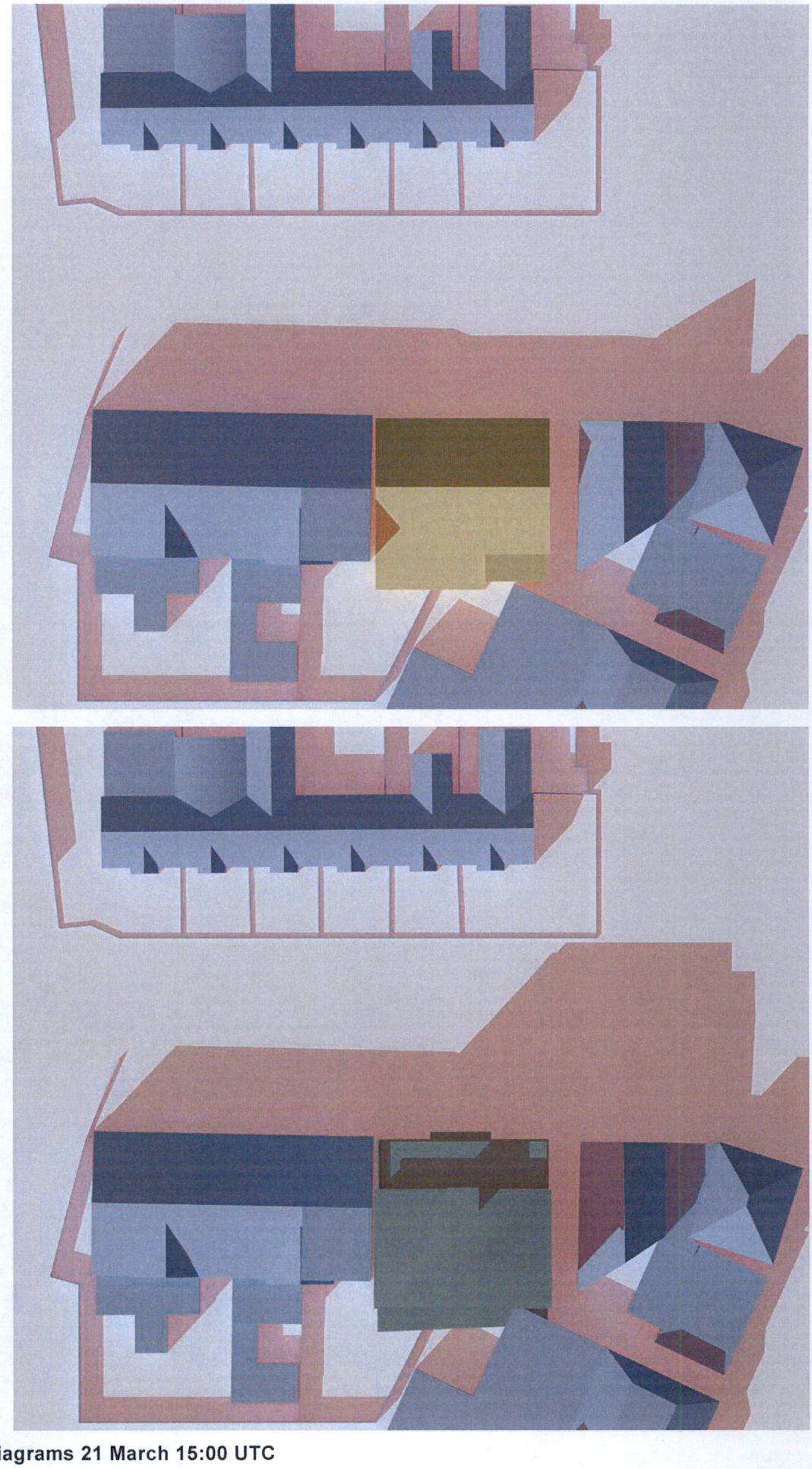
Existing



Proposed

Figure 9: Shadow diagrams 21 March 13:00 UTC

N

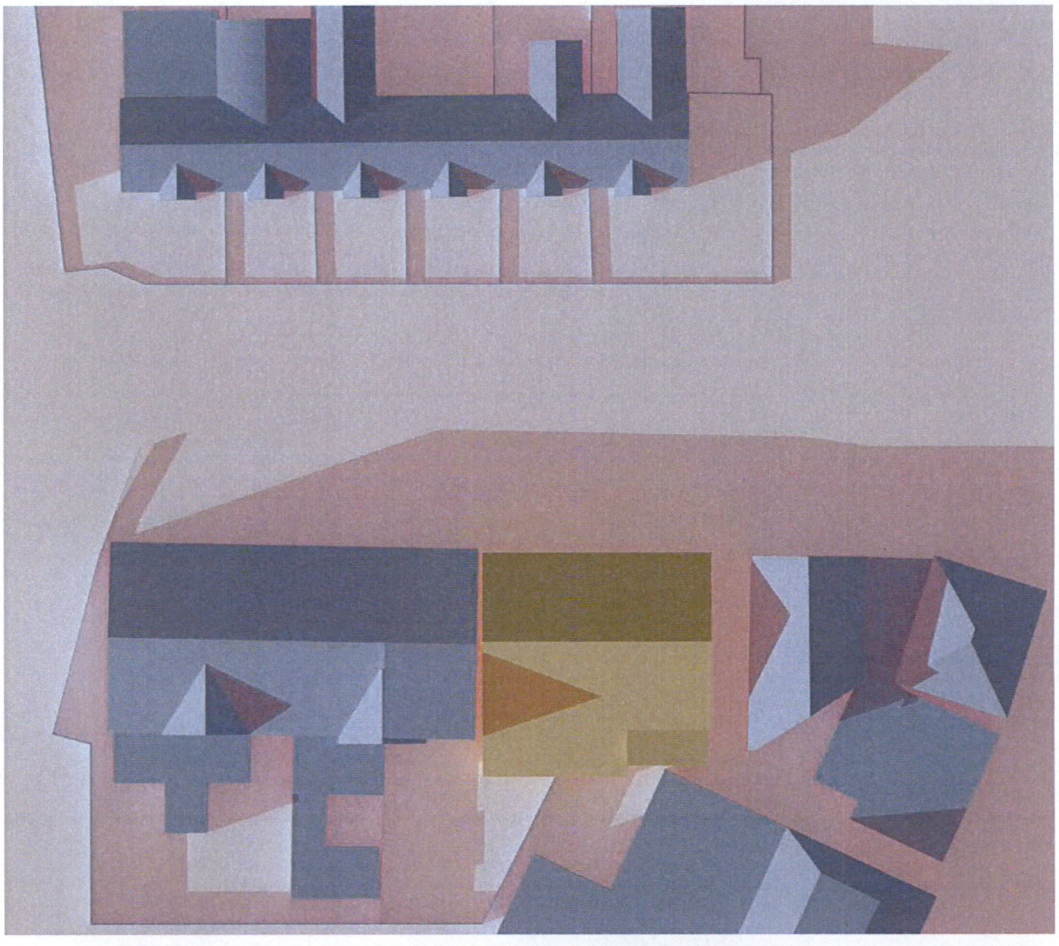


Existing

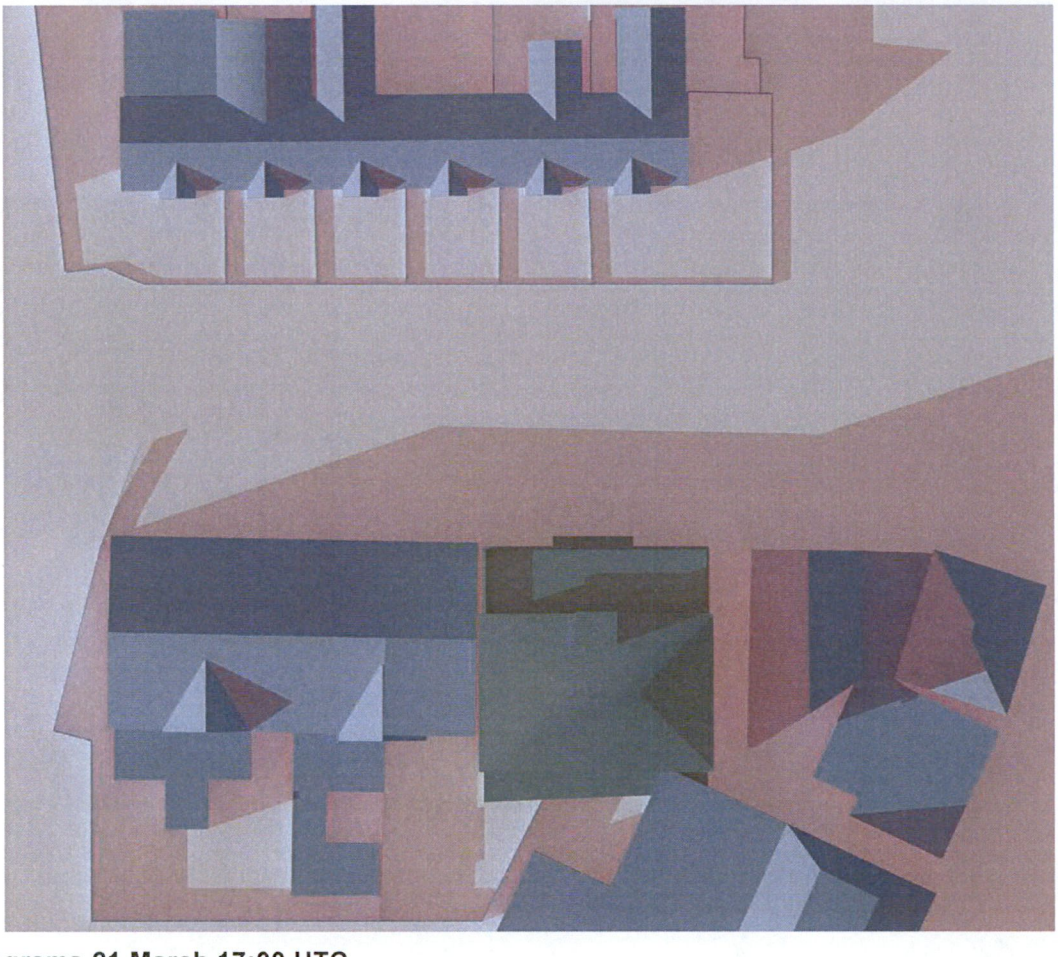
Proposed

Figure 10: Shadow diagrams 21 March 15:00 UTC

N



Existing

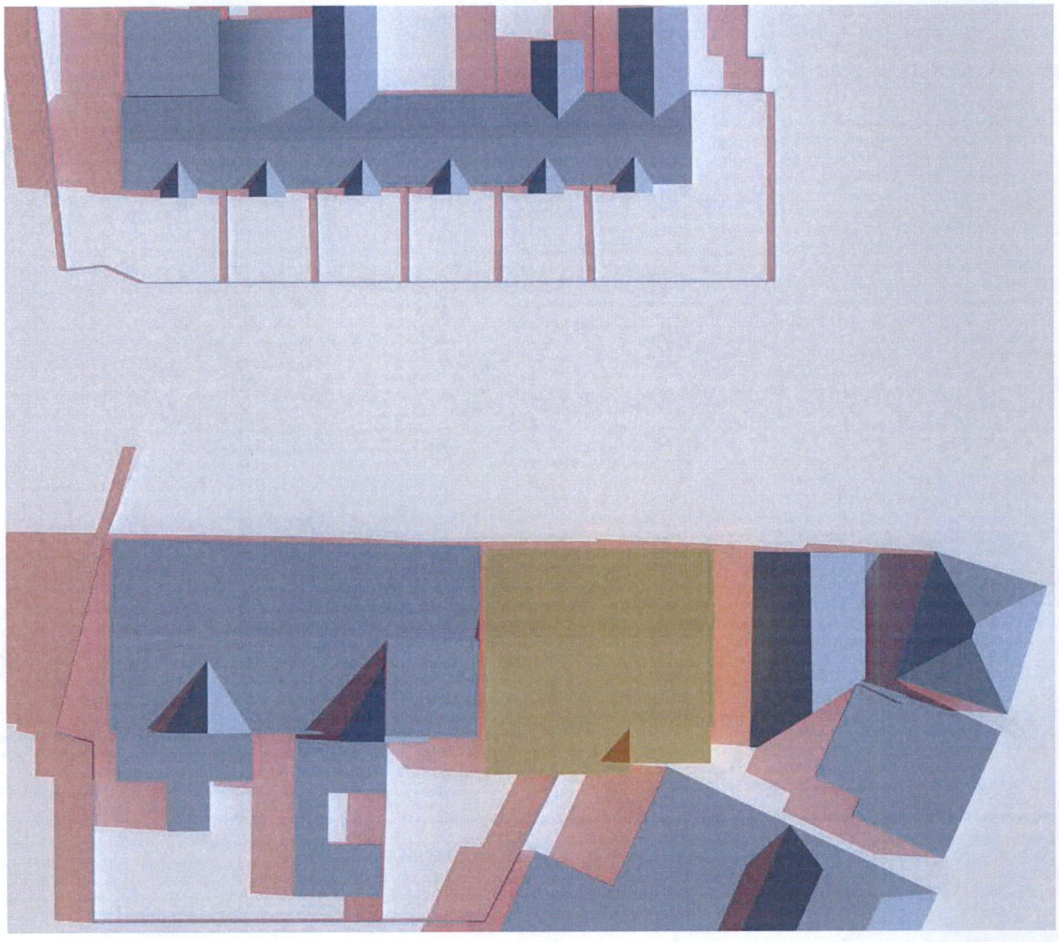


Proposed

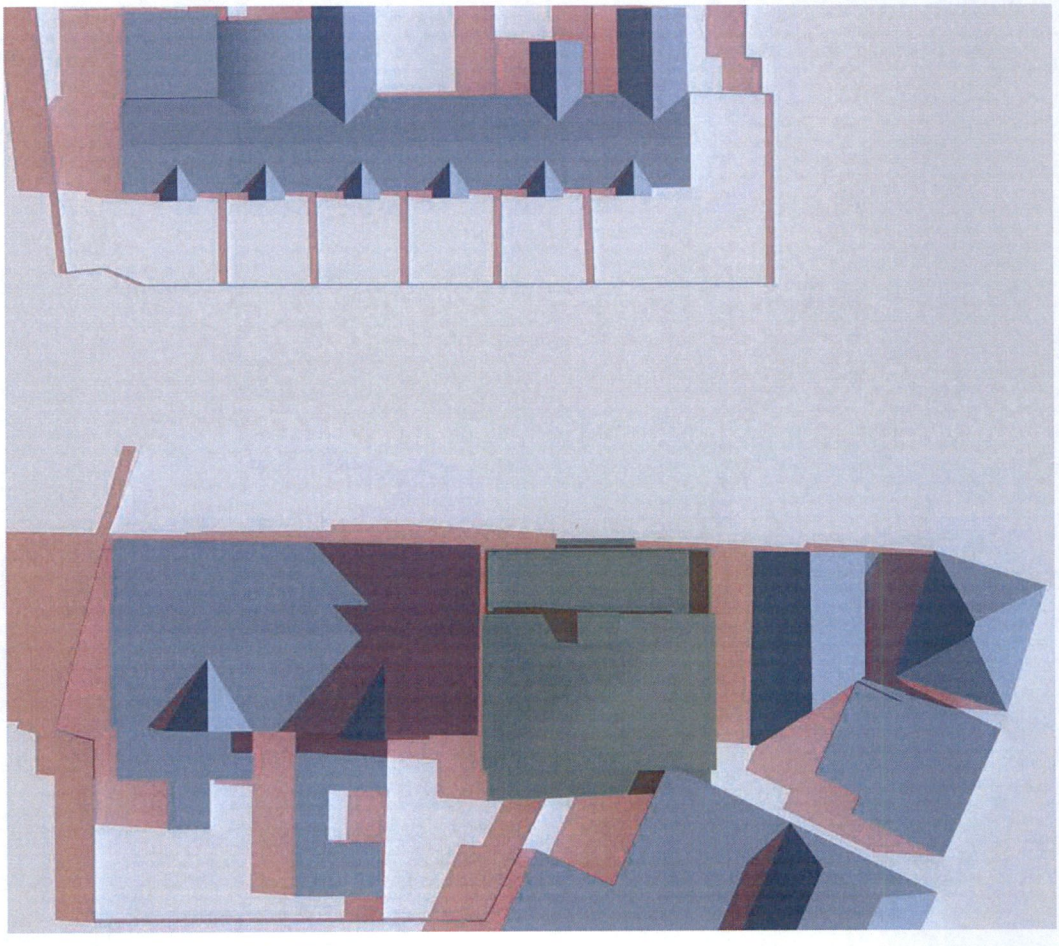
