



Amethyst Lane Daylight, Sunlight and Overshadowing

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Executive Summary

HTA Sustainable Futures have been appointed to carry out a Daylight, Sunlight and Overshadowing Assessment for the proposed development at Amethyst Lane. It is located between Bath Road to the south and Tilehurst Road to the North. To the west is one of Reading's largest parks, Prospect Park.

The development comprises the development of a residential scheme which will contain parking areas and biodiverse green roof for all flat roofs. The proposal provides a total of 21 new homes. All homes enjoy private external amenity in addition to communal residents external amenity spaces. There are four building typologies differing from 1 to 3 storeys in height.

Residential Use

The scheme provides a total of 21 new houses with a bespoke building designed to meet the needs of council tenants wishing to downsize to apartments. The scheme provides 18 houses with 3 bedroom homes and 3 houses with 4 bedrooms. Moreover, it provides 6 bedrooms in the Respite Centre Facility, at the south part of the site. All of them are containing private amenity spaces and shared gardens, as well as a private back gardens for all the houses of the proposed development.

All proposed scheme houses are Affordable and designed to meet at minimum National Described Space Standards.

All residential units are dual aspect, facilitating natural ventilation and access to natural light. All homes enjoy private rear gardens. Additional communal amenity space for the houses is provided and shared amenity spaces for the Respite center.

A mixed provision of quality and robust materials with key details and simple brick homes are provided with a range of houses, meeting the nationally described space standard.

The analysis has been carried out in accordance with the new BRE's guide 'Site Layout Planning for Sunlight and Daylight: A Guide to Good Practice', P J Littlefair (2022). According to the BRE guide:

document should not be seen as an instrument of planning policy. Although it gives numerical guidelines, these should be interpreted flexibly since natural lighting is only one of many factors in site layout design. In special circumstances the developer or planning authority may wish to use different target values' such as a dense urban environment.'

The Daylight and Sunlight assessment was carried out using the following checks in accordance with the BRE Guide (2022):

Daylight Assessment:

- **Existing properties:**
 - 25 degree angular check, and
 - Vertical Sky Component (VSC)
 - No-Sky Line (NSL)
- **Proposed dwellings:**
 - Illuminance (SDA-Spatial Daylight Autonomy),
 - No-Sky Line (NSL)

Sunlight Assessment:

- **Existing properties and proposed dwellings:**
 - 25 degree angular check
 - Annual Probable Sunlight Hours (APSH) and Winter Probable Sunlight Hours (WPSH)
- **Proposed dwellings:**
 - Sunlight exposure (SE)

External spaces:

- **Existing properties and proposed dwellings:**
 - Sunlight on the ground and Overshadowing.

The National Planning Policy Framework (NPPF) (July 2021) states that when considering applications for housing, authorities should take a flexible approach in applying policies or guidance relating to daylight and sunlight, where they would otherwise inhibit making an efficient use of a site. The NPPF sets out at paragraph 11 that planning policies and decisions should promote the effective use of land in meeting the need for new homes, whilst safeguarding and improving the environment and ensuring safe and healthy living conditions.

'...the advice given here is not mandatory and this

Daylight

Impact on the existing buildings

The daylight analysis considered all the **surrounding buildings** with main windows facing the development. The following properties were assessed against the daylight criteria:

- Dellwood Community Hospital
- 65 Ashdene Gardens
- 47 -63 Ashdene Gardens
- 2 Jenkins Close
- 8,10 Jenkins Close
- 39 Ashdene Gardens
- 2 Amethyst Lane
- 6,10 Amethyst Lane
- 3 Amethyst Lane
- 4 Amethyst Lane

Initial analyses were conducted to assess the likely impact that the existing properties surrounding the site would receive from the new building. As the BRE guide explains, it is important to apply the BRE targets sensibly and flexibly, with careful consideration of the specific site context. The BRE also notes that alternative targets might be set depending on the urban context of the site.

The NPPF asks local planning authorities to consider whether satisfactory living conditions are achieved within future developments. .

A total of 24 windows that belong to residential units and to Dellwood Community Hospital, that are in close proximity and face the proposed development have been assessed.

The results show that 67% of the analysed windows achieved VSC levels in line with the BRE recommendations. In summary

- 16 out of 24 windows achieved VSCs more than 27% or with a VSC of at least 0.80 of their existing value.
- The remaining 8 windows, fall below the BRE Criteria.
- More specifically, 3 out of the remaining 8 windows achieved VSCs higher than 20%, which is considered to be a satisfactory level of daylight in urban environments.
- From the remaining 5 windows, 3 are located in the ground, and the remaining 2 are located in the first floor of 47 -63 Ashdene Gardens which is a residential development in a close proximity with the proposed scheme. Given the low-rise nature of the existing structures on site where there is a more than a 20% reduction in VSC, does not mean that the light levels will be unacceptable but, that there may be a noticeable change in daylight levels to the occupants. 4 windows, which are located on the ground and first floor of 47 -63 Ashdene Gardens face the new development in close proximity. These windows

have a 20% reduction in VSC, which means that the occupants of these rooms will have a noticeable daylight reduction rather than an unacceptable daylight level.

Overall, the proposed development will not have any important impact on the surrounding buildings of the site.

Assessment of the proposed development

Daylight levels of the proposed blocks have been tested. The Illuminance (SDA) has been carried out to assess the daylight availability within representative habitable rooms of the proposed scheme.

For the purpose of this study, a total of 50 spaces have been tested. Out of 50 tested, 37 rooms are residential and 13 belong to the Respite center, out of which 4 are office spaces. 80% of the tested rooms pass the recommended Illuminance target. Please refer to the Table below.

Property	Illuminance Factor		
	Analysed rooms	Rooms meeting the criteria (no.)	Rooms meeting the criteria (%)
Respite Facility	13	10	77%
Residential Blocks	37	30	81%
Total	50	40	80%

There are 10 rooms with SDA levels below the recommended target, and therefore not achieving to pass the BRE Criteria. These are 4 bedrooms 2 kitchen-living-dining rooms, 3 kitchens and one office space. 3 rooms (1 LKD and 2 bedrooms) are marginally fall below the criteria with 5-10% below the passing target (50%). From the remaining 7 that fall below the BRE Criteria, 2 are kitchens located on the ground floor of the dwellings to the north and one is a kitchen located to the ground floor of the Respite Facility. The windows to the kitchen spaces are located in corners of the buildings and therefore are overshadowed by the geometry of the structure. From the remaining 4 rooms, 2 are bedrooms located on the 1st floor of the central block to east and west, one is an LKD located to the ground floor of the central block to west, and the remaining one is an office space located to the ground floor of the Respite Facility.

Overall most of the windows which fail to achieve the BRE Criteria, are located on lower floors and they belong to mainly single-aspect units located within close proximity to each other.

Early stage collaboration with the design team increased the design opportunities in regards to balancing the daylight/sunlight, overheating and energy performance. more.

Overall the results are acceptable given the low-rise nature of the existing structures on site.

Sunlight

Impact on the existing buildings

The impact of the proposed development on the existing surrounding buildings has been assessed in terms of sunlight provision. The annual and winter APSH analysis was carried out on the south-facing windows of the existing surrounding properties next to the Proposed Development. The following property was assessed:

- Dellwood Community Hospital
- 47-63 Ashdene Gardens

A total of 12 windows from buildings surrounding the site were assessed for sunlight access. The analysis indicated that 17% of windows satisfied the BRE criteria for annual probable sunlight hours (APSH) and 50% of windows for winter probable sunlight hours (WPSH).

Out of 12 windows within 90° due south, 2 achieved Annual sunlight values (APSH) of more than 27%. It is important to mention that most of these windows only present a reduction in annual sunlight compared to the existing condition. From the remaining 10 windows, 5 fall marginally below the Annual sunlight target with the remaining 5 falling below the BRE Sunlight Criteria. All these windows, with the exception of one window located in the community Hospital, are located in 47-63 Ashdene Gardens residential block, which is located in close proximity to the proposed scheme and to the southeast of the emerging building. Given the low-rise nature of the existing structures on site, it was expected to have a noticeable reduction in the sunlight compared with the previous condition. Moreover, due to eastern orientation, it is likely that these windows have fewer hours of sunlight during the day, especially during winter.

Similarly, 6 out of 12 assessed windows for Sunlight are falling below the Winter Sunlight target set by BRE. This was expected as these windows are all located in close proximity to the proposed scheme and face eastwards as a result they have fewer hours of sunlight over a day.

Overall, the impact on sunlight access to windows of surrounding developments that the proposed development at Amethyst Lane have is acceptable taking into consideration the existing site conditions and the urban environment.

Assessment of the proposed development

For the purpose of this study 8 South facing living rooms have been tested. To assess the sunlight provision within the scheme the BRE guide recommends that living rooms that face within 90° due south should be tested.

The results show that all of the 8 tested living rooms achieve adequate sunlight through the year. The results are deemed excellent.

Sunlight on the ground - Overshadowing

Impact on the existing buildings

A review of the site plan showed that there are 5 amenity spaces located to the north, northeast and northwest of the proposed development that may be affected. A Solar Access Analysis was undertaken on this amenity area for the full 24 hours on 21 March as set out by the BRE. The analysis was carried out for both configurations, existing and proposed.

Overall, the amenity spaces, will achieve sunlight availability in line with the BRE criteria. The results show that there is no reduction compared to the former values.

Assessment of the proposed development

The study of the external amenity areas includes a mix of private gardens and a shared community garden, which are part of the proposed development. 6 spaces have been tested for this analysis. The results of the sun-on-the-ground analysis indicate that 4 out of the 6 in total assessed amenity spaces complies with the requirements described in the BRE guidelines on 21 March. The remaining 2 amenity spaces fall below the target. It is important to note that all the amenity spaces are well sunlit over the summer (21st of June) when the spaces are more likely to be used. Sunlight provision in courtyards will also compensate for the loss of direct sun within the living rooms not facing south.

Overall, the proposed development will offer adequate levels of daylight and sunlight to future occupants, the living spaces and to the external amenity area throughout the year.

In terms of impact on the surrounding properties, the proposed development will not cause unacceptable harm to the surrounding residential amenity. The daylight and sunlight levels are appropriate to the urban context and the overall results are, therefore, considered acceptable against the relevant planning policies and guidance.

Balancing Daylight and Sunlight with Energy and Overheating

This daylight, sunlight and overshadowing report is one of the early reports produced since the new Part O of the Building Regulations came into force. Part O deals with overheating in buildings and sets a number of requirements for windows and ventilation. This is a fundamental change in the design of buildings in the UK and brings regulatory power to bear on the problem of overheating in buildings. While there has been an overheating test in GLA policy for some time, there has not been an equivalent in Building Regulations, until now. This means that designers have a higher priority to design for overheating than for daylight, as compliance with overheating is now a mandatory requirement, whereas compliance with daylight guidance is not. Inevitably where there is a choice to be made between meeting overheating criteria in a design and meeting daylight guidance, the

designer is forced to meet the overheating criteria. It is also important to note that the consequences of overheating are more serious for well-being of the residents than the consequences of lower levels of daylight.

The design and sizing of windows is a complex exercise where three sets of conflicting requirements must be balanced, the need to reduce CO2 emissions which suggests smaller, higher performing windows, the need to provide shade and ventilation to reduce risk of overheating, which suggests smaller but openable windows, and finally daylight which usually suggests larger, and less shaded windows.

The design team have tried to balance all of these criteria as well as possible, while still protecting the architecture of the project and ensuring an optimal number of windows that can be manufactured, supplied and cleaned. Inevitably there are some locations where either overheating is more likely, or some energy efficiency has been sacrificed, or where daylight targets are not met. The difference in measurement and analysis means that homes with very good daylight are more likely to be at risk of overheating, whereas those with lower daylight levels will not be at risk of overheating.