Figure 11: Shadow diagrams 21 March 17:00 UTC

8.3 Shadow Casting diagrams June Solstice

N



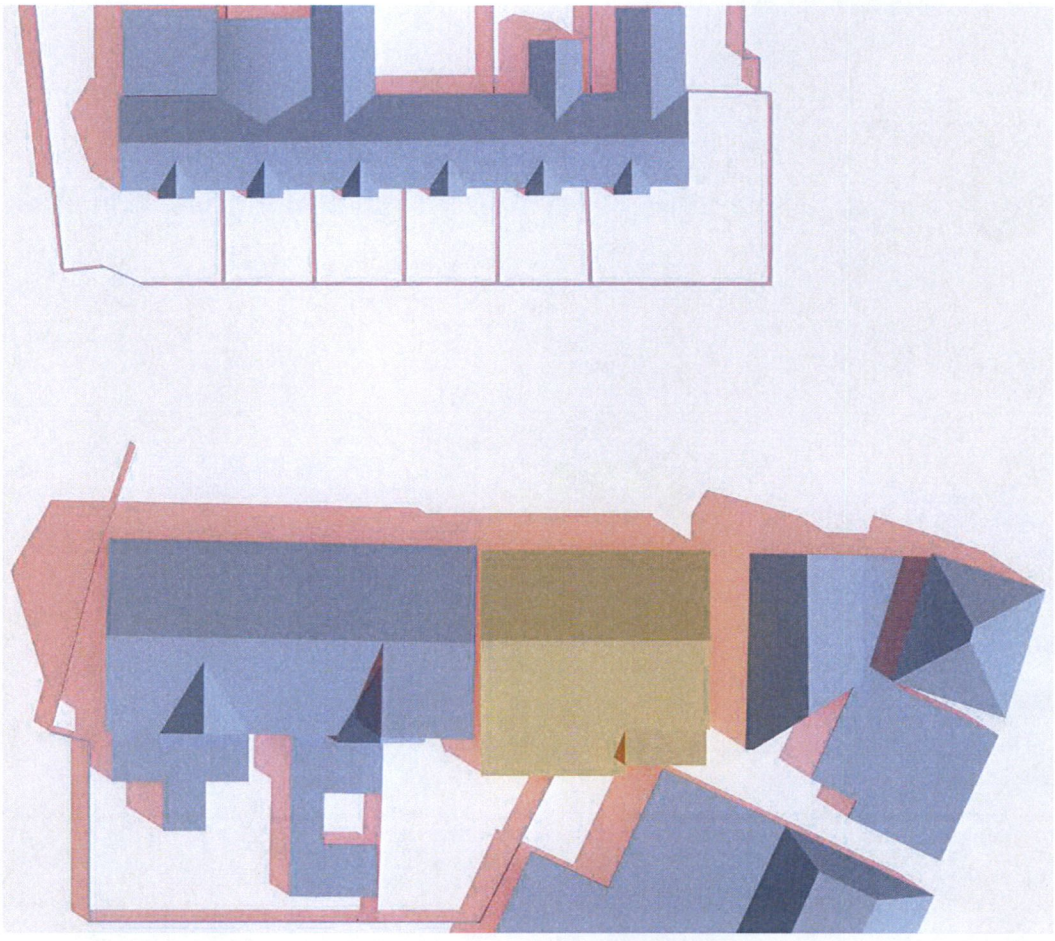
Existing



Proposed

Figure 12: Shadow diagrams 21 June 09:00 UTC+1

N



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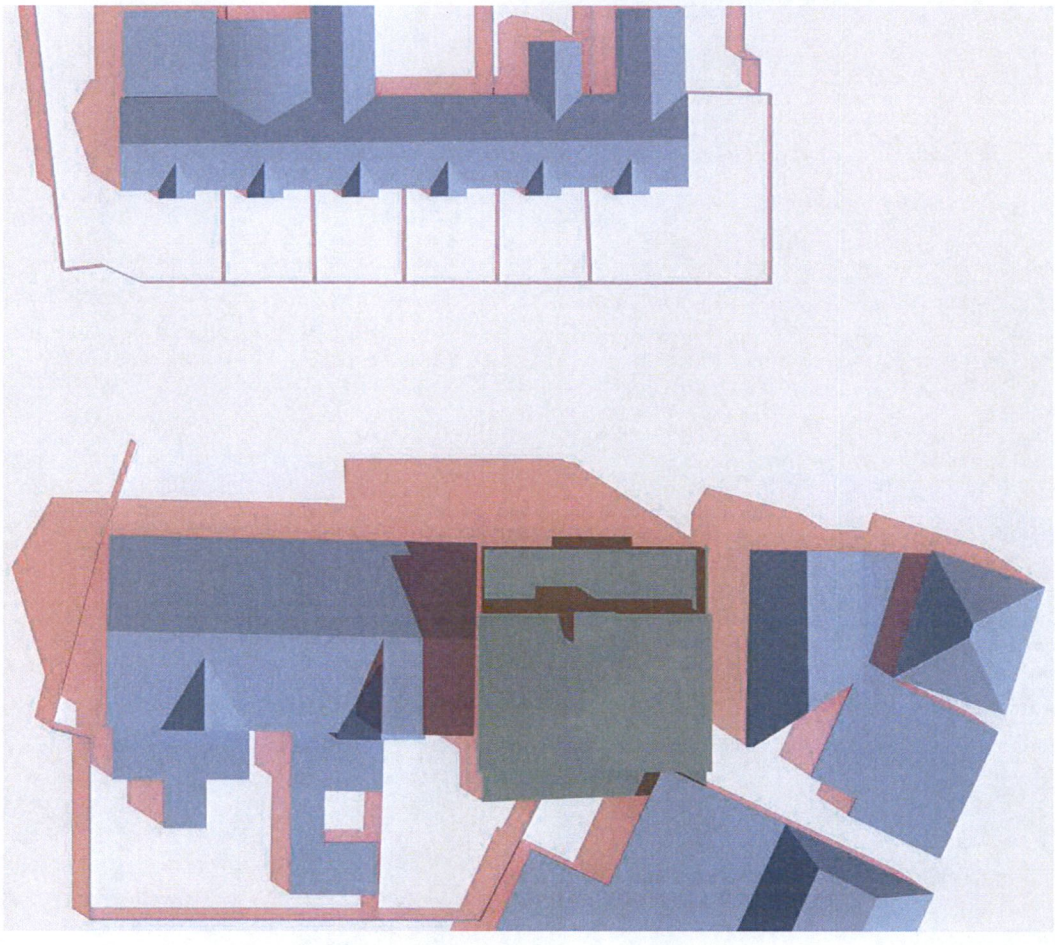
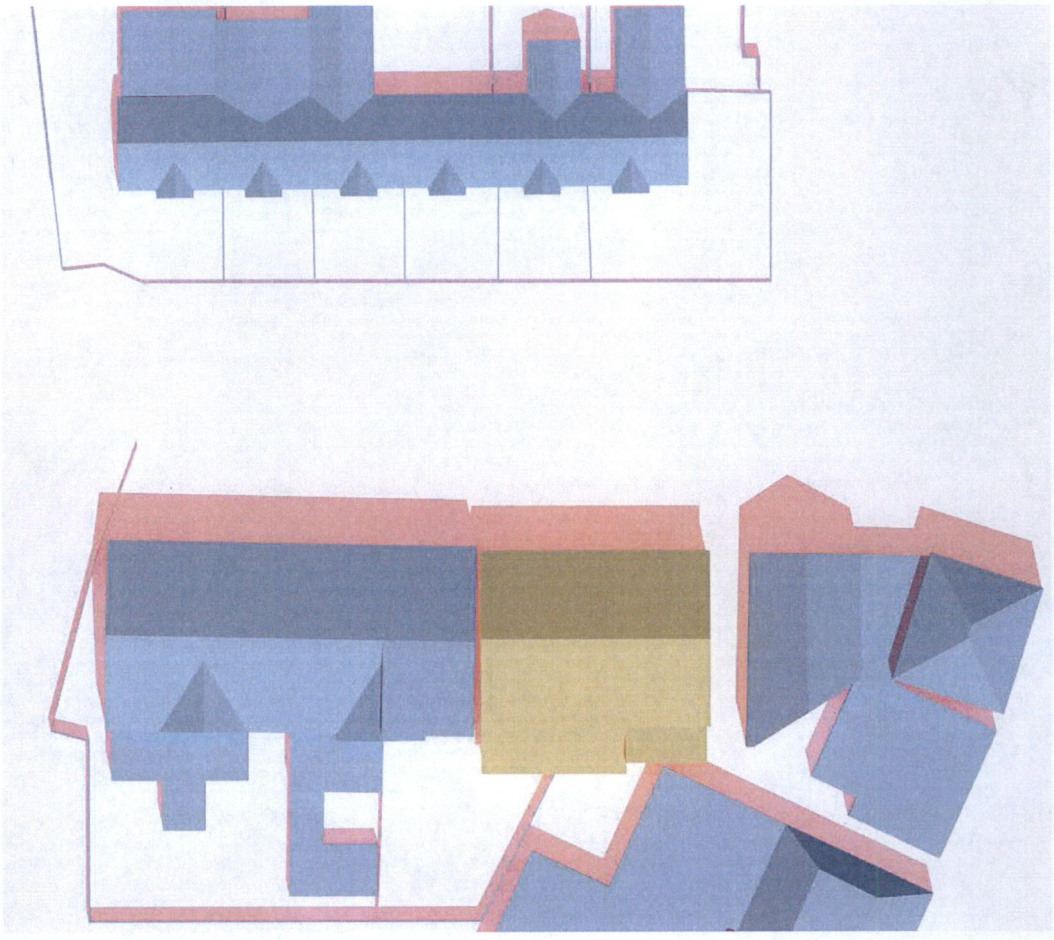