1.0 Introduction

HTA Sustainable Futures have been instructed to prepare a Daylight and Sunlight study to assess the impact of the proposed development at Amethyst Lane, in the Borough of Reading, on the existing surrounding properties and open spaces. Daylight and sunlight in main living areas, i.e. kitchens, living rooms and bedrooms, of the proposed development as well as sunlight provision in outdoor amenity spaces have been also assessed.

Daylight and sunlight calculations have been carried out in accordance with BRE's 'Site Layout Planning for Sunlight and Daylight: A Guide to Good Practice' (2022) by P J Littlefair, which is generally accepted as good practice by planning authorities.

The BRE Guide gives advice on site layout to achieve provision of daylight and sunlight both within buildings and in the open spaces between them. It aims to aid designers in considering the relationship between new and existing buildings to ensure that each retains the potential to achieve good daylight and sunlight levels.

Section 4 of this report briefly describes the BRE methodology and the design standards. Sections 6, 7 and 8 provide a summary of the outcome of the analysis.

BRE guidelines have been drafted primarily for use with low-density suburban developments and should be used flexibly when dealing with dense urban sites and extensions to existing buildings. The Guide states in the introduction:

"The guide is intended for building designers and their clients, consultants and planning officials. The advice given here is not mandatory and the guide should not be seen as an instrument of planning policy; its aim is to help rather than constrain the designer. Although it gives numerical guidelines, these should be interpreted flexibly since natural lighting is only one of many factors in site layout design. In special circumstances the developer or planning authority may wish to use different target values. For example, in a historic city centre, or in an area with modern high rise buildings, a higher degree of obstruction may be unavoidable if new developments are to match the height and proportions of existing buildings."

standards.

There are some specific performance requirements for buildings in new guidance and regulations that are at odds with each other and which need careful and timely analysis during design stages of residential buildings.

More specifically, BRE Daylight standards, recently revised in 2022 to align with other European standards, seeks to equalise the daylight within rooms and pushes windows to be larger.

Finally we have the introduction of Building Regulations Part O in 2022 which applies to all residential buildings across the UK and requires designers to demonstrate that the home will not overheat under the specific conditions laid out in the document. This has the effect of reducing window sizes but increasing the ventilation requirements, and it is affected by local acoustic conditions.

The balancing of these issues is complex and not obvious, and requires in-depth analysis at an early stage of design. Previously it was only within the GLA area that overheating calculations were required, now it's everywhere across the UK whether using a simplified method or software modelling.

These changes will require a change in behaviour of planning officers who typically priorities daylight issues much more than energy Issues. The link between design quality and daylight seems more obvious to clients and planners alike than the link between low energy buildings and design quality.

Recent contradictory changes in daylight guidance and overheating, is making designers work much harder, is pushing up fee levels for consultants and leading to increases in non compliance against some of these

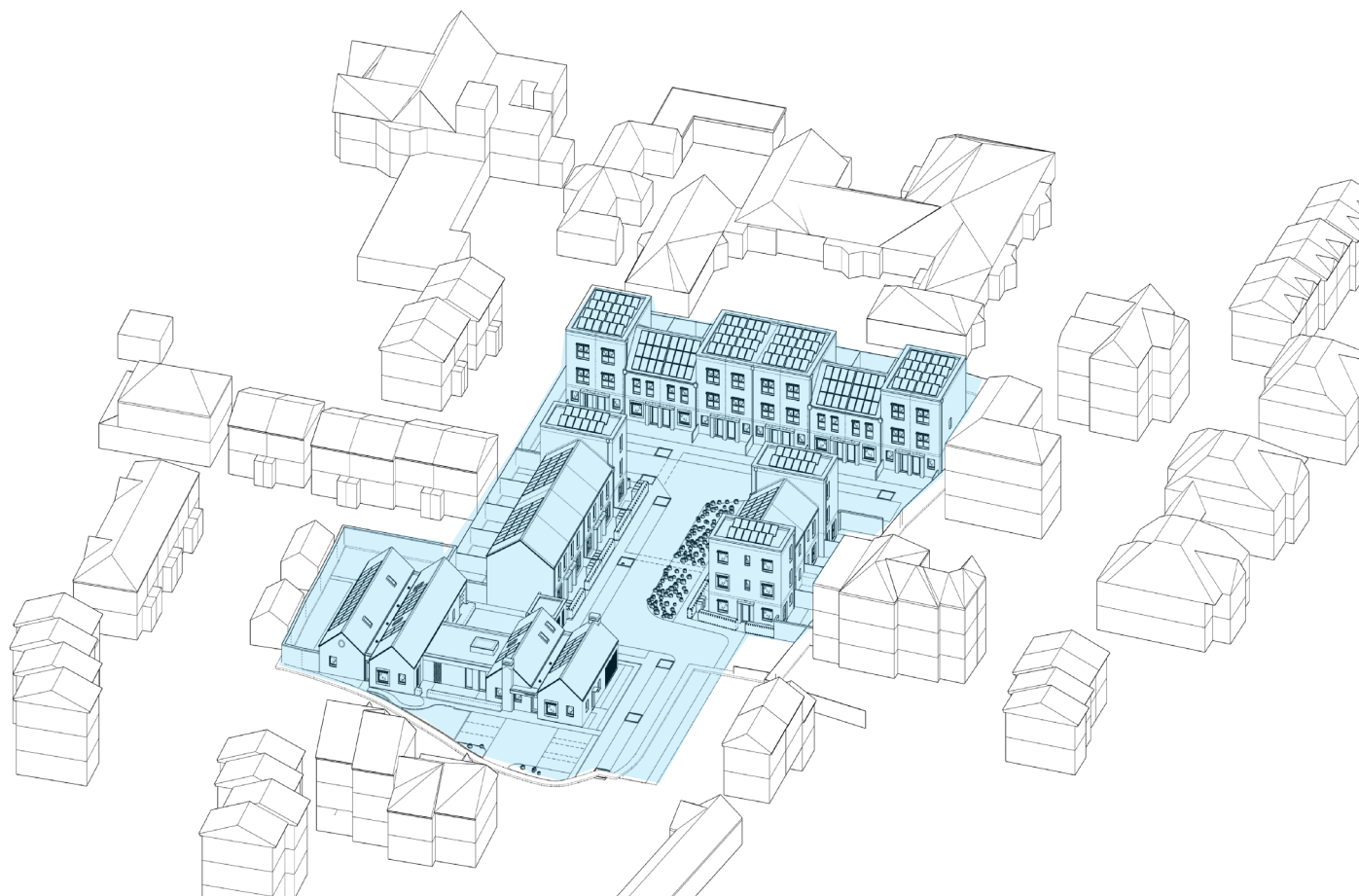


Figure 1 - 3D view

2.0 Site description

Site Overview

The Site is in the West of the Borough in the Southcote ward, southwest of Reading Town Centre. The site is located between Bath Road to the south and Tilehurst Road to the North. To the west is one of Reading's largest parks, Prospect Park. The area is predominantly residential, with a number of local primary schools and community centres throughout. There are shops and local facilities located on Bath Road.

Occupying a plot at the end of the cul-de-sac served by Amethyst Lane, the Site is currently not accessible. The previous Day Centre facility remains standing on the site, as a series of 1 storey courtyard style blocks, and a number of 1 storey outbuildings.

To the East of the site is a relatively recent residential housing development at Ashdene Gardens, consisting of a number of 2-3 storey houses, and 3 storey flatted point blocks, clad in brick, with a series of steeply sloping hipped roofs and 'mock-tudor' detailing. To the West is the primary access road to the site, Liebenrood Road, with Prospect Park just beyond. The site is located within a residential zone of Reading with houses and flatted development 2-3 storeys in height.

Location

The site currently contains a now vacated day centre providing services for older people and a family centre for children in care to meet with the birth parents in a safe environment. The services were relocated as part of previous review and the site has remained vacant for 3 years. Following initial internal site capacity studies the Council has requested a study for a full redevelopment of the site for both general needs housing, and a Respite centre.

The aim for the Amethyst site is to consider general needs housing alongside the provision of a 6 room respite Care Centre. Capacity on site will rely on balancing housing provision alongside associated car parking levels, amenity and landscape and biodiversity aspirations.

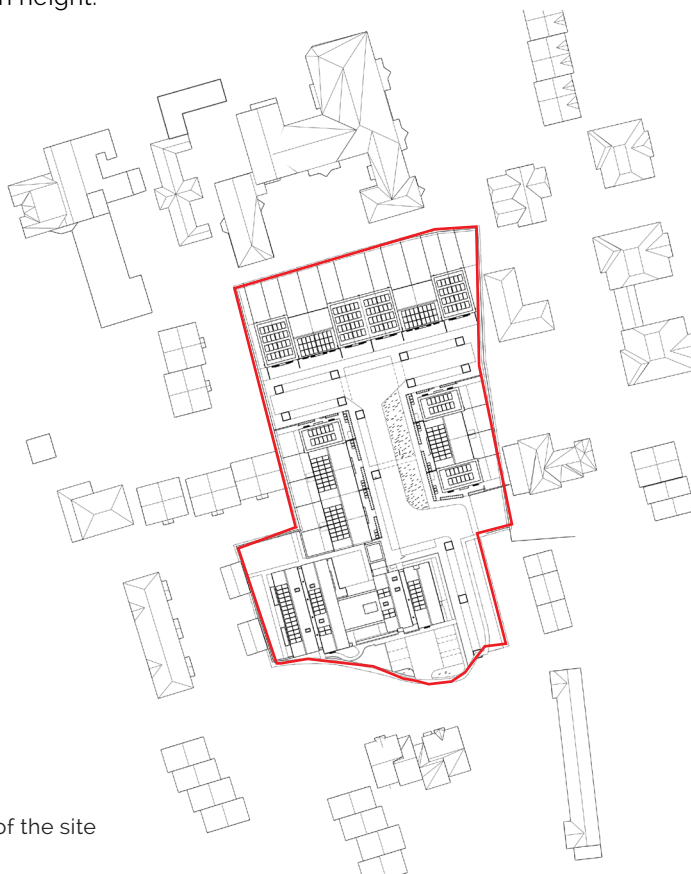


Figure 2 - Top view of the site



3.0 Planning policy

National Planning Policy Framework (2021)

The National Planning Policy Framework was revised in July 2021 and paragraph 125, part C states that:

[...] local planning authorities should refuse applications which they consider fail to make efficient use of land, taking into account the policies in this Framework. In this context, when considering applications for housing, authorities should take a flexible approach in applying policies or guidance relating to daylight and sunlight, where they would otherwise inhibit making efficient use of a site.

National Planning Practice Guidance

This was last revised on 22.07.2019. Paragraph 006 of Reference ID: 66-006-20190722 states that:

Where a planning application is submitted, local planning authorities will need to consider whether the proposed development would have an unreasonable impact on the daylight and sunlight levels enjoyed by neighbouring occupiers, as well as assessing whether daylight and sunlight within the development itself will provide satisfactory living conditions for future occupants. [...].

Local policy

Reading Borough Local Plan (2019)

Design and the Public Realm:

Safeguarding Amenity:

CC8: SAFEGUARDING AMENITY

Development will not cause a detrimental impact on the living environment of existing residential properties or unacceptable living conditions for new residential properties, in terms of:

- Privacy and overlooking;
- Access to sunlight and daylight;
- Visual dominance and overbearing effects of a development;
- Harm to outlook;
- Noise and disturbance;
- Artificial lighting;
- Vibration;
- Dust and fumes;
- Smell; [...].

- [...].
- Smell;
- Crime and safety; or
- Wind, where the proposals involve new development of more than 8 storeys.

The position of habitable rooms, windows and outdoor living spaces will be particularly important. A back-to-back distance of 20 metres between dwellings is usually appropriate, although the circumstances on individual sites may enable dwellings to be closer without a detrimental effect on privacy.