Proposed

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

N



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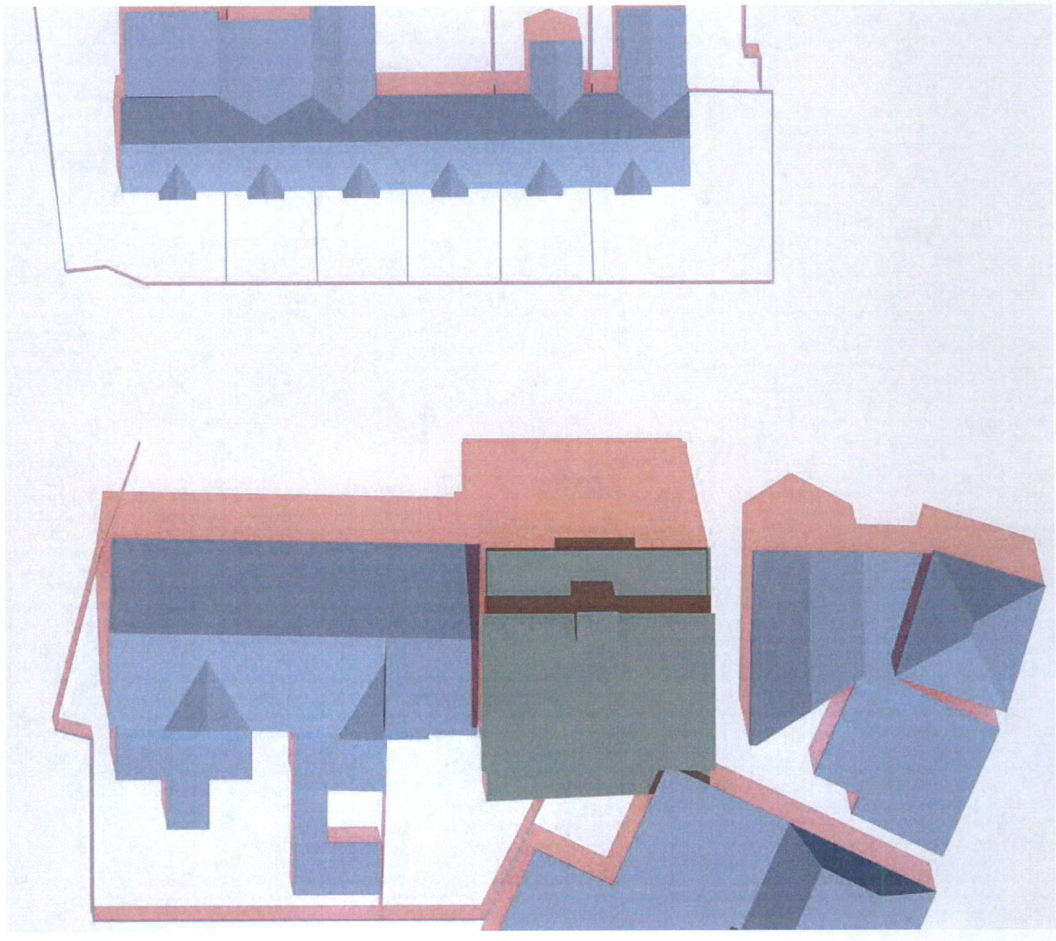
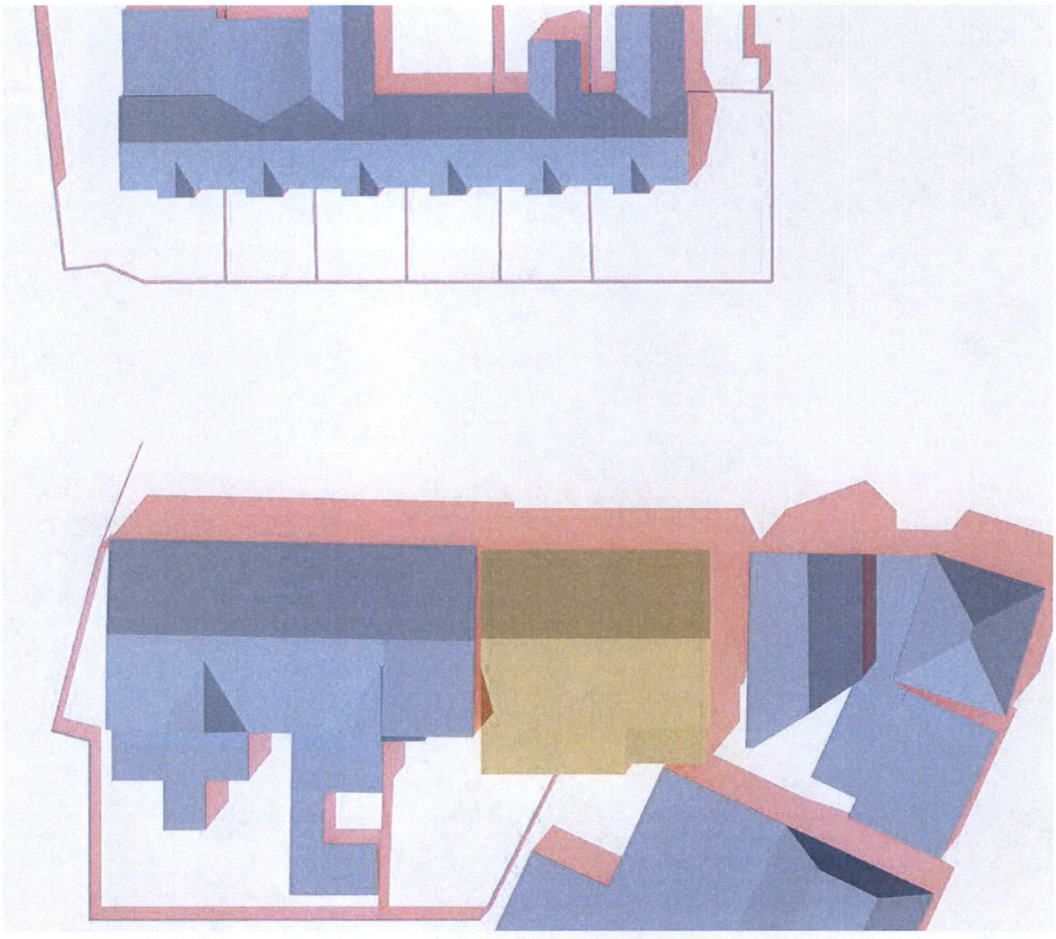


Proposed

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

N



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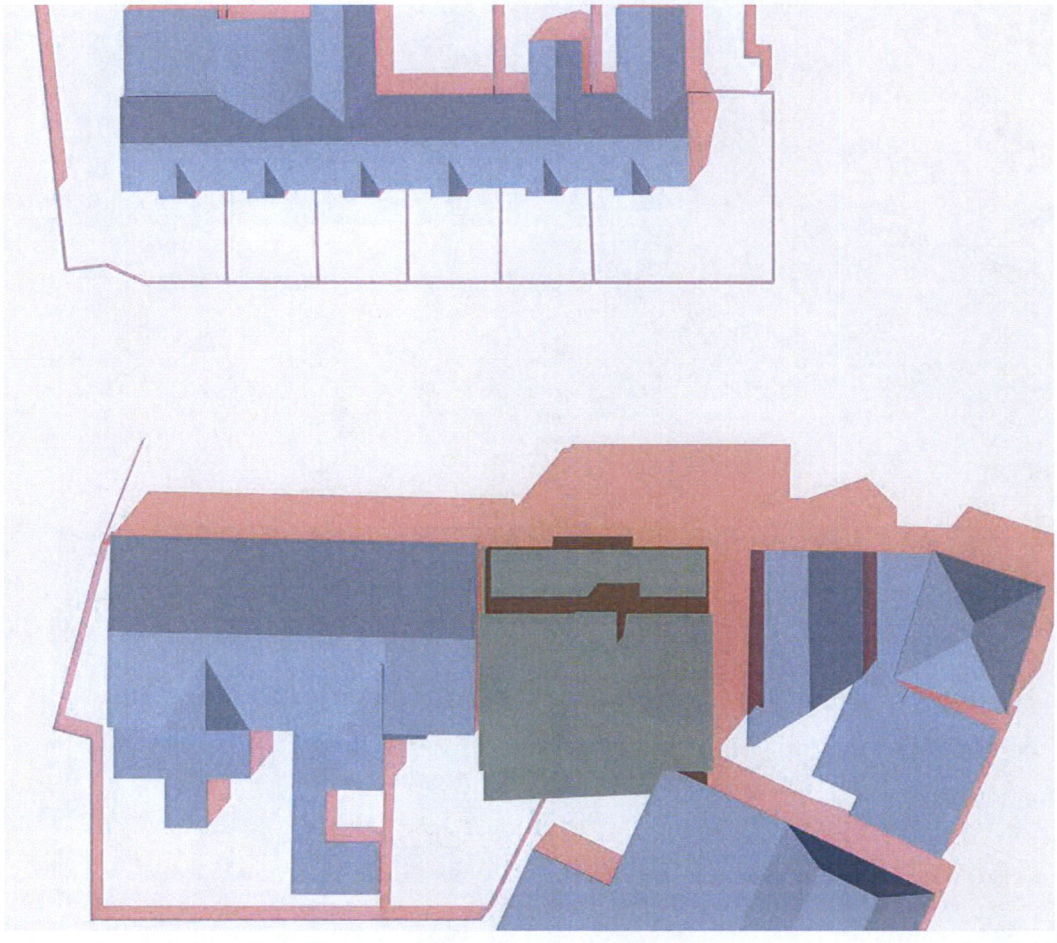
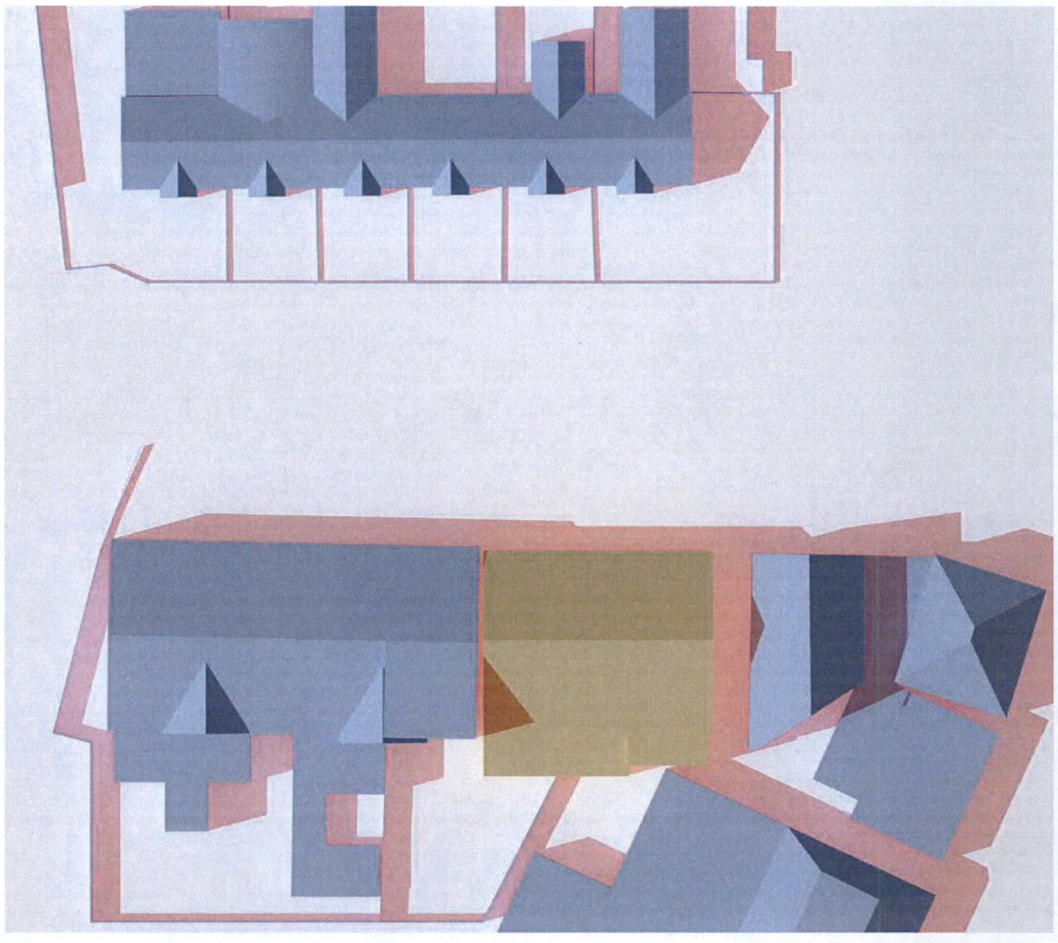