As well as immediate impacts, other aspects to which this policy applies will include matters such as hours of operation of businesses, and effects of traffic movements, particularly of heavy goods vehicles (HGVs). Proposals which would generate regular movements of HGVs on residential roads will not be acceptable.

Where an otherwise acceptable development could change its character to a use that would have a greater impact on amenity without needing planning permission, conditions will be applied to restrict such changes.

House Extensions and Ancillary Accommodation:

H9: HOUSE EXTENSIONS AND ANCILLARY ACCOMMODATION

An extension to a house or other householder development will be acceptable where it:

- Respects the character and appearance of the house in terms of scale, location, materials and design;
- Respects the character and pattern of neighbouring properties and appearance of the street as a whole in terms of scale, location, materials and design, the arrangement of doors, windows and other principal architectural features and any important existing building line;
- Does not present an overbearing impact on neighbours or a large blank façade to public areas; and
- Does not result in a loss of biodiversity within gardens. [...].

Reading, Development Plan Strategy (2026)

Chapter 1:

Local policy

Reading Borough Council Local Plan (2019)

The Reading Borough Council: "Declared a Climate Emergency in 2019, and set out its commitment to work towards achieving a carbon neutral Reading by 2030 [...] the Local Plan contains sustainability policies that put it at the cutting edge of authorities across the country [...] Reading is in the top 5% of local authorities in Britain for cutting carbon emissions and the Local Plan will play a major part in building upon that success."

Vision for Reading 2050

"In parallel to the drafting of the Local Plan to 2036, Reading UK, the economic development and marketing company for Reading, has launched a 2050 vision for the town as a smart and sustainable city by 2050 [...] By 2050 it envisages that Reading will be a smart and sustainable city that:

- Shares success to support and enable thriving communities;
- Delivers a real sense of place and identity;
- Thrives on cultural and cross-generational diversity;
- Is recognised for its heritage and natural assets;
- Embeds technology to deliver innovation and low carbon living for all; and
- Welcomes ethical and sustainable businesses who support Reading."

The following sustainability objectives are set alongside the objectives of other plans, such as the Climate Change Strategy 2013-2020 (Reading Means Business on Climate Change).

"Improve the quality of life for those living, working, studying in and visiting the Borough, creating inclusive, sustainable communities with good access to employment, open space and waterspace, transport, education, services and facilities (such as sustainable water supplies and wastewater treatment, healthcare services, social and community facilities, sport and recreation, etc.) to meet identified needs;"

Policy CC3 - Adaptation to climate change

"All developments will demonstrate how they have been designed to incorporate measures to adapt to climate change.

The following measures shall be incorporated into development:

- Wherever possible, new buildings shall be orientated to maximise the opportunities for both natural heating and ventilation and reducing exposure to wind and other elements;
- Proposals involving both new and existing buildings shall demonstrate how they have been designed to maximise resistance and resilience to climate change for example by including measures such as solar shading, thermal mass, heating and ventilation of the building and appropriately coloured materials in areas exposed to direct sunlight, green and brown roofs, green walls, etc;
- Use of trees and other planting, where appropriate as part of a landscape scheme, to provide shading of amenity areas, buildings and streets and to help to connect habitat, designed with native plants that are carefully selected, managed and adaptable to meet the predicted changed climatic conditions; and
- All development shall minimise the impact of surface water runoff from the development in the design of the drainage system, and where possible incorporate mitigation and resilience measures for any increases in river flooding levels as a result of climate change."

4.0 Methodology - Assessment criteria

The Daylight and Sunlight Assessment, presented in this report, has been carried out in compliance with the methodology outlined in the Building Research Establishment (BRE) Guide 'Site Layout Planning for Sunlight and Daylight: A Guide to Good Practice' by P J Littlefair (2022). The third BRE guide edition has introduced new methodology for the assessment of the proposed development. The strategy for the impact assessment remains unchanged.

4.1 Daylight - Impact on existing properties

The design of a new development should safeguard potential for daylight to nearby buildings. Otherwise, obstruction caused by new built sites may make surrounding properties look gloomy and unattractive.

BRE guidelines are intended for use for living areas in adjoining dwellings or main occupied spaces in non domestic buildings where daylight is required. The methodology to assess the impact on daylight access of the properties surrounding the development is as follows:

Angular check

This test should only be used where the proposed development is of a reasonably uniform profile and is directly opposite the existing building. A plane is drawn at 25 degrees from the horizontal at the centre of an existing window. If the new development intersects with this plane, i.e. the obstruction angle is greater than 25 degrees, daylight access of the assessed window may be reduced. A more detailed assessment should be then carried out to calculate the loss of daylight to the existing window.

Buildings that are not directly facing the new development may still experience a change to their lighting condition and therefore the 45 degrees approach method should be applied to assess the impact. A horizontal plane should be drawn from the highest point of the proposed development angled at 45 degrees downward. If existing windows fall within the area created by the existing building, proposed development and the angled plane, these should be also included in the assessment.

Vertical Sky Component method (VSC)

The Vertical Sky Component (VSC) quantifies the amount of available daylight, received at a particular window and measured on the outer pane of the window. This is the ratio, expressed as a percentage, of the direct illuminance falling on a reference point (usually the centre of the window) to the simultaneous horizontal illuminance under an unobstructed sky (overcast sky conditions). The maximum value of VSC for a completed unobstructed vertical window pane is 40%.

In order to maintain good levels of daylight the BRE guidance recommend that the VSC of a window should be 27% or greater. However, the 2022 BRE Handbook makes allowance for different target values in cases where a higher degree of obstruction may be unavoidable such as historic city centres or modern high rise buildings. The guide states that the 27% value is:

“..purely advisory and different targets may be used on the special requirements of the proposed development or its location”.

If the VSC is less than 27% then further assessment should be carried out to compare existing and proposed daylight levels received by an existing window.

Comparison method

The comparison test considers the VSC results of the baseline/existing condition and the VSC results assuming that the new development is in place. The 2022 BRE Handbook states that where the proposed VSC is less than 27%, the comparison with the existing situation should be analysed and if the VSC is less than 0.8 times its former value, occupants of the existing building may notice a reduction in the amount of daylight.

4.2 Daylight - New Development

The quality and quantity of daylighting in an interior space depends on two main factors: external environment and internal layout. External environment, e.g. Obstruction from neighbouring buildings or topographical features has an impact on daylight provision whereas internal layout and windows' size affects daylight distribution within a living area.

Section 2.1 of the new BRE guide provide several methods for calculating daylight levels within new developments.

According to the new BRE guide and BS EN 17037, only main living areas within a dwelling, i.e. Kitchens, living/dining rooms and bedrooms, should be assessed against the criteria provided, as these are occupied for a long period throughout the day and daylighting is essential for carrying out tasks. Therefore, secondary spaces, e.g. Circulation areas, bathrooms and storerooms, are excluded from this study.

Vertical Sky Component

According to BRE Guide, if VSC as measured at the centre of a window is at least 27% then the living space is expected to receive good daylight levels.

The VSC, however, is a general measure of potential for daylight in a space that does not take into consideration the function of the space being assessed and should be carried out at early design when rooms' layout is not yet determined and the optimum position of windows is being assessed. Therefore, VSC calculation has been omitted from this study for the proposed development.

Illuminance method

For daylight provision in buildings, BS EN 17037 provides two methodologies. One is based on target illuminances (SDA-Spatial Daylight Autonomy) from daylight to be achieved over specified fractions of the reference plane for at least half of the daylight hours in a typical year. The other, alternative, method is based on calculating the daylight factors achieved over specified fractions of the reference plane. The alternative DF method has been omitted from this study.

The UK National Annex gives illuminance recommendations of 100 lux in bedrooms, 150 lux in living rooms and 200 lux in kitchens. These are the median illuminances, to be exceeded over at least 50% of the assessment points in the room for at least half of the daylight hours.

Position of the No-Sky Line

A measure to assess the distribution of daylight in a space is the percentage of area that lays beyond the no-sky line i.e. The area that receives no direct skylight. This is important as it indicates how good the distribution of daylight is in a room. If more than 20% of the working plane lies beyond

the no-sky line poor daylight levels are expected within the space.

The following table summarises the assessment criteria as described in the BRE Guide that should be applied to new developments in order to ensure good daylight levels within the main living areas of residential units.

For the purposes of this study, the illuminance (SDA) and No-Sky view have been calculated.

Table 01 - Daylight criteria for the assessment of the daylight levels of new buildings

Measure of Interior Daylight	Benchmark	Daylight Criterion
Illuminance (SDA)	50% 200 LUX	Minimum value of SDA for Kitchens
	50% 150 LUX	Minimum value of SDA for Living rooms
	50% 100 LUX	Minimum value of SDA for Bedrooms
No-Sky View	80%	There will be a good distribution of light in the room if at least 80% of the working plane receives direct skylight.

4.3 Sunlight - Impact existing properties

The impact of the new development on the sunlight levels received by the neighbouring residential buildings has been carried out in accordance with the BRE Guide.

The methodology is based on guidelines set out in the 2022 BRE Handbook. Only windows facing 90° of due south have been considered in the analysis. The methodology to assess the impact on the sunlight access of the properties surrounding the new development is as follows:

Angular check

This test should only be used where the proposed development is of a reasonably uniform profile and is directly opposite the existing building. A plane is drawn at 25 degrees from the horizontal at the centre of an existing window. If the new development intersects with this plane, i.e. the obstruction angle is greater than 25°, daylight access of the assessed window may be reduced. A more detailed assessment should be then carried out to calculate the loss of daylight to the existing window.

Annual Probable Sunlight Hours

BRE have produced sunlight templates for London, Manchester and Edinburgh indicating the Annual Probable Sunlight Hours (APSH) for these regions. The London template has been selected for this study which has an APSH of 1,486 hours and a Winter Probable Sunlight Hours of 446 hours. The same VSC reference points are used for the calculation of the APSH and WPSH. It should be considered that sunlight is deemed less important in kitchens and bedrooms.

The 2022 BRE Handbook states:

"In houses, the main requirement for sunlight is in living rooms, where it is valued at any time of day, but especially in the afternoon".

The 2022 BRE Handbook also states:

"...a south facing window will, in general, receive most sunlight, while a north facing one will receive it only on a handful of occasions. East and west facing windows will receive sunlight only at certain times of day".

According to the BRE guide, for a space to be reasonably sunlit:

- At least one main window wall should face within 90° of due south and,
- The centre of at least one window to a main living room should receive 25% of annual probable sunlight hours, including at least 5% of annual probable sunlight hours in the winter months between 21 September and 21 March. If a room has multiple windows on the same wall or on adjacent walls, the highest value of APSH should be taken. If a room has two windows on opposite walls, the APSH due to each can be added together.

If the available sunlight hours are below the above thresholds then an additional assessment should be carried out.

Comparison method

The comparison test considers the APSH and WPSH results of the baseline condition and the APSH and WPSH results of the Development in place. The BRE guidance say that if the reduction in sunlight between the baseline condition and the future one results in an APSH and WPSH of at least 0.8 times its former value, then it is considered that the sunlight received is adequate.

4.4 Sunlight - New development

Sunlight Exposure

Sunlight is valued as it provides dwellings with light and warmth and it also allows for passive heating through solar gains that reduces heating energy consumption. Optimum arrangement of the site to produce the best orientation (within 90° of due south) and reduce overshadowing should be considered in order to take advantage of solar energy during winter time.

According to BRE Guide (2022), the main requirement for sunlight in housing is in living rooms, whereas in bedrooms and kitchens sunlight is viewed as less important.

For interiors, access to sunlight can be quantified. BS EN 17037[1] recommends that a space should receive a minimum of 1.5 hours of direct sunlight on a selected date between 1 February and 21 March with cloudless conditions. It is suggested that 21 March (equinox) be used.

For dwellings, at least one habitable room, preferably a main living room, should meet at least the minimum criterion.

According to the BRE Guide, in high-density developments it becomes difficult to avoid some dwellings being seriously obstructed or having a poor orientation. Where prolonged access to sunlight is available, measures to avoid overheating and unwanted glare from the sun are necessary.

4.5 Overshadowing - Gardens and open spaces

Existing spaces

The methodology is based on guidelines set out in the 2022 BRE Handbook that states the following:

"The availability of sunlight should be checked for all open spaces where it will be required. This would normally include: private gardens (usually the main back garden of a house), parks and playing fields, children's playgrounds..."

BRE Guide recommends that for a garden or amenity to appear adequately sunlit throughout the year, at least half of it should receive at least two hours of sunlight on 21 March (Spring Equinox).

The Guide suggests that where large buildings are proposed which may affect a number of amenity spaces it is useful to plot a shadow plan to show the location of shadows at different times of the day on 21st March.

The methodology to assess the sunlight impact of the amenity spaces is as follows: sunlight provision is considered adequate if at least 50% of the amenity space receives two hours of sunlight on 21 March. If otherwise, then a comparison between the existing and proposed conditions is required to test whether the amenity space receives at least 80% of sunlight of its former value. If this is the case the BRE guidance states that the loss of sunlight is negligible.

Proposed development

A good site layout planning should be able to provide not only interiors but also spaces between buildings with adequate levels of daylight and sunlight. This will have an important impact on the overall appearance and ambience of a development by providing attractive sunlit views, making outdoor activities more pleasant, encouraging plant growth etc.

BRE Guide recommends that for a garden or amenity to appear adequately sunlit throughout the year, at least half of it should receive at least two hours of sunlight on 21 March.

5.0 Site model

The Daylight/Sunlight analysis was carried out by creating a three-dimensional model of the proposed development and its surroundings (Figure 3).

A detailed model of the proposed living spaces was also created. All of the residential rooms have been analysed and assessed against the BRE standard. For each unit only kitchens, dining rooms, living rooms and bedrooms were assessed in terms of daylight and sunlight provision.

Floor layouts of the proposed development, shown in Appendix B, highlight those units included in the daylight and sunlight study described in the following sections.

The model was also used to assess the impact on the surrounding buildings in terms of daylight, sunlight and overshadowing.

The calculations were based on the following assumptions:

- Daylight provision in new rooms has been checked using the method in BS EN 17037 Daylight in Buildings[1]: direct prediction of illuminance levels using hourly climate data
- The working plane was set at 0.85m above the floor as per BRE guidance for dwelling
- Clean, clear double glazing with a low emissivity coating was assumed with diffuse visible transmittance of 0.63.

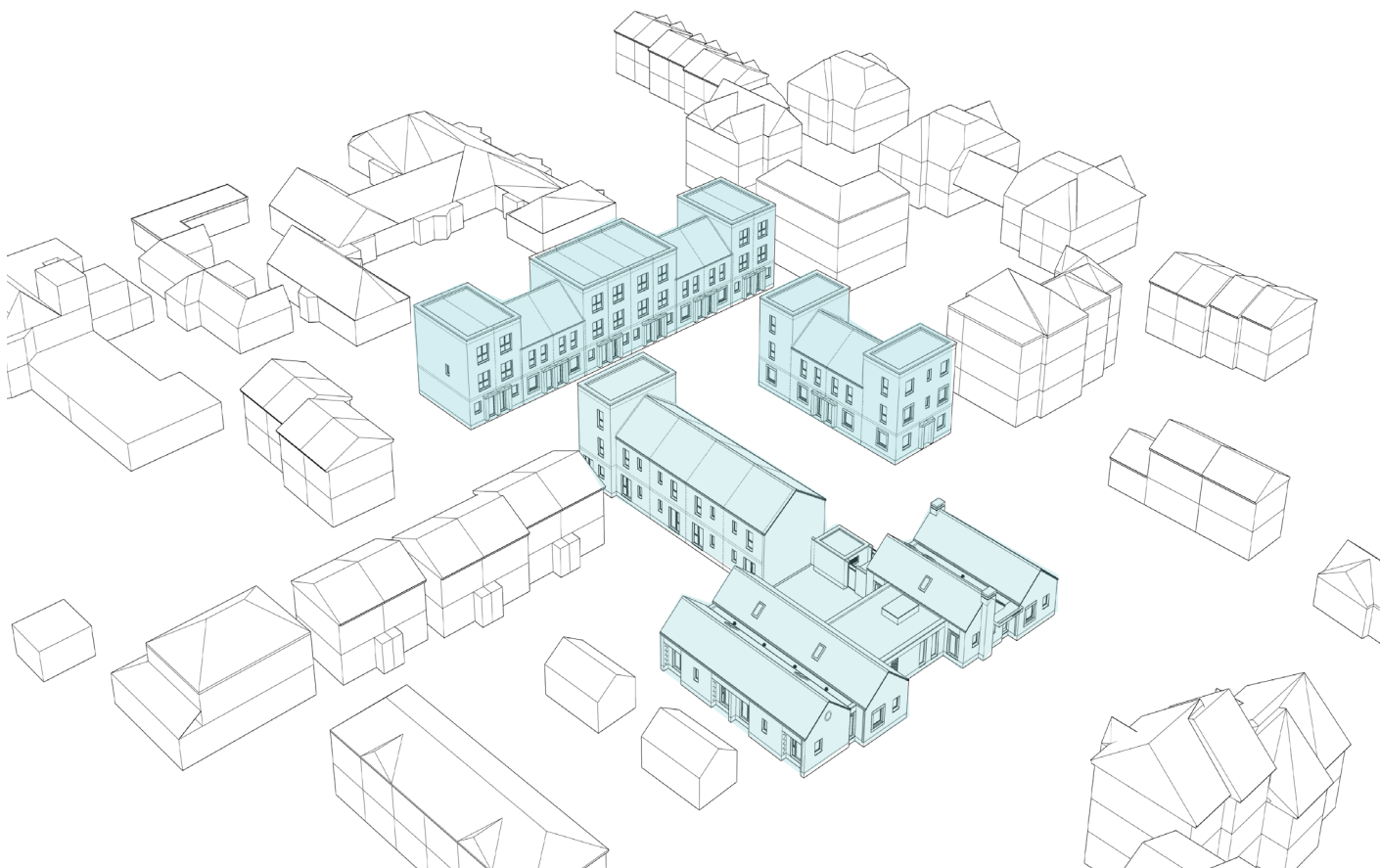


Figure 3 - 3D model of the proposed development and its surroundings

6.0 Daylight assessment

6.1 Impact on existing properties

A daylight analysis has been carried out to assess the impact of the new development on the surrounding existing properties in terms of availability of daylight. Figure 3 shows the location of the existing buildings but also of the emerging building schemes, that surround the proposed development and whose daylight availability may be affected by the new blocks.

Vertical Sky Component (VSC)

The design of a new development should safeguard potential for daylight to nearby buildings. Otherwise, obstruction caused by new built sites may negatively affect neighbouring sites. The Vertical Sky Component (VSC) quantifies the amount of available daylight, received at a particular window and measured on the outer pane of the window. The maximum VSC value for a completely unobstructed vertical window pane is 40%. In order

to maintain good levels of daylight the BRE guidance recommends that the VSC of a window should be 27%. An alternative target can be set in accordance with the urban setting of the site. For example the typical values achieved in an urban context is usually 18% and this can be used as alternative target in configurations where the typical obstruction angle fromw the ground floor window level is 40°.

As the BRE guide notes, the targets recommended in the guide are purely advisory and different targets may be used based on the special requirements of the proposed development or its location. Mayoral Decisions have confirmed that alternative targets can be set to suit the urban context of the development. Examples include the Whitechapel Estate and Monmouth House where the Mayor referred to VSC levels in excess of 20% being reasonably good and VSC levels in mid-teens regarded as acceptable.

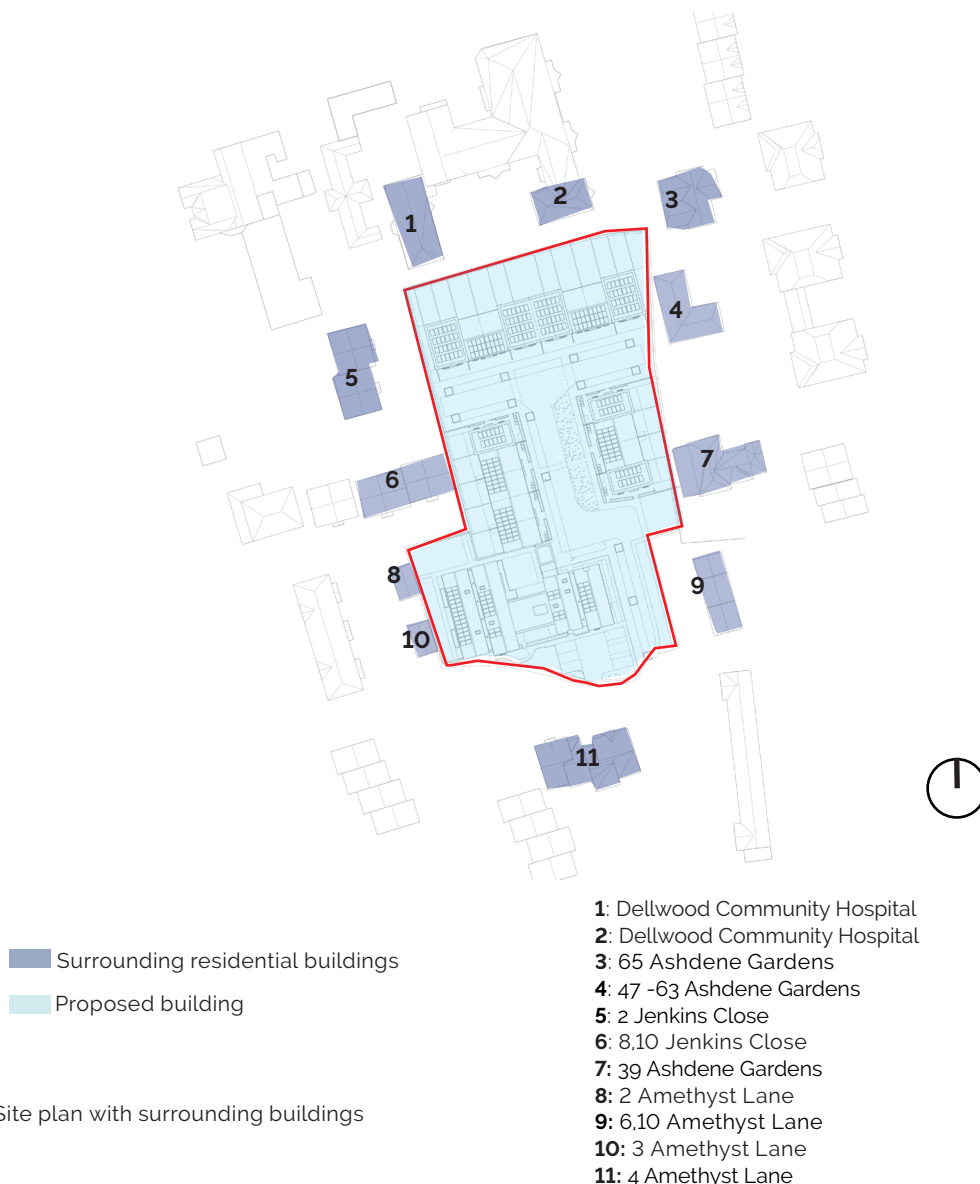
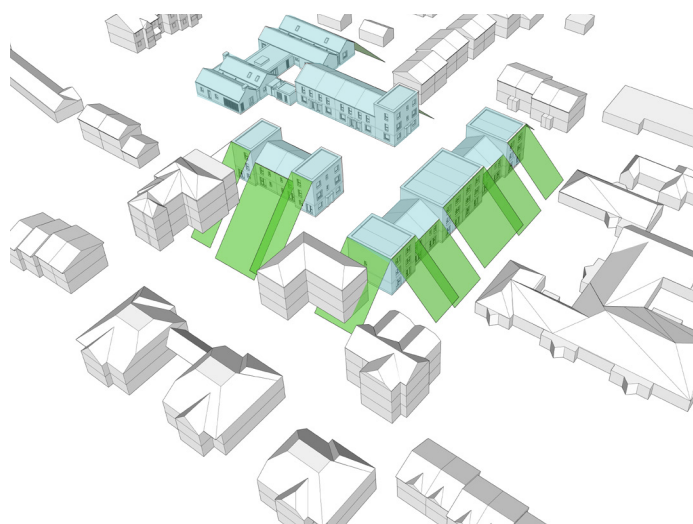
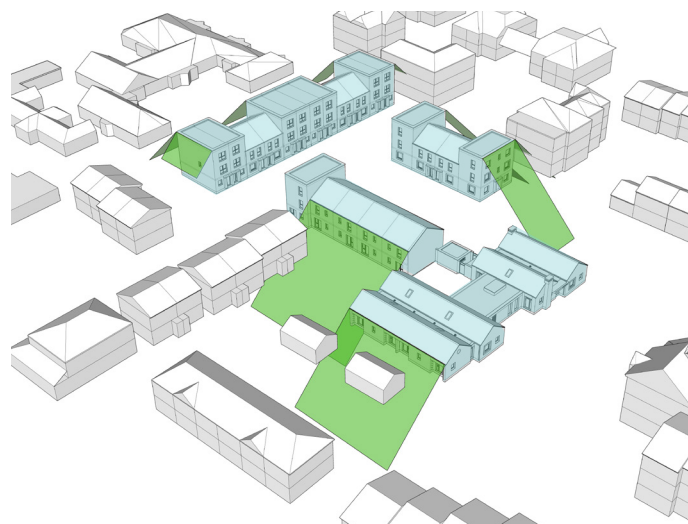