Proposed

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

N



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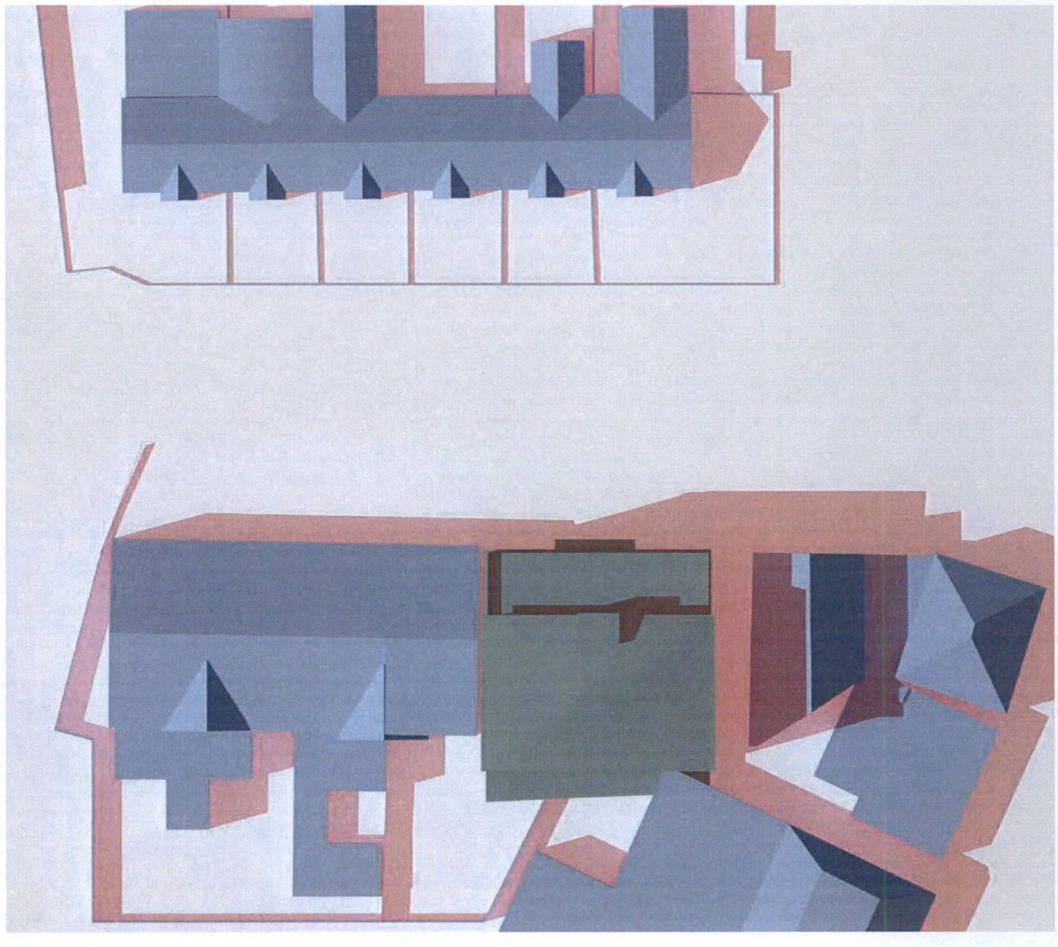
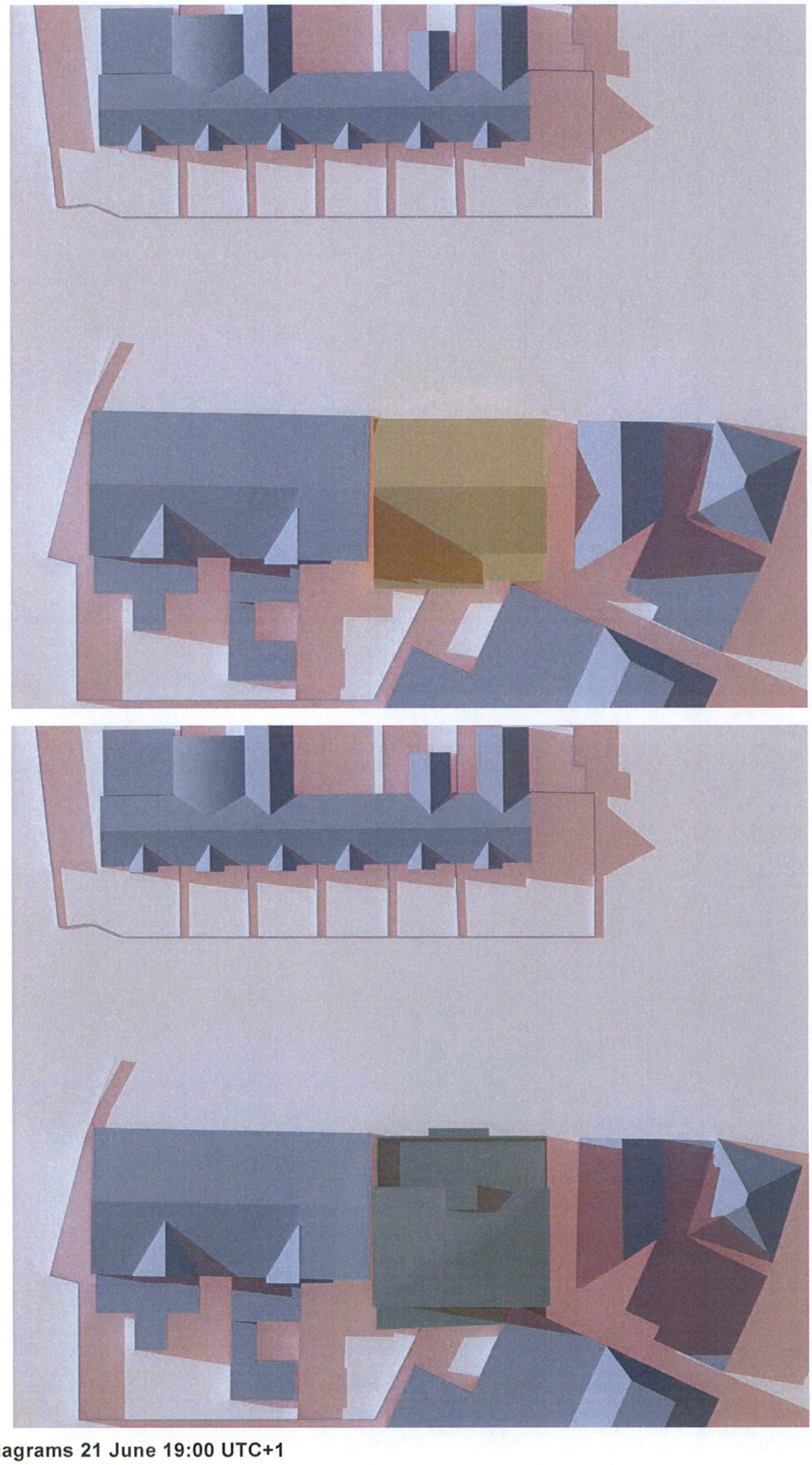


Proposed

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

N



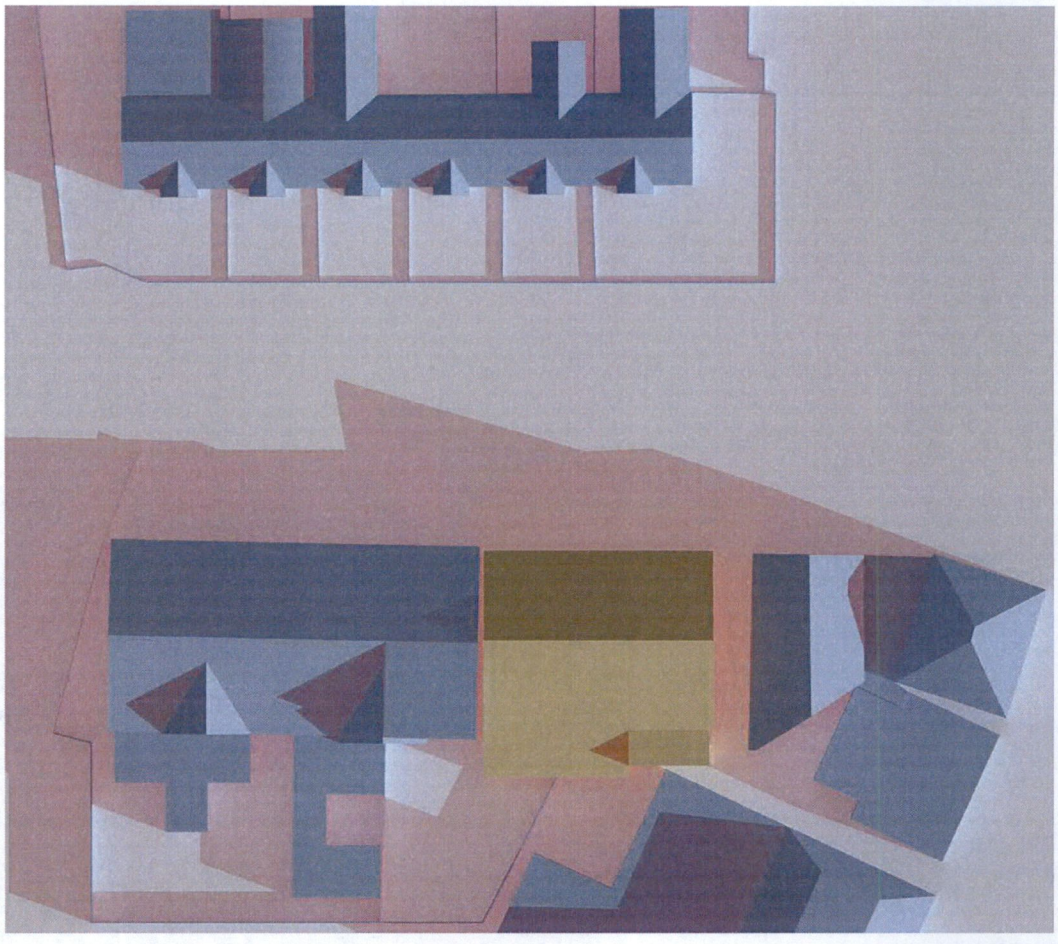
Existing

Proposed

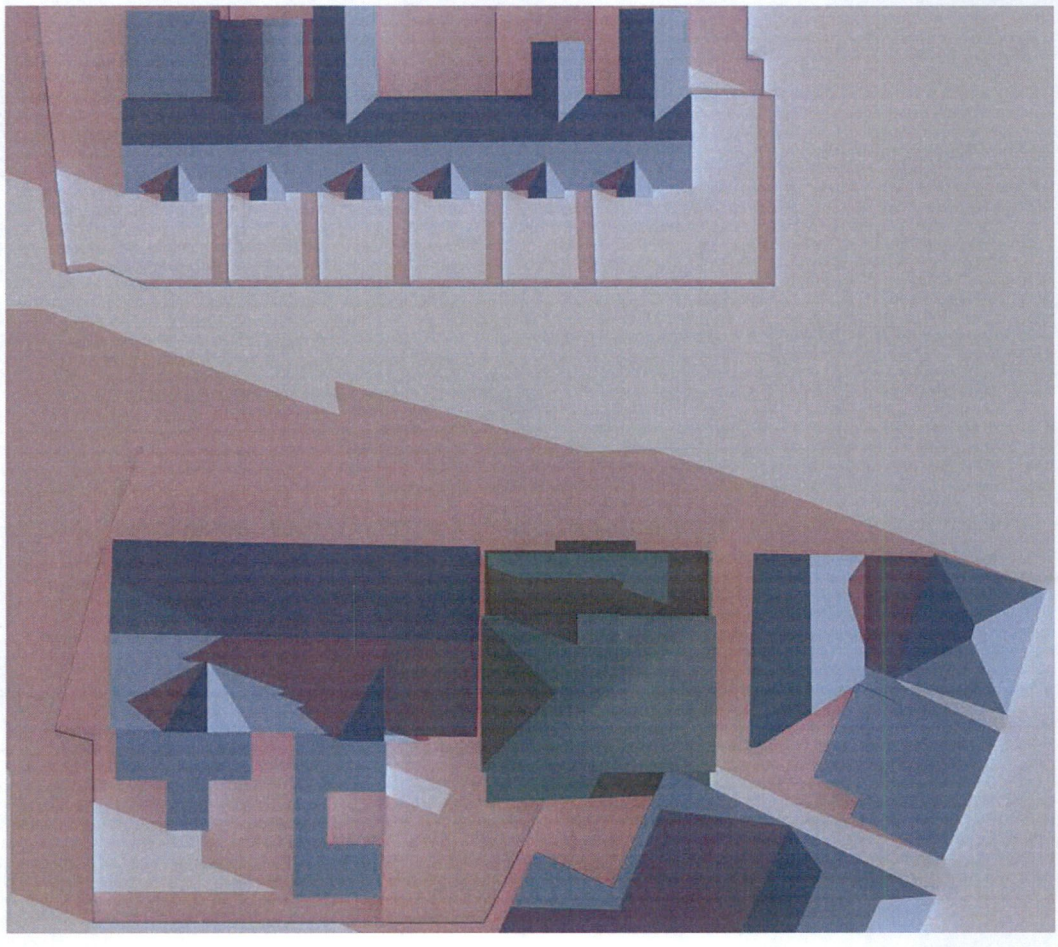
Figure 17: Shadow diagrams 21 June 19:00 UTC+1