Figure 4 - Site plan with surrounding buildings



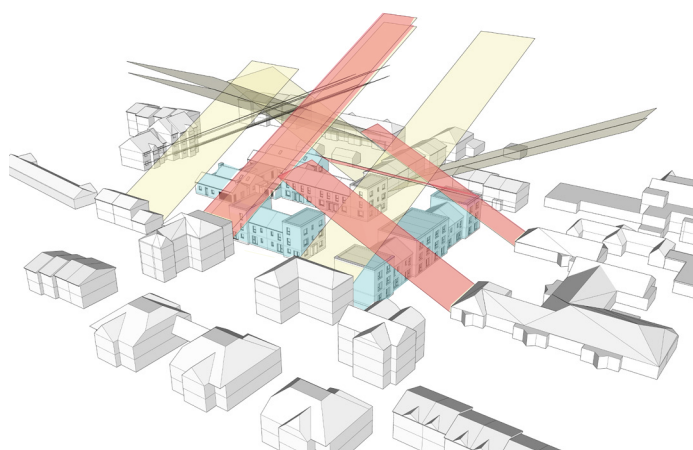
45 degree line check

Figure 5 - Angular check of the surrounding buildings



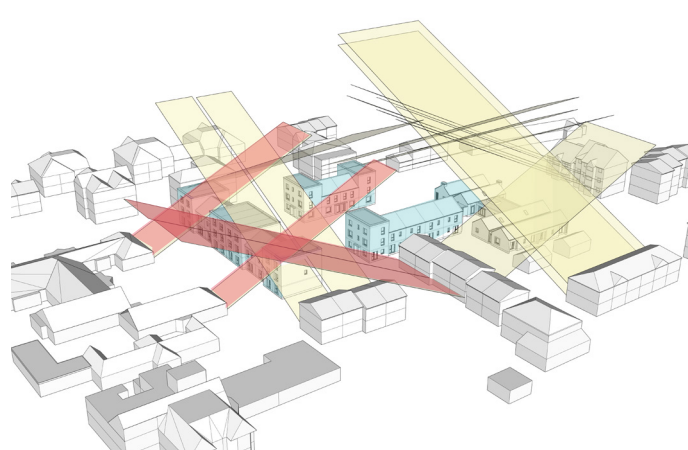
45 degree line check

Figure 6 - Angular check of the surrounding buildings



25 degree line check: no intersections
(no further analysis is required)

25 degree line check: intersections
(VSC analysis is required)



25 degree line check: no intersections
(no further analysis is required)

25 degree line check: intersections
(VSC analysis is required)

Figure 7 - Angular check of the surrounding buildings

The properties analysed in this study are the residential buildings which are located around the site and which might be affected by the Proposed Development.

The following windows which belong to residential buildings directly facing the proposed development pass the 25-degree line test and therefore they are unlikely to be affected by the proposed development.

These windows belong to:

- 65 Ashdene Gardens
- 8,10 Jenkins Close
- 39 Ashdene Gardens
- 2 Amethyst Lane
- 6,10 Amethyst Lane
- 3 Amethyst Lane
- 4 Amethyst Lane

Several initial studies were conducted to assess the likely impact of the proposed massing to the existing properties with the intention of guiding the design team and provide advice on opportunities for reducing the impact while maximising daylight and sunlight availability within the proposed scheme. Therefore the design was adapted to reduce the impact on the properties.

The conservative targets described in the BRE guide which are typical for low rise configurations are applied for this assessment. Furthermore, the BRE guidance also focuses on 'relative change' which is likely to be exaggerated given the low-rise nature of the existing structures on site. Where there is more than a 20% reduction in VSC, this does not mean that the level of daylight will be unacceptable but, rather, that there may be a noticeable change in daylight levels for the occupants.

The following properties are considered relevant for this development and have been analysed in detail.

- Dellwood Community Hospital

- 47 -63 Ashdene Gardens
- 2 Jenkins Close

The BRE guide explains that any reduction of more than 20% of the former value would be perceived by the human eye and careful considerations are required in assessing the degree of impact caused by the new obstructing element. Daylight and sunlight is usually more limited in urban contexts given the proximity to the adjacent buildings and the higher levels of obstructions. Therefore, a flexible approach is required in assessing the impact to the existing surrounding buildings.

Dellwood Community Hospital

Dellwood Community Hospital is located to the north of the site. A detailed assessment was conducted by assessing the VSC at the centre of each windows that are facing the proposed development. The results show that all 3 assessed windows achieved a VSC higher than 27%.

Overall, the impact from the proposed development on this building is considered acceptable for the scheme.

47 -63 Ashdene Gardens

This is a residential building located in northeast of the proposed development. The results show that out of 9 analysed windows, 2 windows achieve a VSC value of at least 27%. From the remaining 7 windows, 2 achieve VSC values greater than 20% which is considerable to be good amount of daylight for an urban environment and the remaining 5 are falling below the BRE criteria for daylight. These windows are facing in a close proximity the proposed development.

At this point it is important to note that these windows were receiving an excessive amount of daylight in their existing situation so the reduction to the VSC levels does not mean that the level of daylight will be unacceptable but, rather, that there may be a noticeable change in daylight levels to the occupants.

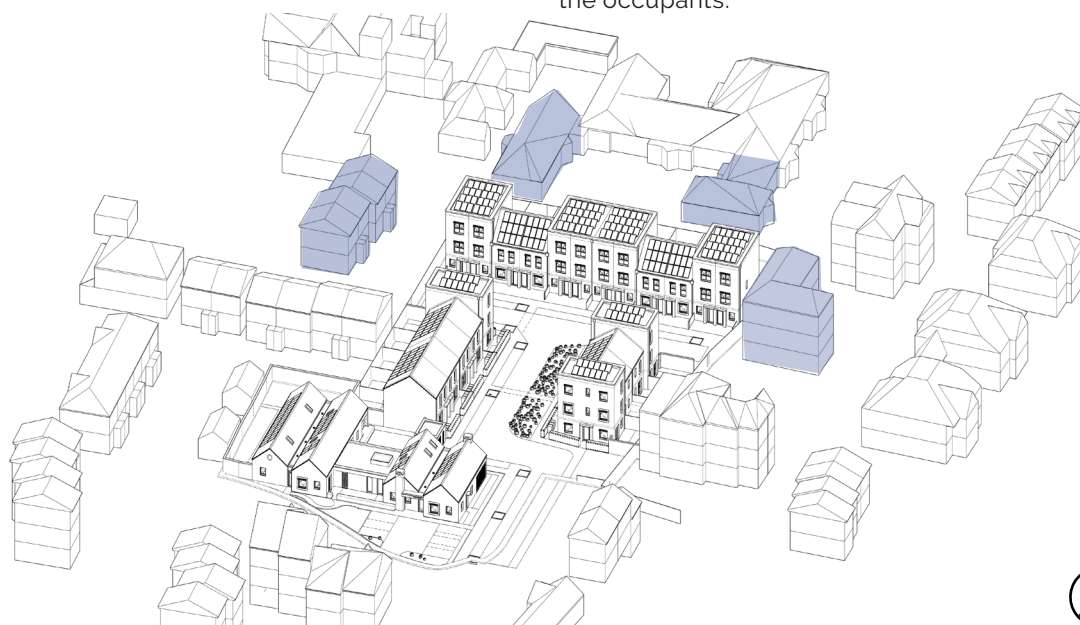


Figure 8 - 3D view of the model used for the analysis and its surrounding buildings

Therefore, given the location of the proposed development, with the height of the immediate neighbouring buildings to the east and west being no more than two storeys in height, and the currently low-rise nature of the existing site, it is important to take into account that, although the 27% VSC target is the standard criterion available, it is not fully applicable to the development and that a lower VSC target is acceptable.

2 Jenkins Close

This is a residential development which is located to the northwest of the site. A detailed assessment was conducted by assessing the VSC at the center of each window that are facing the proposed development. The results show that out of 12 assessed windows, 11 achieved a VSC higher than 27% or that the reduction is no more than 20% of their former value. The remaining window is marginally below the daylight BRE criteria with VSC levels greater than 20%, which is considered a good daylight level in an urban city environment.

Overall, the results are considered to be acceptable given the low-rise nature of the existing building in the site.

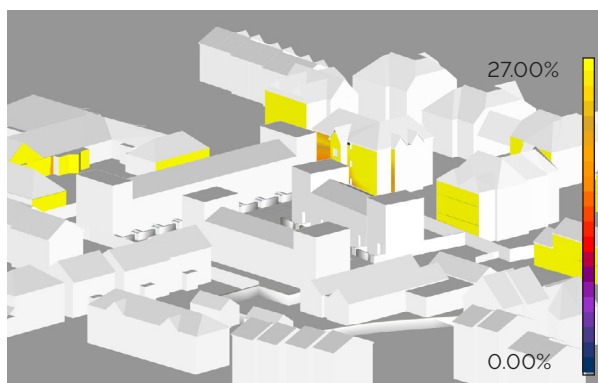


Figure 9 - Vertical Sky Component analysis - Proposed Configuration

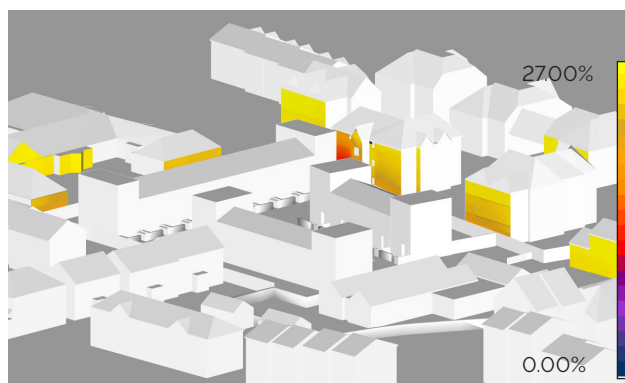


Figure 10 - Vertical Sky Component analysis - Ratio Configuration



Figure 11 - Vertical Sky Component analysis - Proposed Configuration



Figure 12 - Vertical Sky Component analysis - Ratio Configuration

Table 1. Daylight Assessment: Impact on the surrounding buildings - VSC

Property	Number of Window Tested	Windows that meet BRE Guidelines		VSC Windows No. of Rooms Experiencing Adverse Impacts		
		No.	%	20-29.99% loss (minor adverse losses)	30-39.99% loss (moderate adverse losses)	>40% loss (substantial losses)
Dellwood Community Hospital	3	3	100%	0	0	0
47 -63 Ashdene Gardens	9	2	22%	1	0	6
2 Jenkins Close	12	11	92%	1	0	
Total	24	16	67%	2	0	6

6.2 Assessment of the proposed development

The daylight analysis was carried out on the proposed design to ensure good daylight levels according to the BRE guidelines.