8.4 Shadow Casting diagrams September Equinox

N



Existing



Proposed

Figure 18: Shadow diagrams 21 September 09:00 UTC+1

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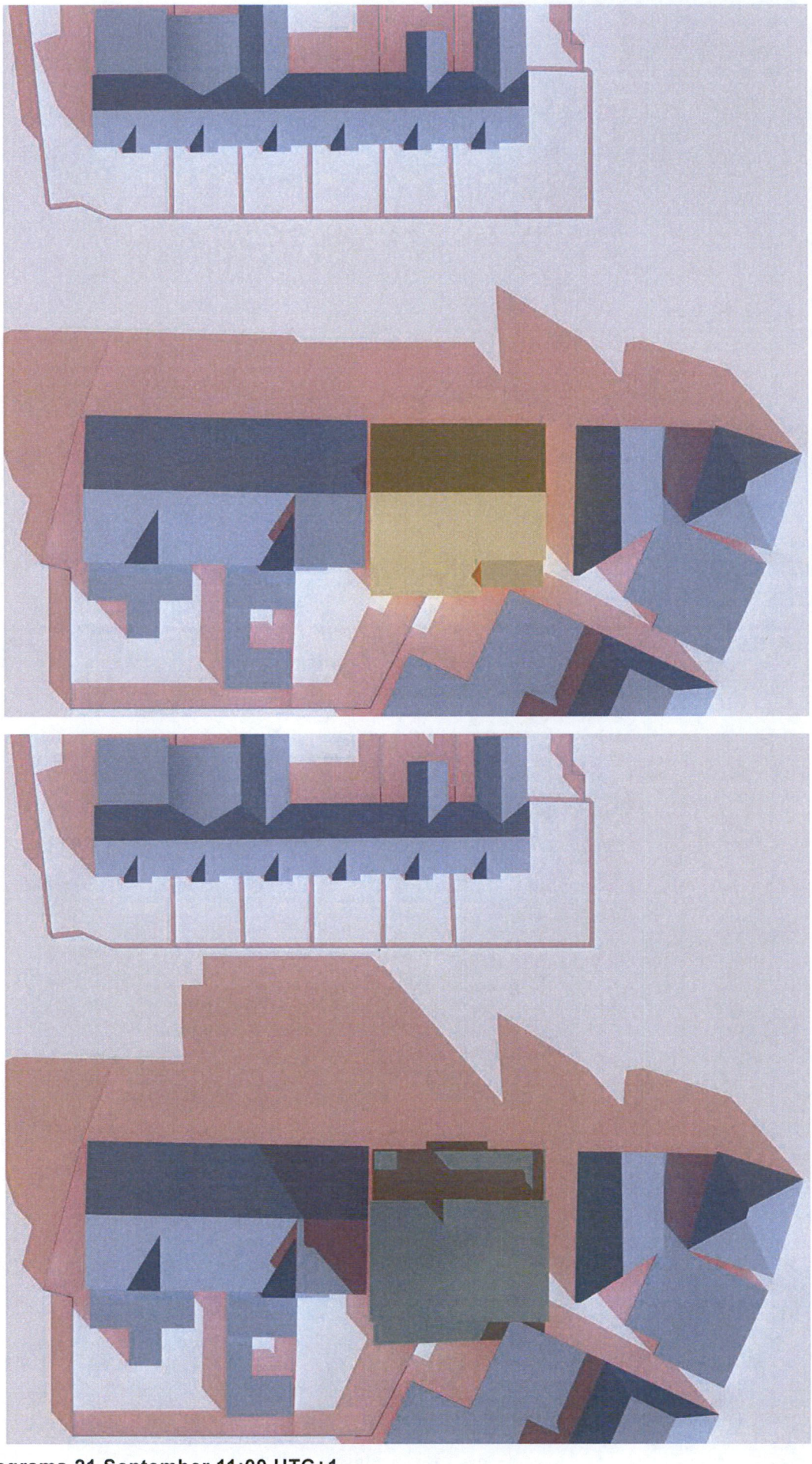
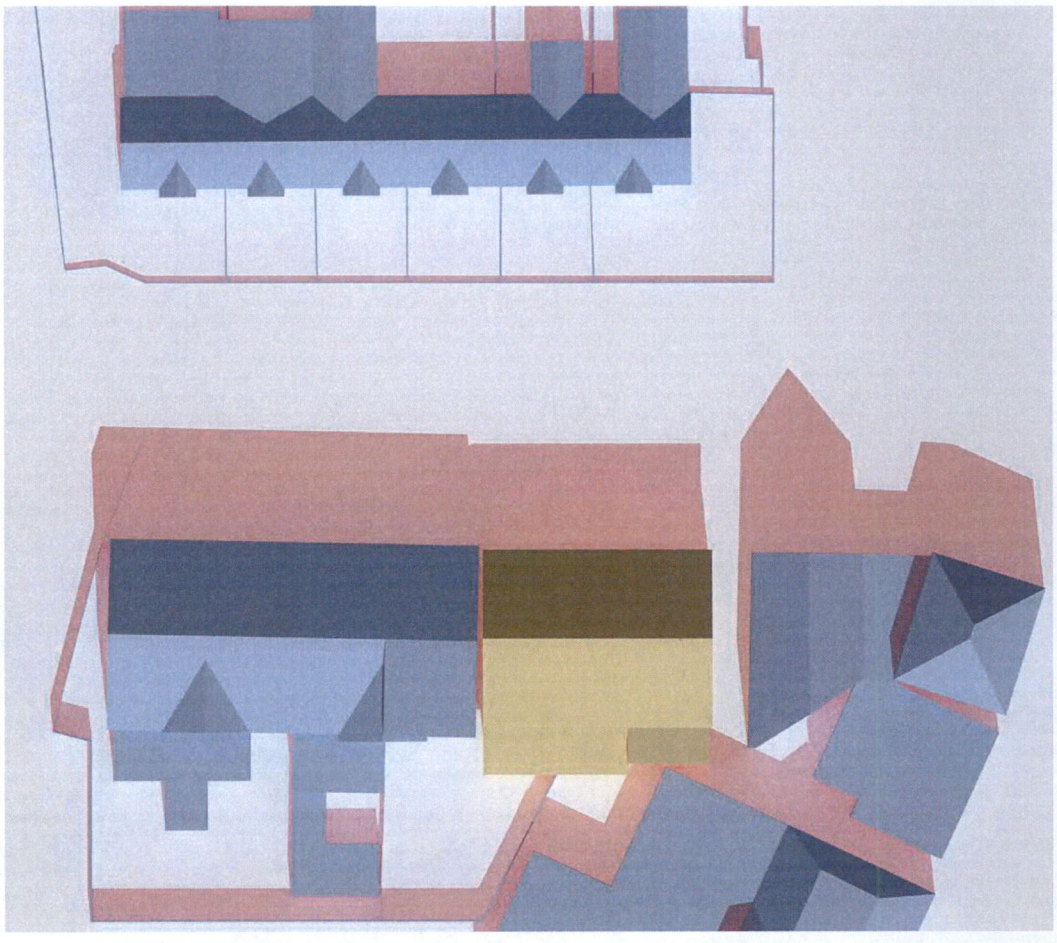


Existing

Proposed

Figure 19: Shadow diagrams 21 September 11:00 UTC+1

N



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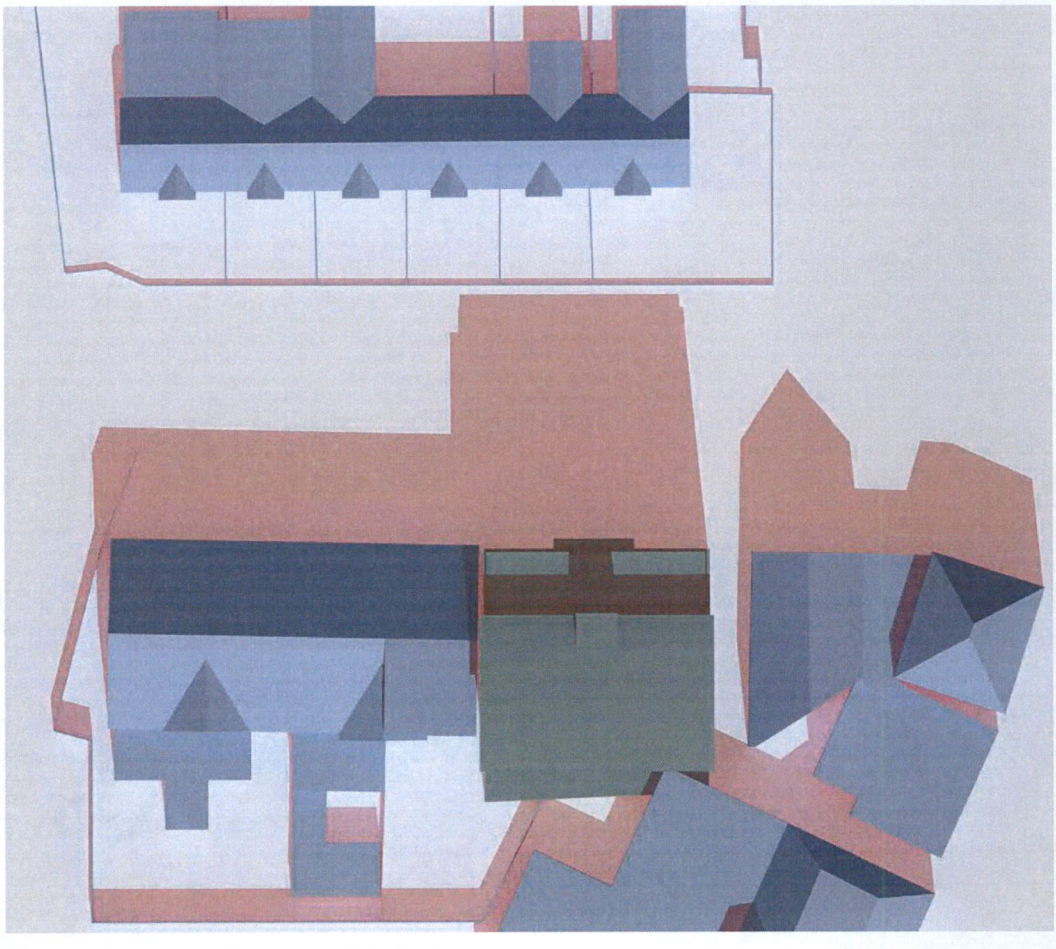

Proposed

Figure 20: Shadow diagrams 21 September 13:00 UTC+1

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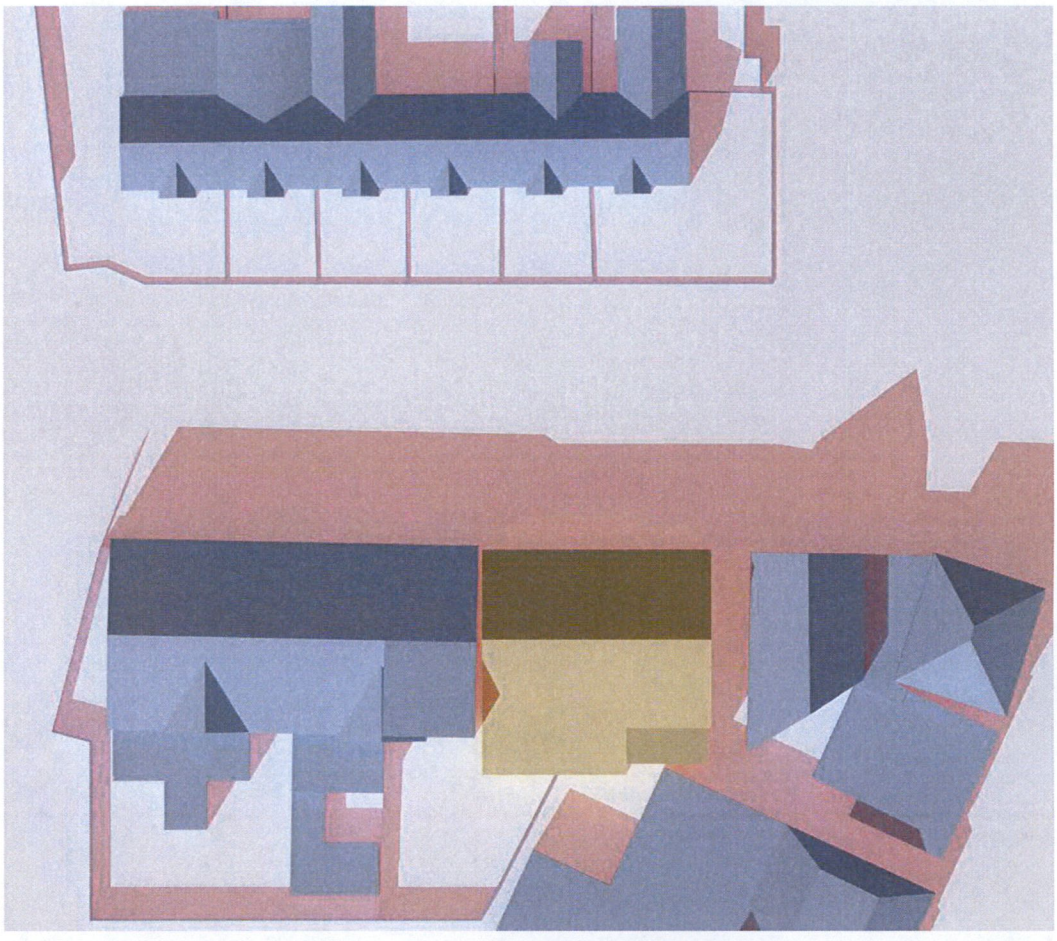

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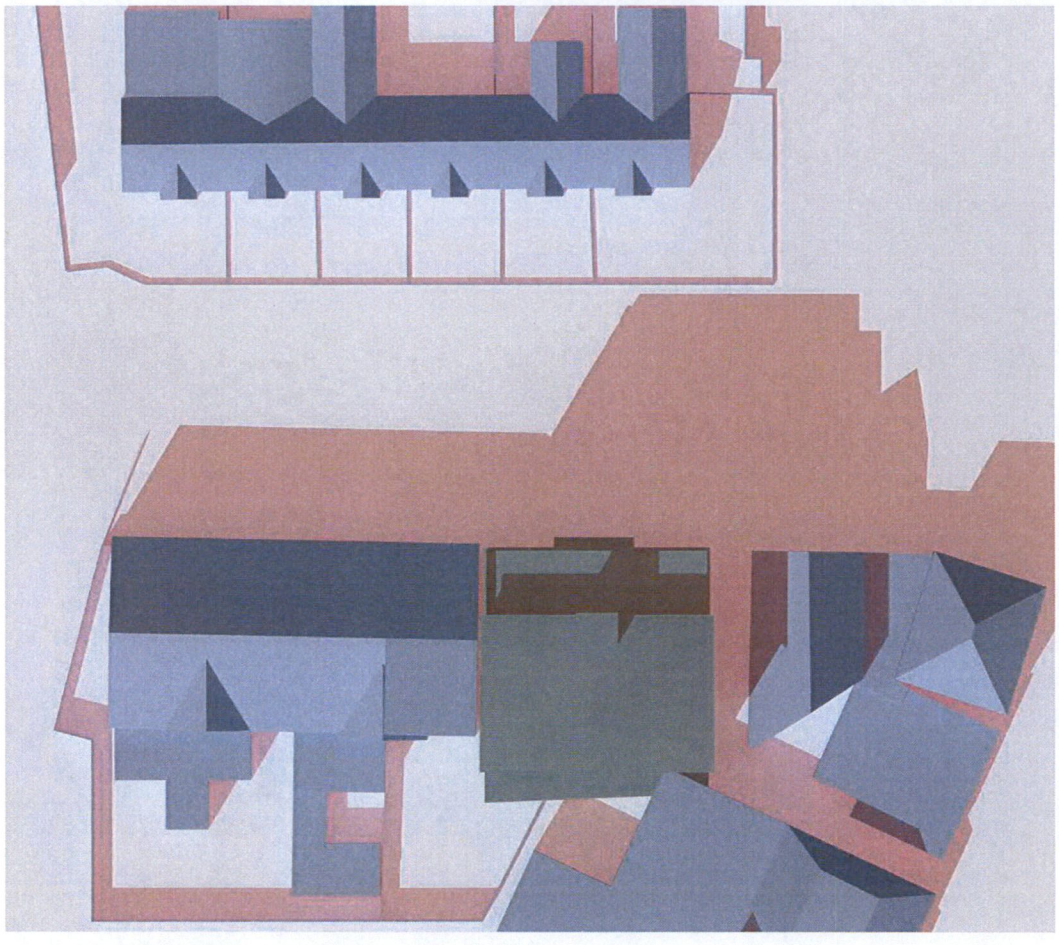
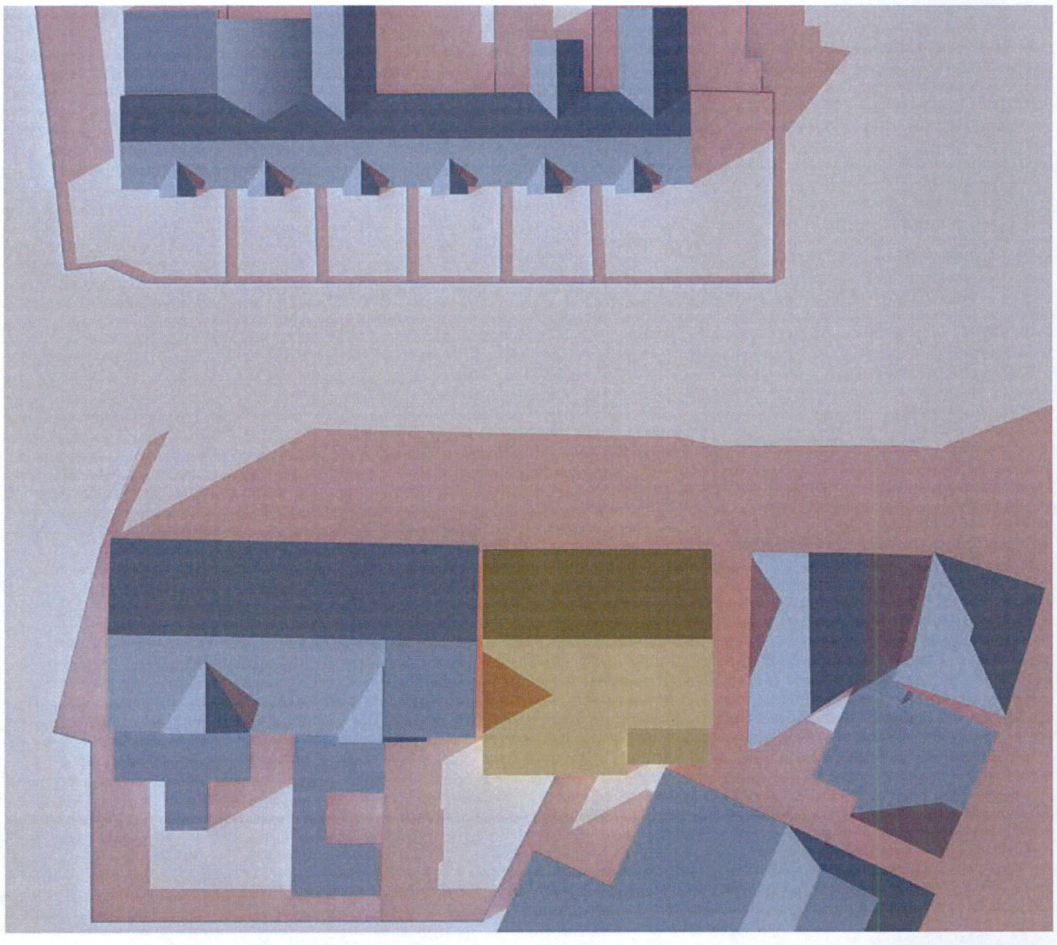