Tables 2 and 3 present a summary of the daylight analysis results, in terms of daylight provision (Illuminance levels and View of the Sky). A total number of 50 rooms were tested against the new BRE criteria.

* Spatial Daylight Autonomy (SDA)= Illuminance values

Assessment of the proposed design

The three-dimensional representation of the proposed buildings was placed in the context of its surrounding buildings. The existing properties have been modeled from the research of drawings in the planning portal of Reading, the OS map, and site photographs. The simulation assumptions are based on improved values from reflectance, transmittance and maintenance factors as specified in BS EN 1703. The tables below summarise the factors used in the analysis:

Reflectance values:

Surrounding	0.2
Internal walls	0.6
Internal ceiling	0.8
Internal floor	0.4

Transmittance values

Double glazing (Low-E)	0.63
------------------------	------

Maintenance factors

Double Low-E (Frames modelled)	
TV (normal)	0.75
A.3	8
A.4	1
A.5	1
A.6	0.8
TV (Total)	0.55

The results of the illuminance (SDA) analysis (tables 2 and 3) show that 40 rooms, equal to 80% of the total number of assessed spaces, meet the target described in both the BS EN 17037 and the UK National Annex. Detailed results of the analysis can be found in Appendix B1.

There are 10 rooms achieving SDA values below the recommended target. These are, 4 bedrooms 2 kitchen-living-dining rooms, 3 kitchens and one office space do not meet the illuminance criteria. Out of 10 rooms not meeting

the criteria, one LKD and 2 bedrooms marginally fall below the criteria with 5-10% below the passing target (50%). Of the remaining 7, 3 are kitchen located on the ground floor of the dwellings to the north and to the ground floor of the Respite Care Facility. The windows to the kitchen spaces are located in corners of the buildings and therefore are overshadowed by the geometry of the structure.

From the remaining 4 rooms, 2 are bedrooms located on the 1st floor of the central block to east and west, one is an LKD located to the ground floor of the central block to west, and the remaining one is an office space located to the Ground Floor of the Respite Facility.

The standards provided by the BRE are aimed at maximising daylight and sunlight provision in all parts of rooms so that irrespective of furniture layouts, the rooms function well for daylight. This is an ideal position, but not one that can always be delivered, and runs counter to other factors influencing apartment design.

Many units have deep rooms rather than wide rooms as it is dictated by the site layout and the shape of the building, and these deep rooms are naturally the most difficult rooms to achieve the required SDA levels. However, rooms with lower SDA scores are not necessarily badly daylighted rooms, as the aim of SDA is to equalise daylight over at least 50% of the room. If the tasks and activities that the room is used for can be carried out in the part of the room that has good daylight, then the room is sufficiently daylighted as mentioned above.

Also, the requirement for kitchens and open spaces is higher than the requirement for bedrooms or for separate living rooms. It is, therefore, harder to achieve the minimum target of these rooms in blocks of flats located in urban environments. The numerical results indicate that kitchen-living-dining rooms which include a living rooms and a kitchen often achieve an illuminance value of at least 150 Lux. This is the value recommended for living rooms.

The 'No-Sky Line' divides points on the working plane which can and cannot see the sky. In housing the working plane is assumed to be horizontal and 0.85m high. The results of the No-Sky Line assessment show that 49 (98%) rooms achieve values in line with the BRE recommendations. Windows that are sited close to the corners or below the balconies are usually more obstructed and achieve lower levels of both daylight and sky view.

Therefore, it is anticipated that all habitable spaces within the proposed scheme will receive good levels of daylight.

Overall Summary

The introduction of the Spatial Daylight Autonomy (SDA) standard during the advanced design phase of the project meant that the team has coped with the implementation of a new standard in a design that was already well advanced. The design has been validated against multiple

design and sustainability criteria and will be an exemplary high-quality place for people to live in. SDA has principally been developed to ensure that students in classrooms or workers in an office, are not in locations with little or no daylight, and efforts are made to equalise daylight across the working space. This is less of an issue for residential design where there is no expectation or need to have equal daylight levels throughout an apartment, in fact, it could easily be argued that variety in levels of daylight in an apartment is useful, so that some tasks (like computer use for virtual meetings) can be carried out without reflections on the computer screen.

The daylight and sunlight assessment indicate that there is a reduction in the amount of daylight available to homes in a denser urban environment which is expected and brings the estate closer to the design quality of traditional urban places, where greater extremes in daylight availability, particularly at street level, is a normal feature of urban life. The density requirements of the development, a replacement of the vacant site, means that more housing is being provided, at a higher density and greater building height, to alleviate the shortage of affordable homes.

The aim for the Amethyst site is to consider general needs housing alongside the provision of a 6 room respite Care Centre. Capacity on site will rely on balancing housing provision alongside associated car parking levels, amenity and landscape and biodiversity aspirations.

All homes enjoy private external amenities in addition to communal residents external amenity. External shades are proposed to south-facing windows across the scheme to help minimise overheating which helps to avoid overheating.

Designing larger windows risks increasing solar gains and increased overheating which the new BRE Guidelines cautions against. However the design team has increased the opportunity to provide a good level of daylight quality by increasing the window sizes as much as practicable, while confronting the challenges of balancing the overheating risks and energy performance.

Overall, the majority of rooms achieve and exceed the recommendations and the results meet the average performance for the scheme.

The scheme has sought to achieve a balance between these competing factors as well as other planning and design considerations in order to deliver housing which is of a high quality, sustainable and enjoyable but also more modern and flexible workspaces, generous Living Room areas and social spaces such as dining spaces and the lounge. The daylight conditions are, therefore, deemed good for the scheme of this size and nature.

Table 02 - Summary results of the daylight assessment - Proposed design

Analysed rooms	Illuminance Factor		No-sky line	
	Rooms meeting the criteria (no.)	Rooms meeting the criteria (%)	Rooms meeting the criteria (no.)	Rooms meeting the criteria (%)
50	40	80%	49	98%

Table 03 - Summary results of the daylight assessment - Proposed design

	Illuminance Factor		
		Rooms meeting the criteria (no.)	Rooms meeting the criteria (%)
Analysed bedrooms	29	25	86%
Analysed Kitchen-living-dining rooms	5	3	60%
Analysed Kitchens	5	2	40%
Analysed Living rooms	5	5	100%
Analysed Offices	4	3	75%
Analysed Studio	1	1	100%
Analysed Dining Room	1	1	100%