Proposed

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

N



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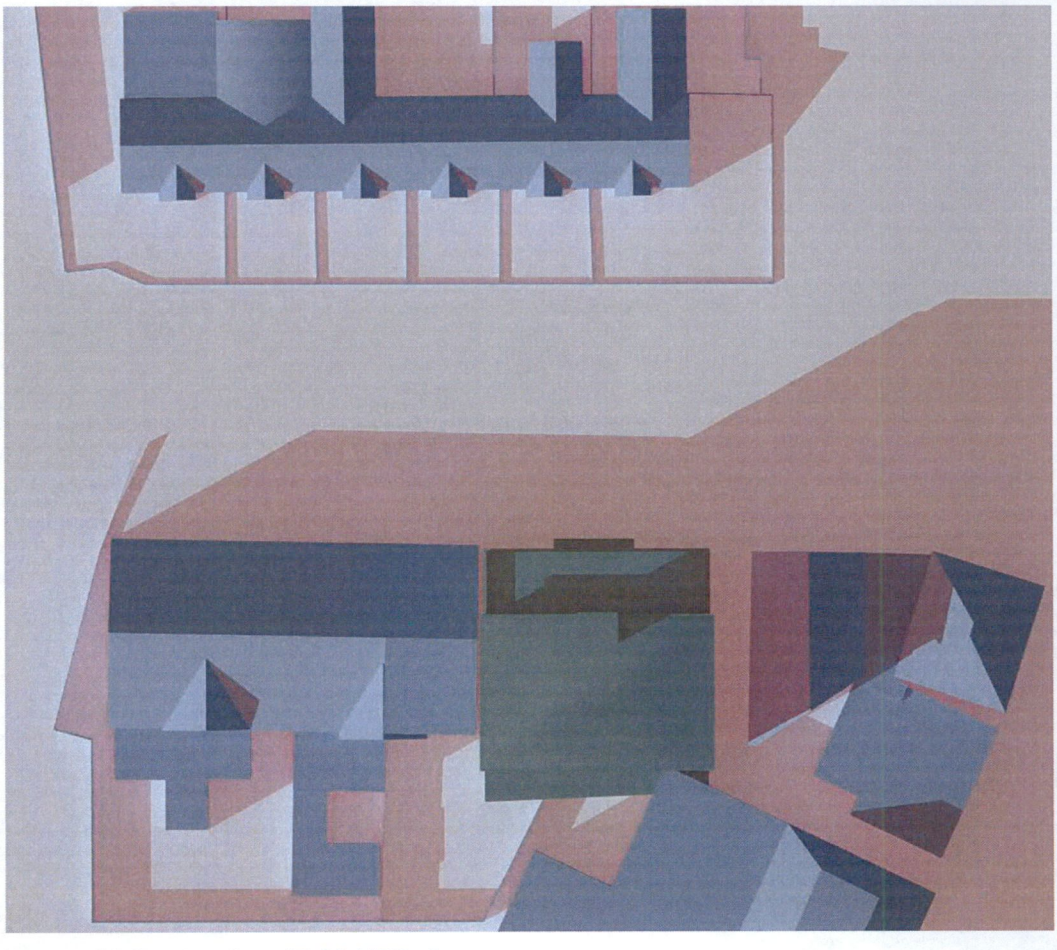
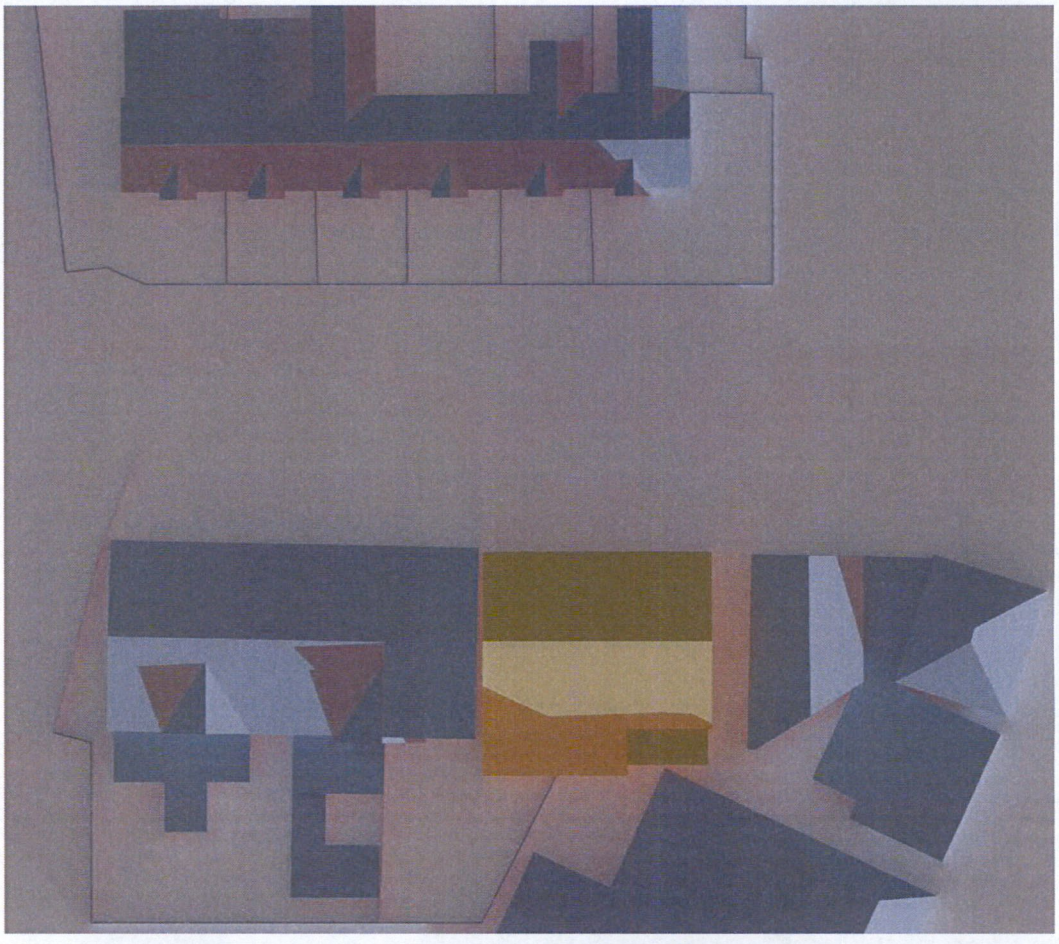


Proposed

Figure 22: Shadow diagrams 21 September 17:00 UTC+1

8.5 Shadow Casting diagrams December Solstice

N



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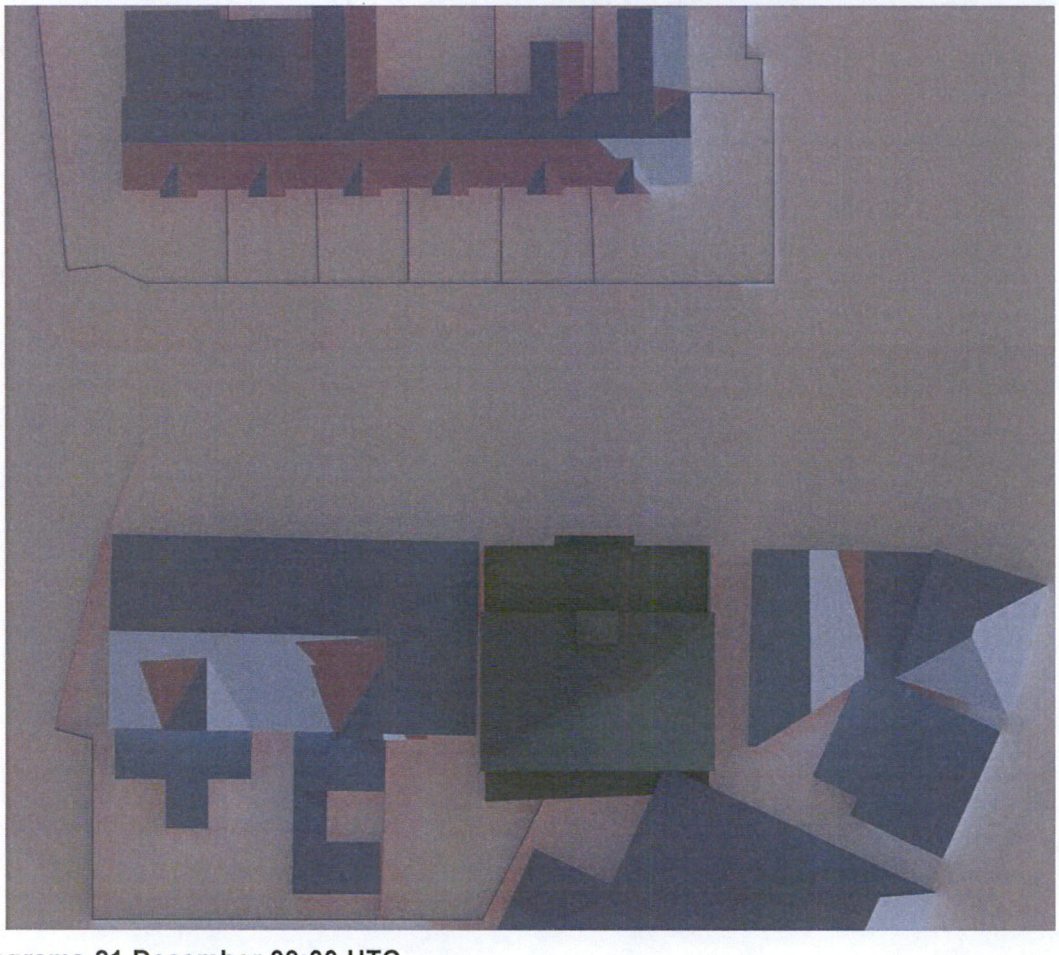
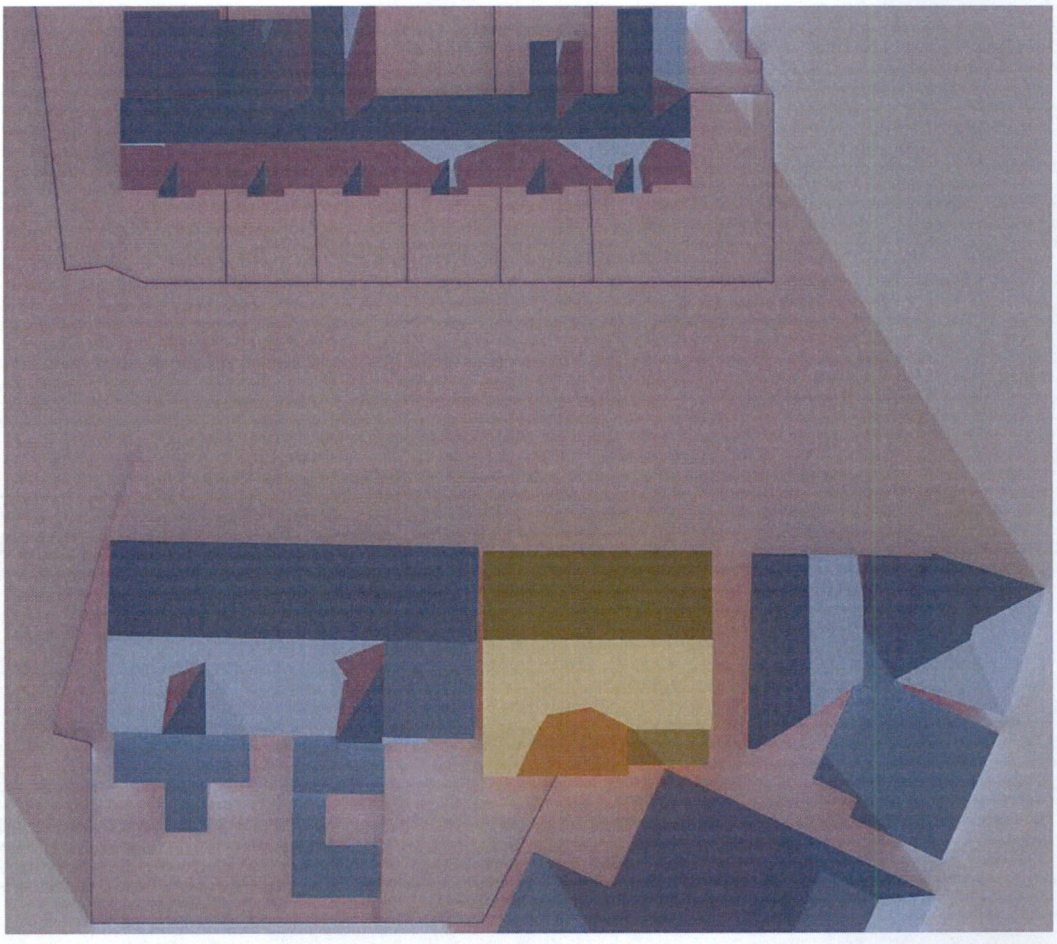