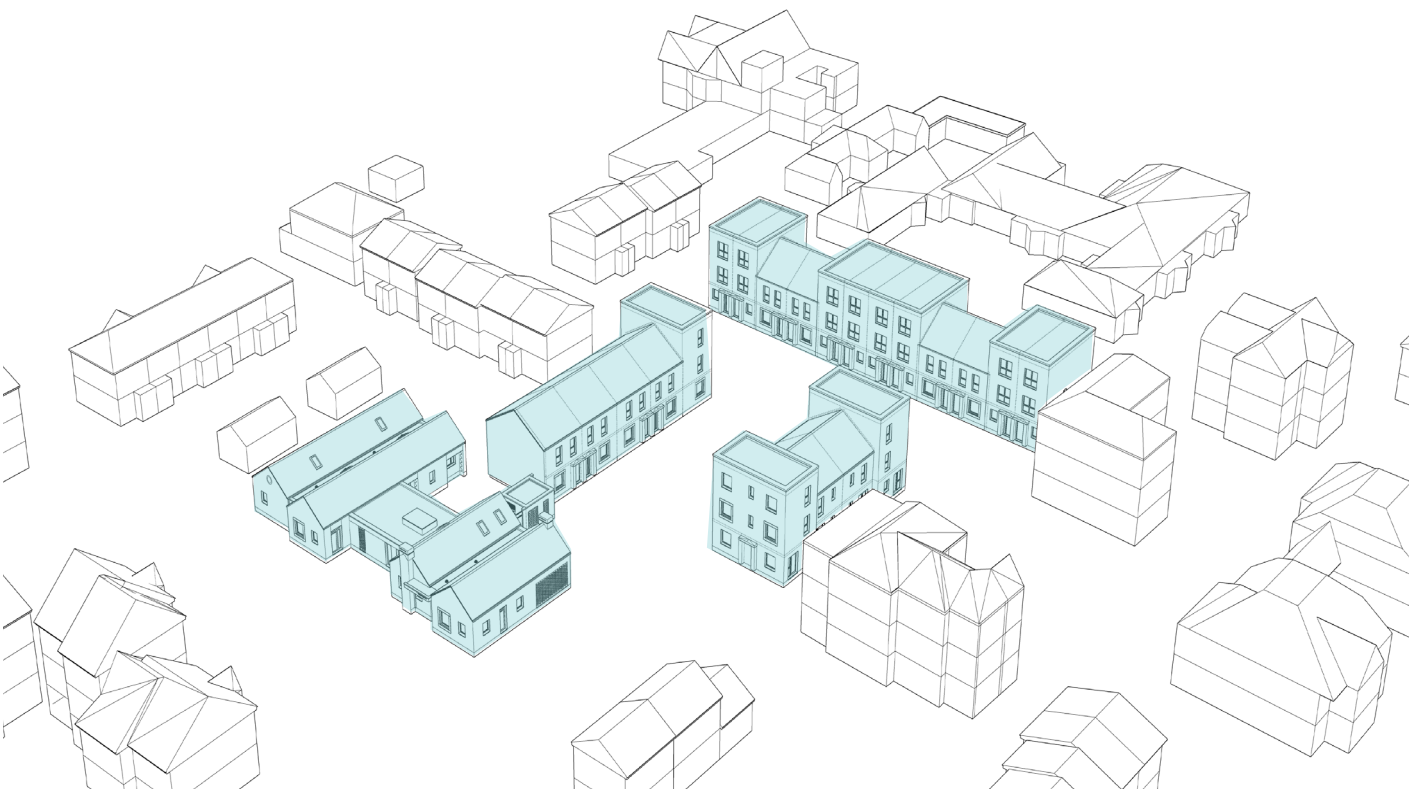


Figure 13 - 3D model of the proposed development and its surroundings

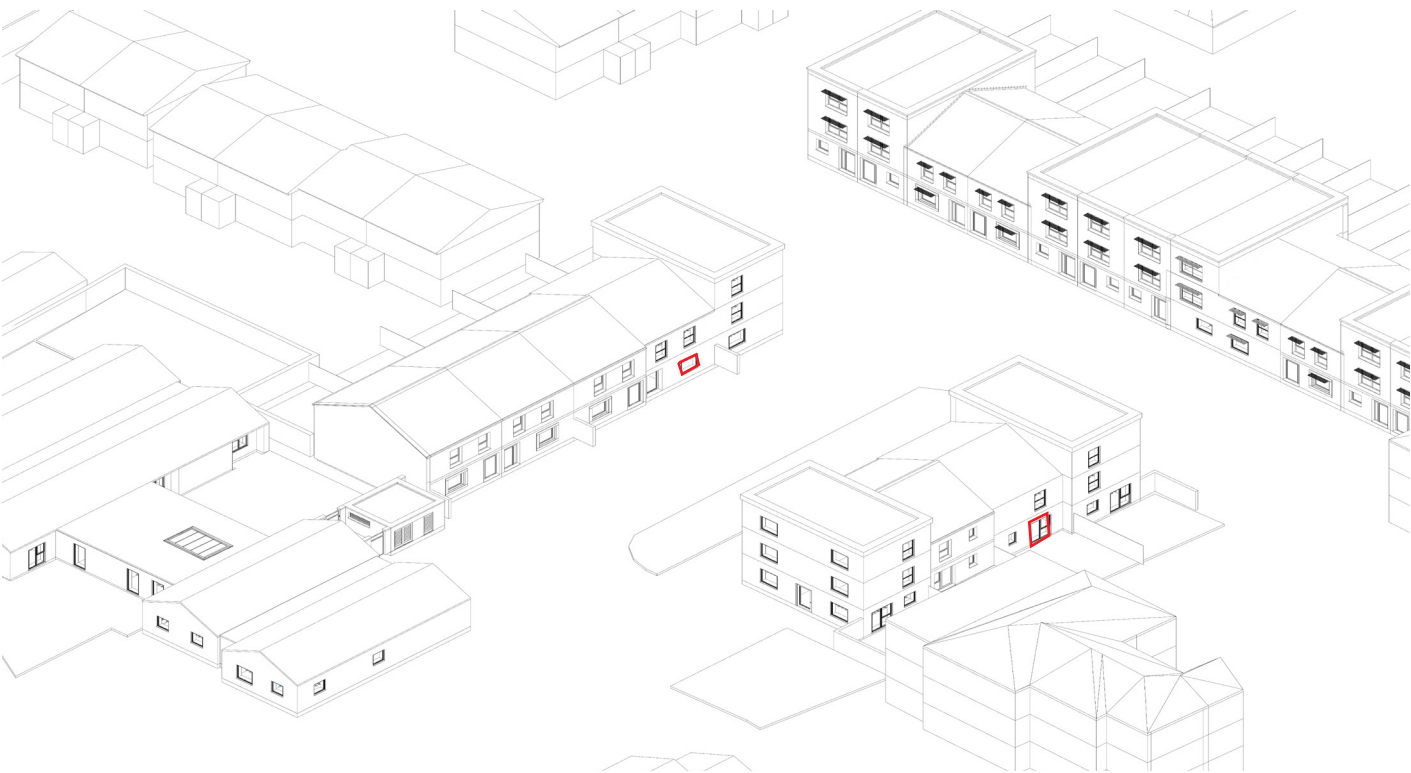


Figure 14 - 3D view - Window design



Figure 15 - Level 0, LKDs in Block B and C - Representative unit - Illuminance (SDA) results

Legend: SDA % of hours with required lux levels

Key

● Rooms not meeting the SDA (Illuminance criteria)

*for the purposes of the daylight assessment

7.0 Sunlight Assessment

7.1 Impact on existing properties

Sunlight is an important issue to consider for the quality of an internal space. The orientation of windows and the position of a building on a site will have an impact on the amount of sunlight it receives but will also have an effect on the sunlight which neighbouring buildings receive. Unlike daylight, which is non-directional and assumes that light from the sky is uniform, the availability of sunlight is dependent on the orientation of the window or area of ground being assessed relative to the position of the sun.

In accordance with the BRE guide, only windows facing within 90 degrees of due south need to be assessed.

Dellwood Community Hospital, 47 -63 Ashdene Gardens were analysed in more detail.

A total of 12 windows from buildings surrounding the site were assessed for sunlight access. The analysis indicated that 17% of windows satisfied the BRE criteria for annual probable sunlight hours (APSH) and 50% of windows for winter probable sunlight hours (WPSH).

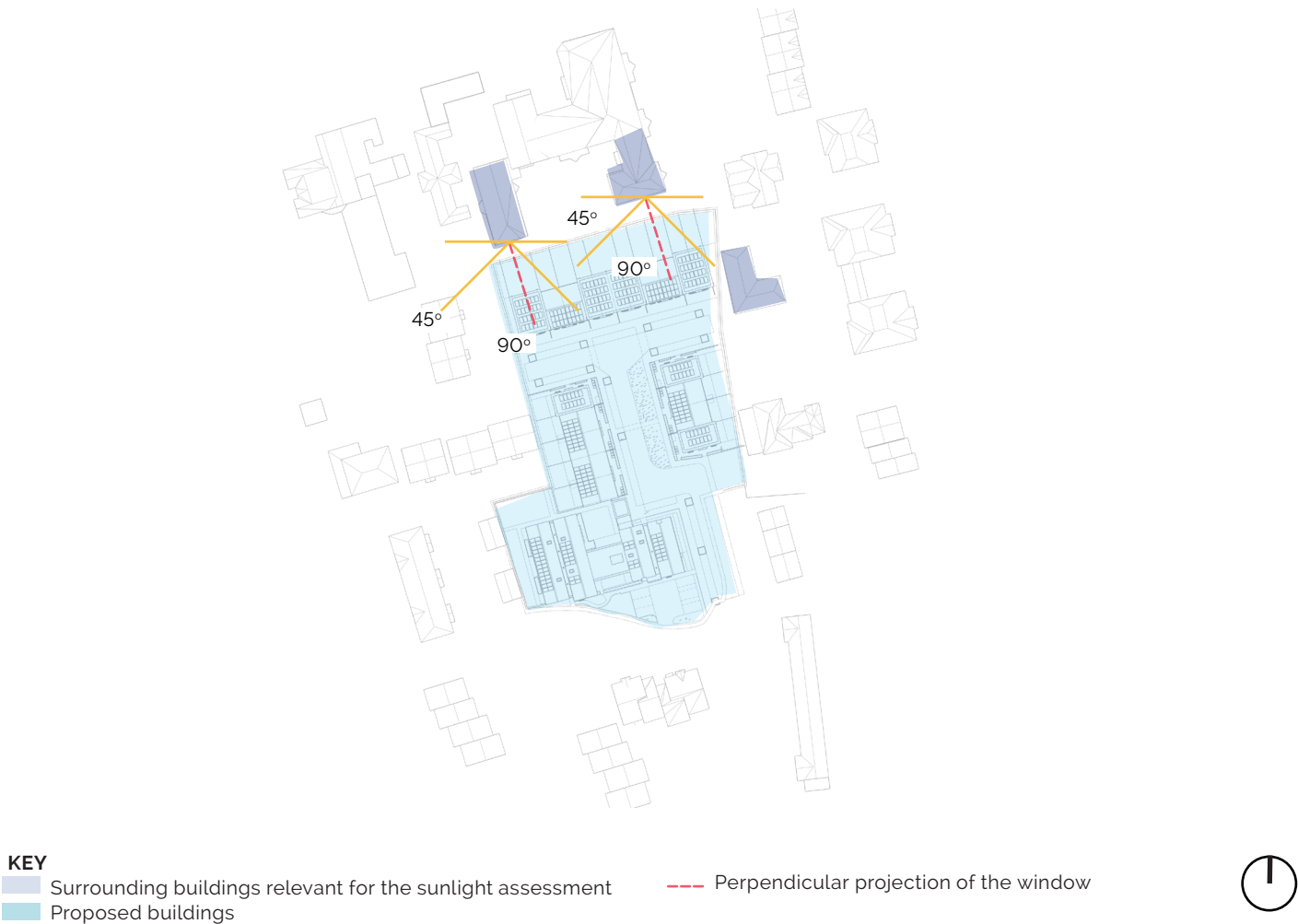


Figure 16 - Site plan indicating the existing buildings tested for the sunlight assessment

Out of 12 windows within 90° due south, 2 achieved Annual sunlight values (APSH) of more than 27%. It is important to mention that most of these windows only present a reduction in annual sunlight compared to the existing condition. From the remaining 10 windows, 5 fall marginally below the Annual sunlight target with the remaining 5 falling below the BRE Sunlight Criteria. All these windows, with the exception of one window located in the community Hospital, are located in 47-63 Ashdene Gardens residential block, which is located in close proximity to the proposed scheme and to the southeast of the emerging building.

Given the low-rise nature of the existing structures on site, it was expected to have a noticeable reduction in the sunlight compared with the previous condition. Moreover, due to eastern orientation, it is likely that these windows have fewer hours of sunlight during the day, especially during winter.

Similarly, 6 out of 12 assessed windows for Sunlight are falling below the Winter Sunlight target set by BRE. This was expected as these windows are all located in close proximity to the proposed scheme and face eastwards as a result they have fewer hours of sunlight over a day.

Overall, the impact on sunlight access to windows of surrounding developments that the proposed development at Amethyst Lane have is acceptable taking into consideration the existing site conditions and the urban environment.

Appendix C shows the detailed results of the analysis.