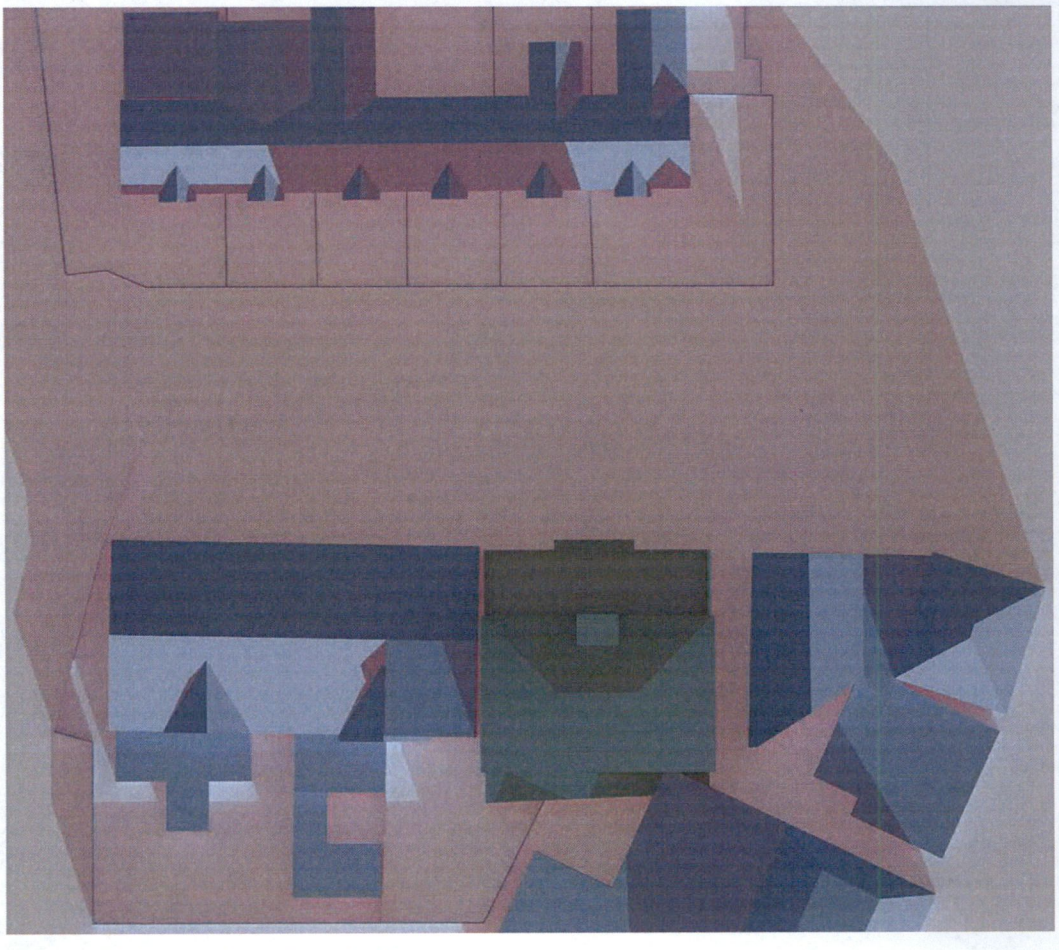
Proposed

Figure 23: Shadow diagrams 21 December 09:00 UTC

N



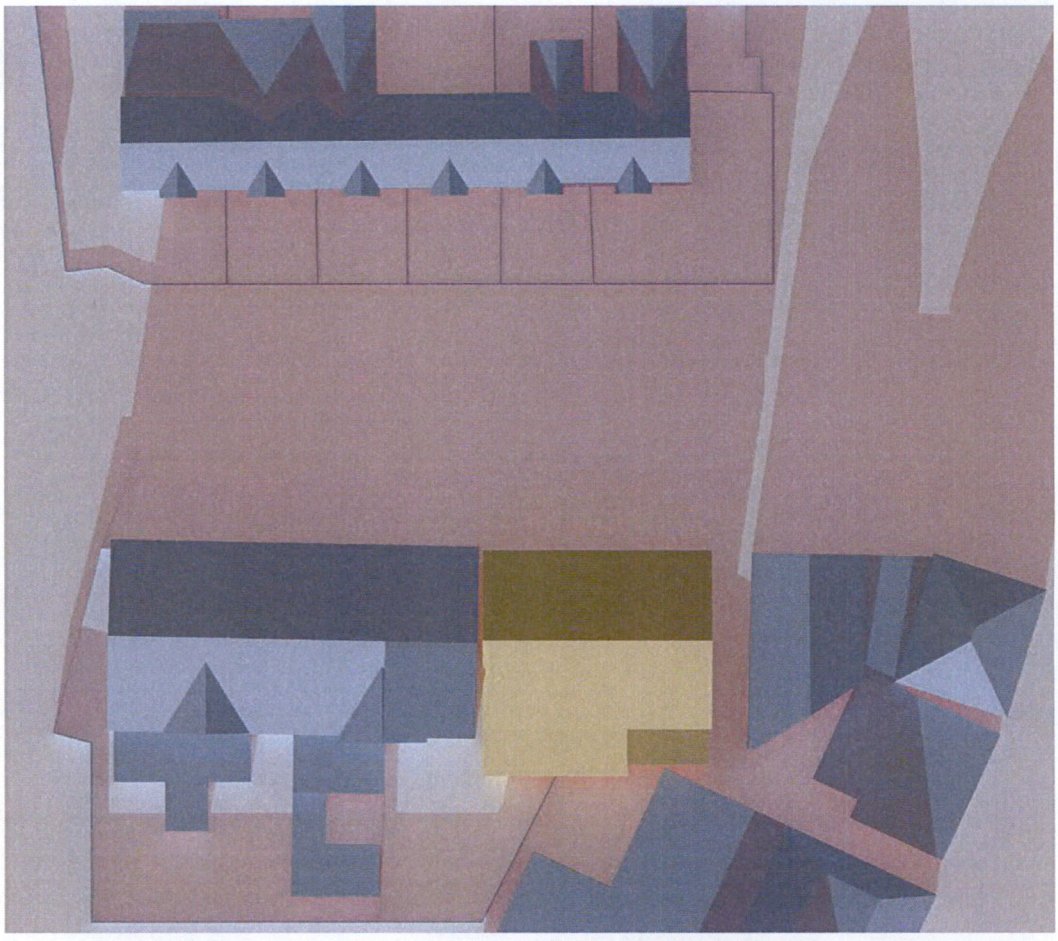
Existing



Proposed

Figure 24: Shadow diagrams 21 December 11:00 UTC

N



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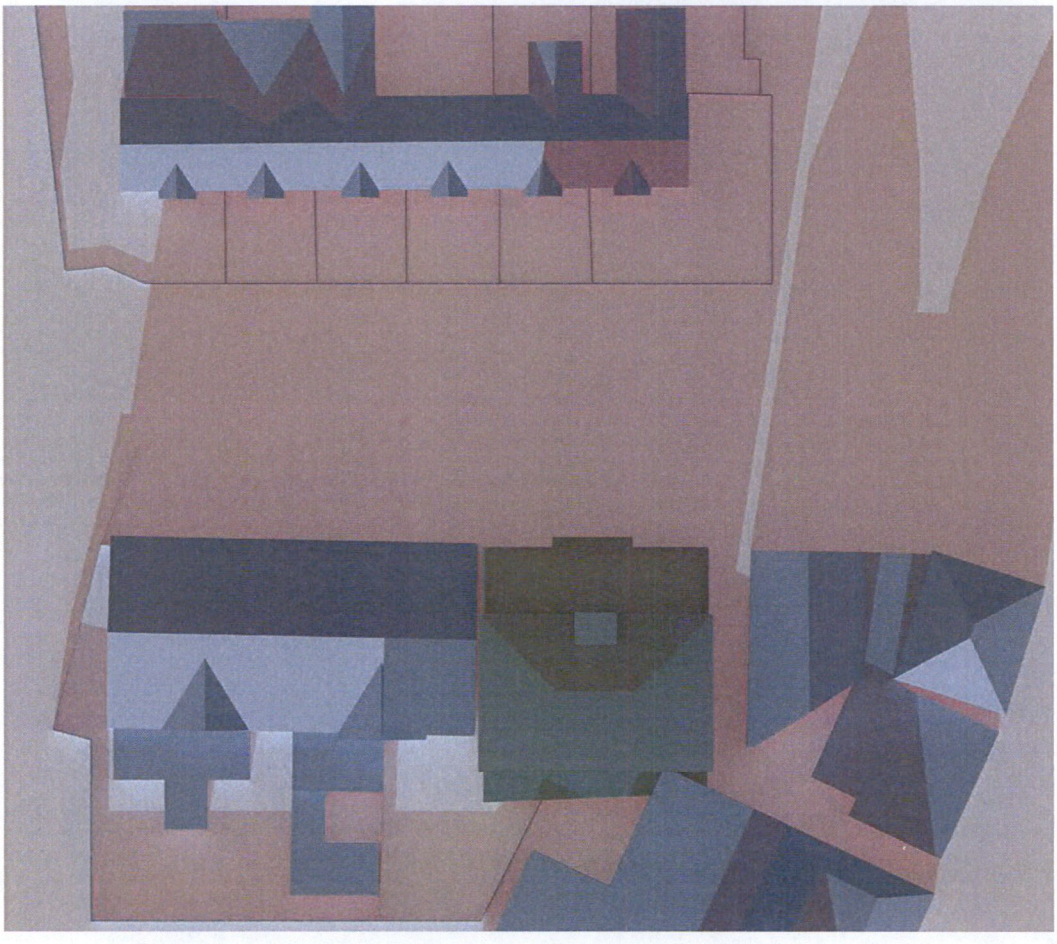
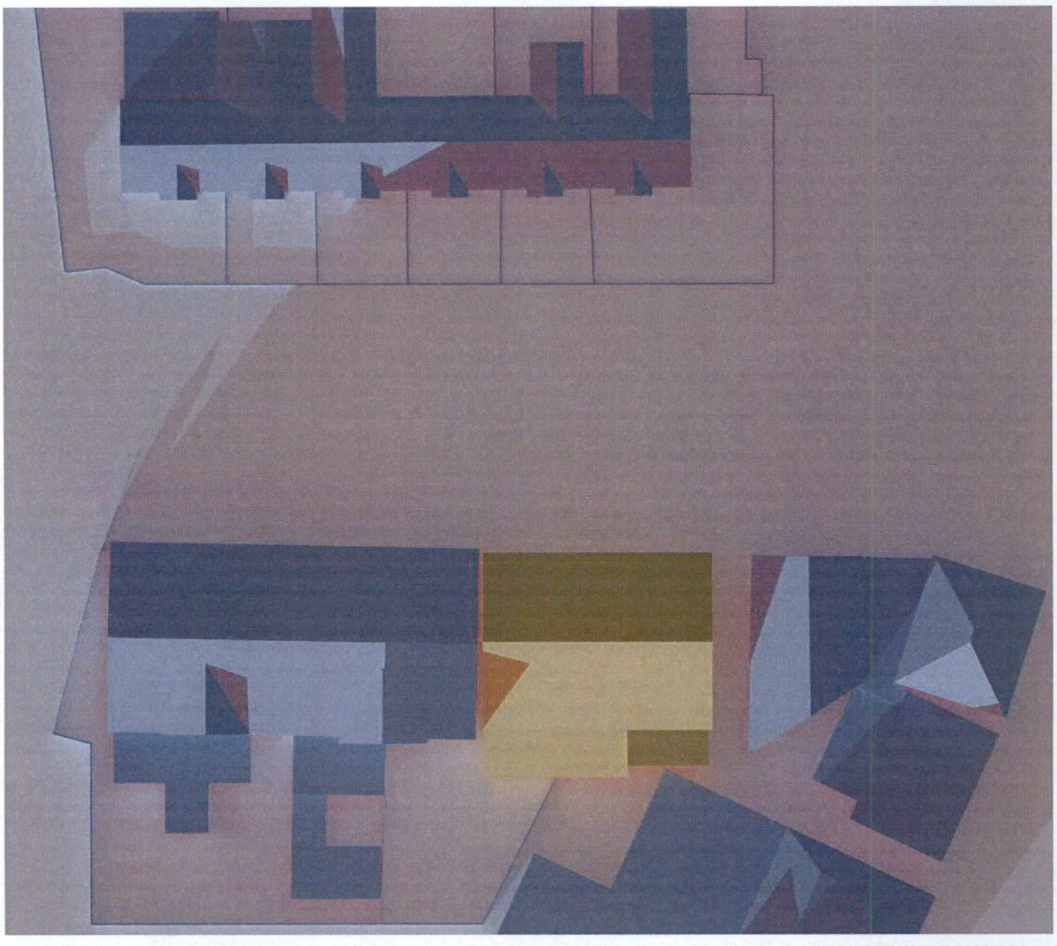


Proposed

Figure 25: Shadow diagrams 21 December 13:00 UTC

N

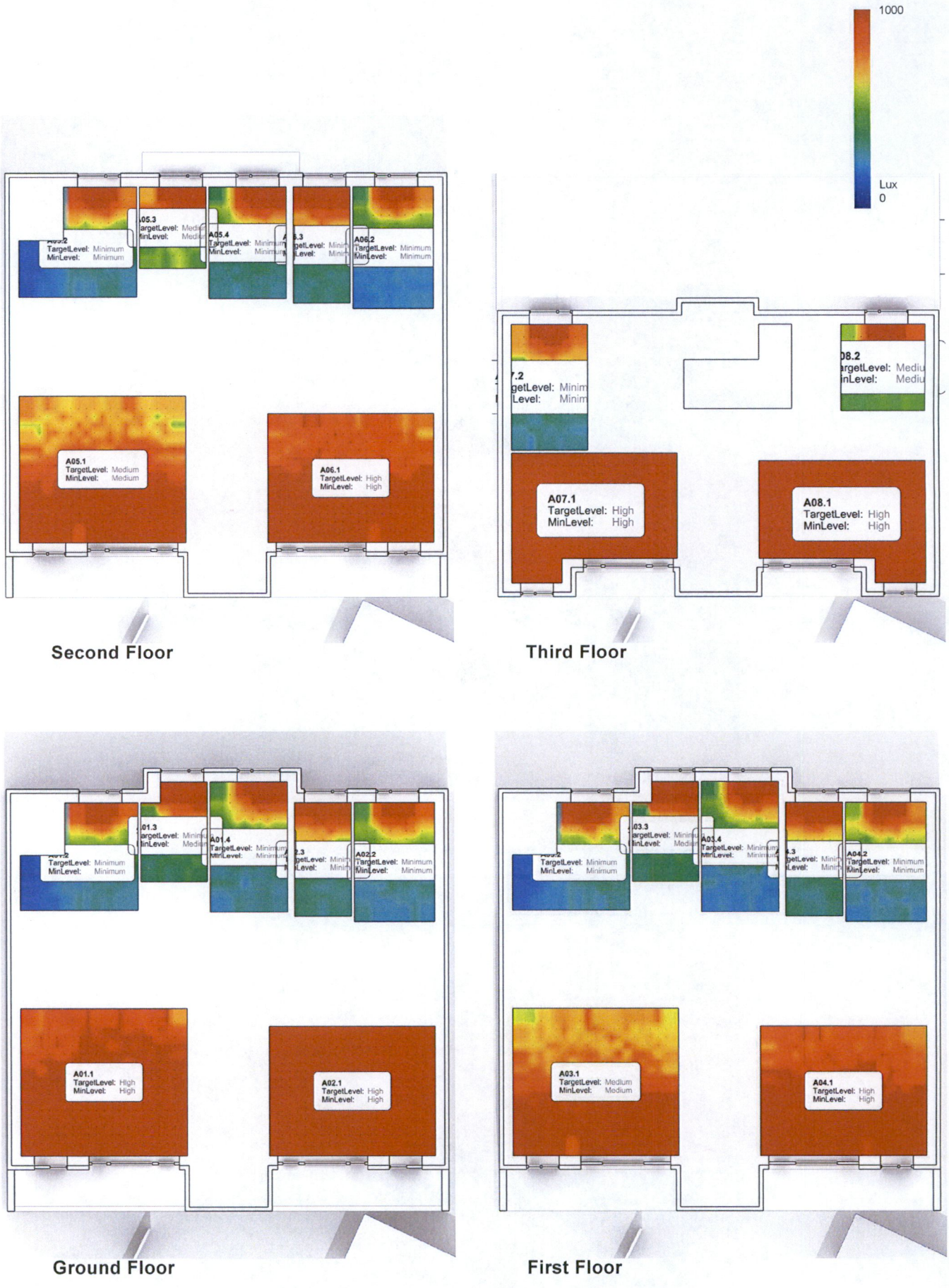


Existing

Proposed

Figure 26: Shadow diagrams 21 December 15:00 UTC

Appendix A - EN17037:2018 Table A.1 Daylight Provision Room Compliance Results



Second Floor

Third Floor

Ground Floor

First Floor

Figure 27: Daylight Provision and Annual Average Illuminance to all habitable rooms.

EN17037:2018 Table A.1 Daylight Provision Room Compliance											
Space ID	Description	Area [m^2]	Sensor Count	Target Compliance	300lux_50	500lux_50	750lux_50	Minimum Compliance	100lux_95	300lux_95	500lux_95
A01.1	LKD	32.3	304	High	75.8%	65.2%	53.8%	High	85.5%	68.9%	54.8%
A01.2	Bed	14.0	115	Minimum	52.7%	24.1%	0.3%	Minimum	56.9%	0.2%	0.0%
A01.3	Bed	8.4	69	Minimum	66.2%	46.8%	19.6%	Medium	82.1%	53.8%	24.5%
A01.4	Bed	13.6	112	Minimum	58.7%	36.6%	5.0%	Minimum	78.2%	41.5%	3.8%
A02.1	LKD	28.4	266	High	78.5%	68.1%	58.2%	High	87.2%	74.1%	61.7%
A02.2	Bed	13.0	104	Minimum	57.7%	35.0%	3.9%	Minimum	77.1%	36.3%	1.4%
A02.3	Bed	8.8	60	Minimum	63.1%	42.5%	14.6%	Minimum	79.0%	44.8%	7.7%
A03.1	LKD	32.3	304	Medium	70.7%	57.6%	44.5%	Medium	83.0%	63.0%	47.1%
A03.2	Bed	14.0	115	Minimum	53.1%	25.4%	0.8%	Minimum	56.6%	0.2%	0.0%
A03.3	Bed	8.4	69	Minimum	64.7%	45.0%	18.6%	Medium	81.8%	53.6%	25.4%
A03.4	Bed	13.6	112	Minimum	54.5%	28.0%	0.5%	Minimum	73.3%	25.7%	0.0%
A04.1	LKD	28.4	266	High	74.7%	63.6%	51.8%	High	85.6%	68.3%	53.9%
A04.2	Bed	13.0	104	Minimum	57.9%	36.0%	5.5%	Minimum	76.5%	35.8%	1.0%
A04.3	Bed	8.8	60	Minimum	64.0%	43.8%	15.8%	Minimum	79.1%	45.5%	8.8%
A05.1	LKD	32.3	304	Medium	71.5%	58.7%	45.3%	Medium	83.0%	63.1%	46.6%
A05.2	Bed	14.0	115	Minimum	53.9%	28.1%	0.7%	Minimum	54.5%	0.0%	0.0%
A05.3	Bed	7.1	56	Medium	76.9%	62.0%	46.2%	Medium	86.1%	66.4%	47.0%
A05.4	Bed	11.4	96	Minimum	63.7%	43.2%	11.4%	Minimum	79.4%	47.2%	10.0%
A06.1	LKD	28.4	266	High	74.6%	63.4%	51.8%	High	85.4%	68.1%	53.9%
A06.2	Bed	13.0	104	Minimum	52.5%	20.9%	0.1%	Minimum	72.9%	23.7%	0.0%
A06.3	Bed	8.8	60	Minimum	66.9%	48.2%	23.0%	Minimum	79.7%	49.2%	13.6%
A07.1	LKD	24.9	221	High	81.5%	73.4%	64.1%	High	88.9%	78.4%	67.9%
A07.2	Bed	12.9	112	Minimum	62.0%	40.4%	11.7%	Minimum	78.9%	44.7%	4.7%
A08.1	LKD	23.2	202	High	82.6%	75.0%	66.0%	High	89.8%	80.4%	70.7%
A08.2	Bed	9.7	81	Medium	73.7%	55.8%	37.6%	Medium	86.2%	65.7%	45.1%

Table 13: Daylight Provision individual room compliance values for all habitable rooms on the ground floor EN 17037 Table A.1.

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

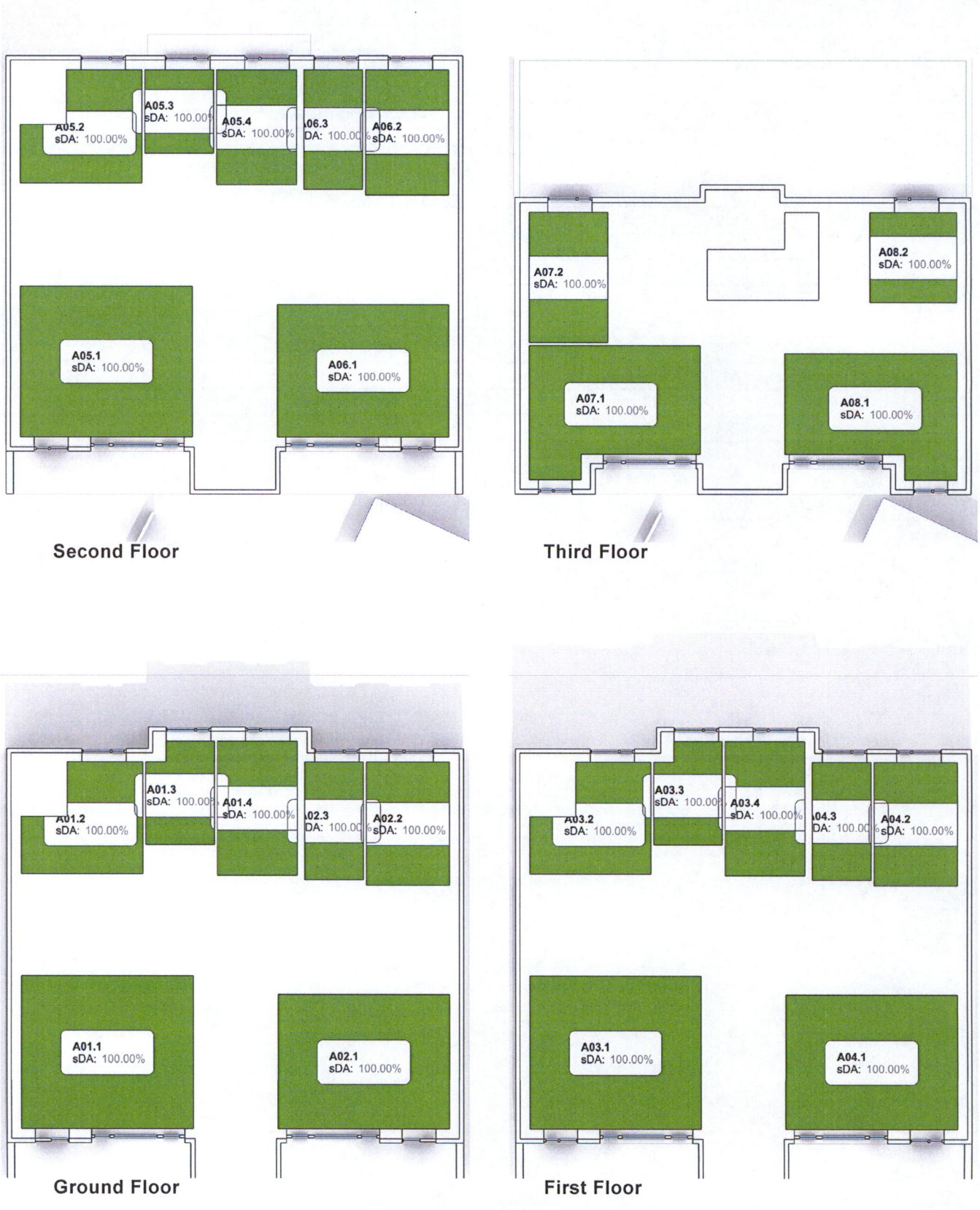


Figure 28: Floor plans indicating Daylight Provision BS EN17037:2021+A1 Table NA.1 compliance for habitable rooms

Minimum illuminance levels from BS EN17037:2021+A1 - Table NA.1							
Space ID	Use	Area m2	Sensor Countz	Median DF	Target Lux	% of grid target exceeded: Minimum 50% of grid	Meets Criteria
A01.1	LKD	32.3	304	200	1582	100%	Y
A01.2	Bed	14.0	115	100	448	100%	Y
A01.3	Bed	8.4	69	100	636	100%	Y
A01.4	Bed	13.6	112	100	516	100%	Y
A02.1	LKD	28.4	266	200	1787	100%	Y
A02.2	Bed	13.0	104	100	491	100%	Y
A02.3	Bed	8.8	60	100	589	100%	Y
A03.1	LKD	32.3	304	200	1206	100%	Y
A03.2	Bed	14.0	115	100	460	100%	Y
A03.3	Bed	8.4	69	100	637	100%	Y
A03.4	Bed	13.6	112	100	465	100%	Y
A04.1	LKD	28.4	266	200	1389	100%	Y
A04.2	Bed	13.0	104	100	500	100%	Y
A04.3	Bed	8.8	60	100	591	100%	Y
A05.1	LKD	32.3	304	200	1226	100%	Y
A05.2	Bed	14.0	115	100	465	100%	Y
A05.3	Bed	7.1	56	100	828	100%	Y
A05.4	Bed	11.4	96	100	556	100%	Y
A06.1	LKD	28.4	266	200	1396	100%	Y
A06.2	Bed	13.0	104	100	442	100%	Y
A06.3	Bed	8.8	60	100	653	100%	Y
A07.1	LKD	24.9	221	200	2133	100%	Y
A07.2	Bed	12.9	112	100	560	100%	Y
A08.1	LKD	23.2	202	200	2326	100%	Y
A08.2	Bed	9.7	81	100	717	100%	Y

Table 14: Minimum Daylight Provision individual room compliance values for all habitable rooms BS EN17037:2021+A1 Table NA.1.