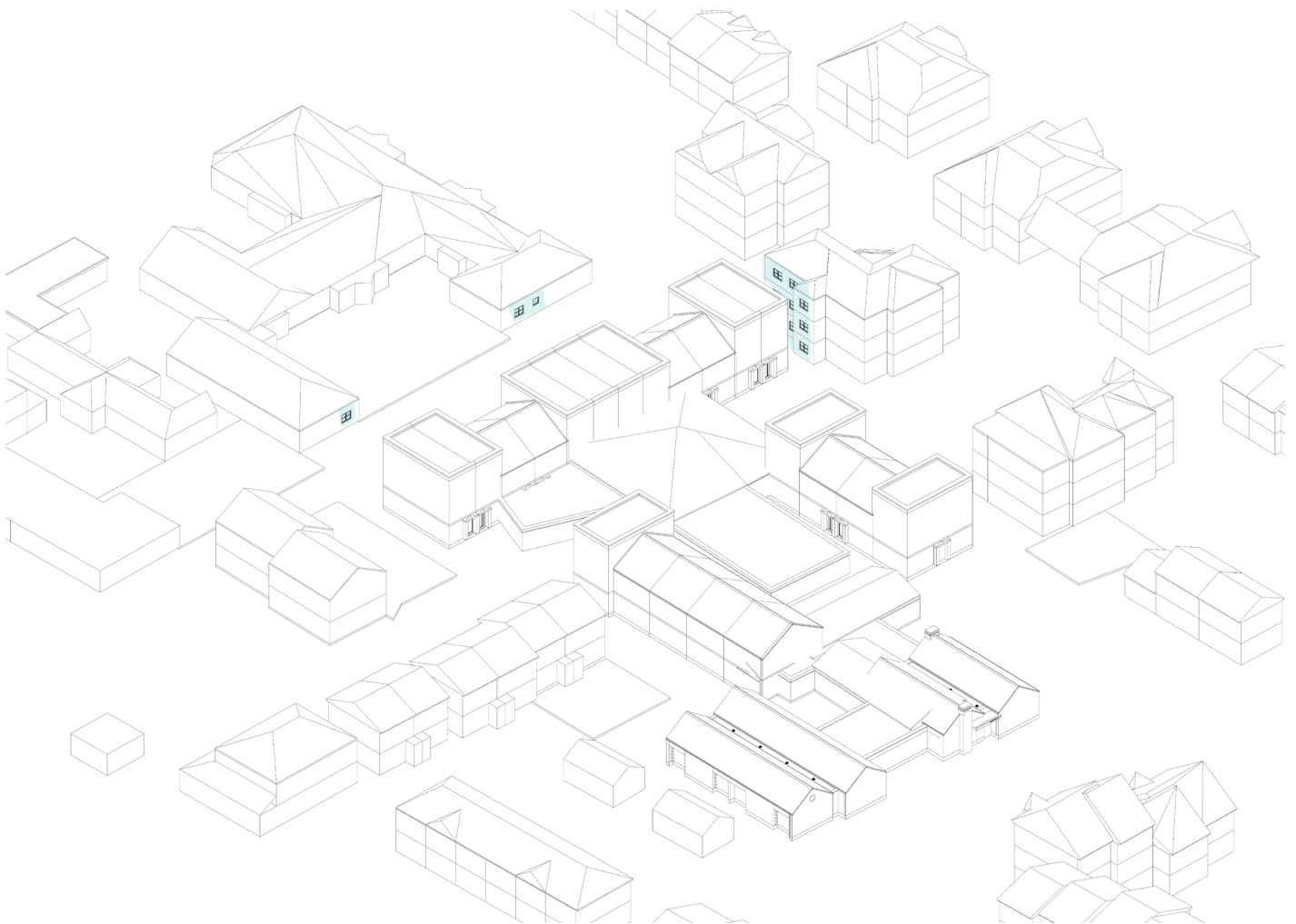


Figure 17 - Assessed windows for Sunlight

Table 2. Detailed results of the Sunlight Assessment - Impact on the surrounding

Property	Number of Rooms Tested	Annual			Winter			Both		
		Rooms that meet BRE Guidelines		No. of Rooms Experiencing Adverse Impacts	Rooms that meet BRE Guidelines		No. of Rooms Experiencing Adverse Impacts	Rooms that meet BRE Guidelines		No. of Rooms Experiencing Adverse Impacts
		No.	%		No.	%		No.	%	
Dellwood Community Hospital	3	2	67%	1	3	100%	0	2	100%	1
47 -63 Ashdene Gardens	9	1	11%	11	3	50%	6	0	-	9

7.2 Proposed development

In residential spaces, the main requirement for sunlight is in living rooms, where it is valued at any time of day, but especially in the afternoon.

According to the new BRE guide, for a space to be reasonably sunlit:

- At least one main window wall should face within 90° of due south and
- A habitable room, preferably a main living room, can receive a total of at least 1.5 hours of sunlight on 21 March. This is assessed at the inside centre of the window(s); sunlight received by different windows can be added provided they occur at different times and sunlight hours are not double

As suggested in BS EN 17037, If a room has multiple windows, the amount of sunlight received by each can be added together provided they occur at different times and sunlight hours are not double counted.

A total of 8 south-facing living rooms and 18 windows have been assessed against the criteria set out in the BRE guide. The image below indicates these rooms and windows.

The results show that all of the 8 tested living rooms achieve adequate sunlight through the year. The results are deemed acceptable.

Living rooms facing other orientations are not analysed as

they fall outside the 90 degree criterion. Lower sunlight values will be achieved on these windows. However, adequate sunlight access will be provided through access to a communal external space as described in the next section of this report.

The design team has carefully considered sunlight provision alongside overheating, noise, energy requirements, and elevation design. The results are deemed to be satisfying.

Detailed results of the analysis can be found in Appendix B3

Table O4 - Summary results of the sunlight assessment

Sunlight Exposure		
South facing living rooms	Rooms meeting the criteria (no.)	Rooms meeting the criteria (%)
8	8	100%

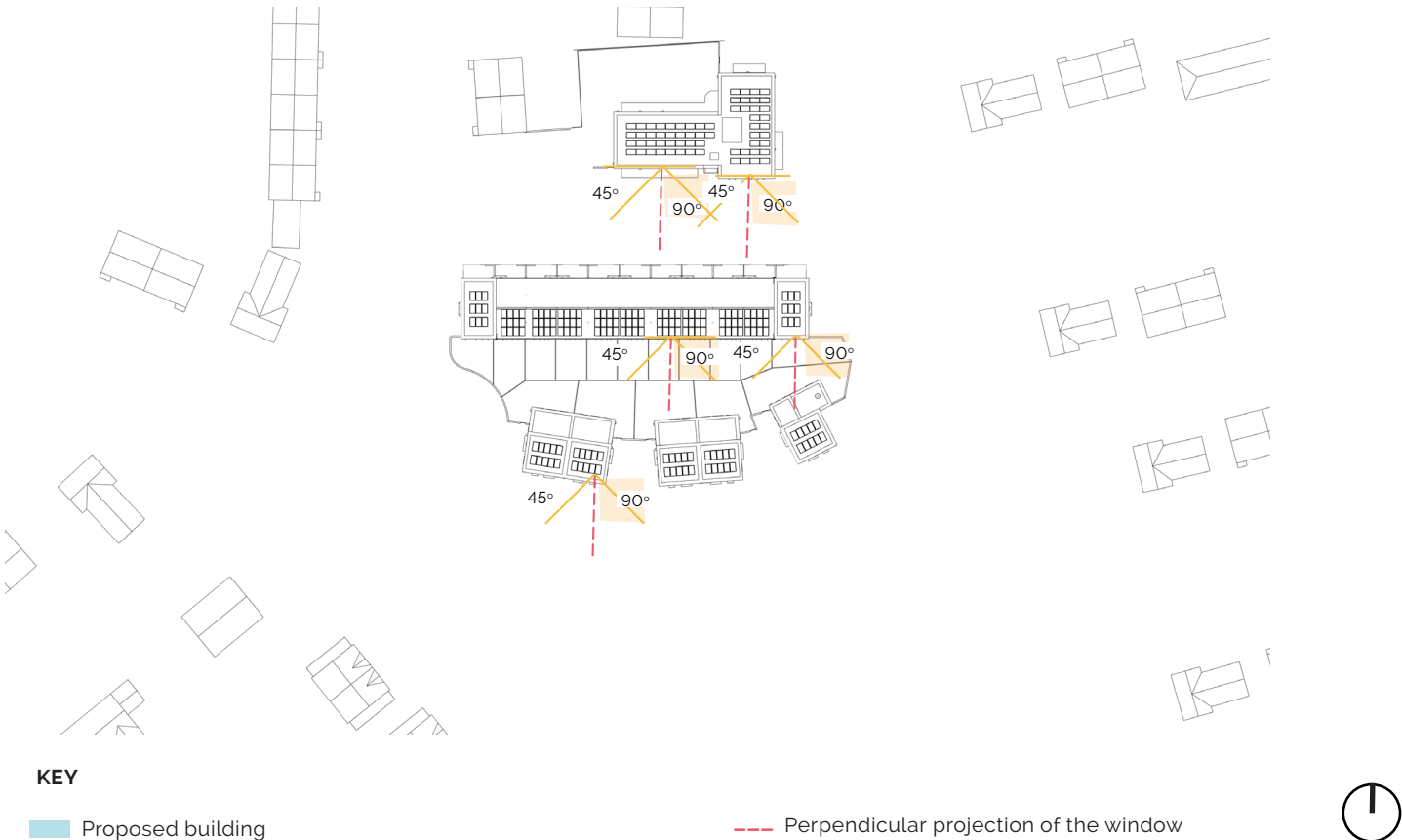


Figure 18 - Site plan indicating the proposed building tested for the sunlight assessment

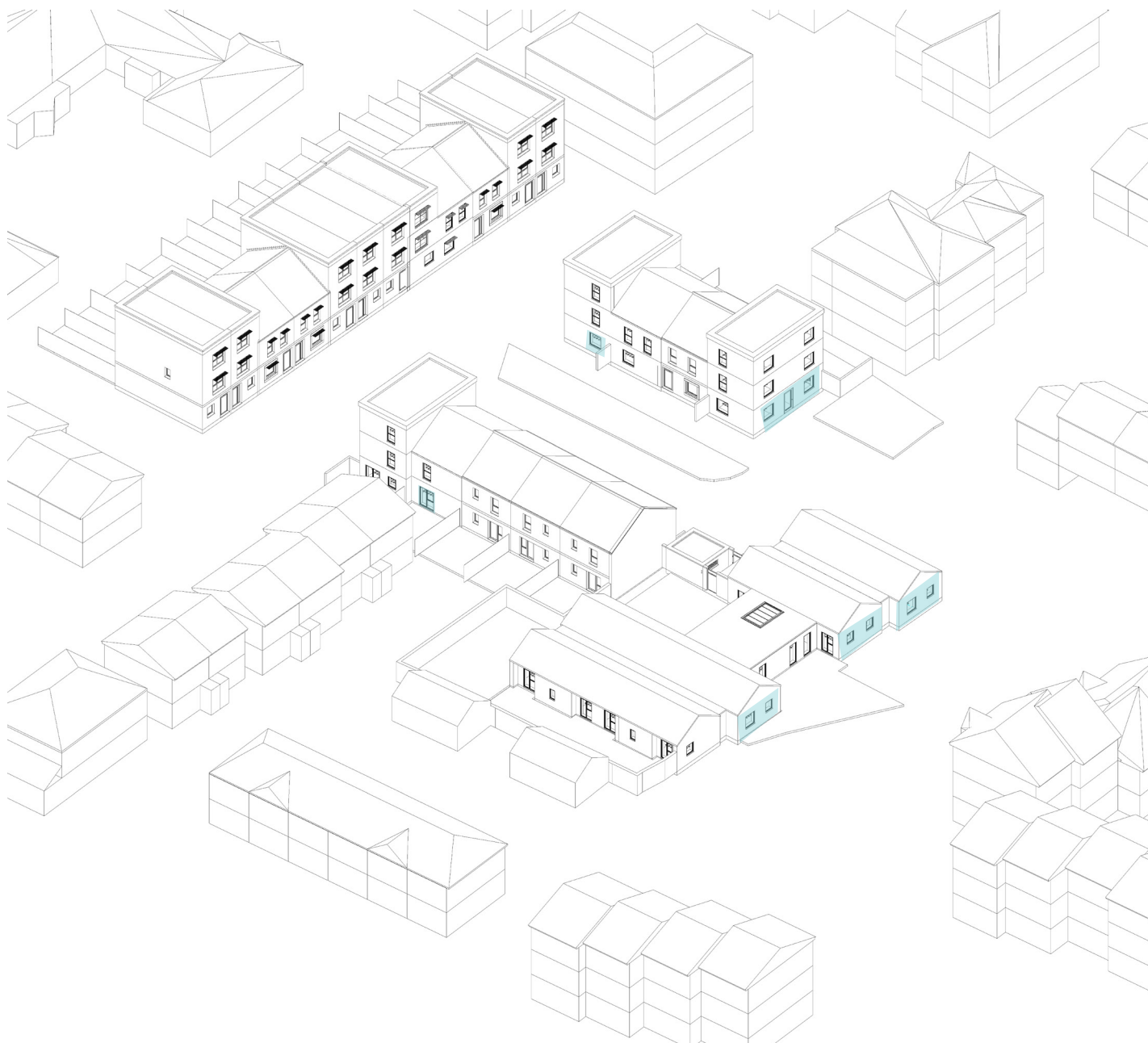


Figure 19 - 3D model of the proposed development, light blue color indicates the living rooms tested with at least one window due to south

8.0 Sun-on-the ground Analysis

8.1 Impact on the existing properties

The recommendations set out in the BRE guide explain how to ensure that outdoor spaces are not permanently in shade for a large part of the year. At least 50% of the open spaces should receive 2 hours of sunlight on the equinox (21st March).

According to the BRE guidance, the availability of sunlight should be checked for all open spaces where it will be required. This would normally include:

- Gardens,
- Parks and playing fields,
- Children's playgrounds,
- Sitting out areas such as those between non-domestic buildings and in public squares, and
- Focal points of view such as a group of monuments or fountains.

An analysis was carried out to assess the sunlight availability on 21 March, including a comparison with the existing configuration.

Appendix D presents the shadow range analysis indicating the time of the day when buildings and external spaces will be in shade.

The sun-on-the ground analysis has been undertaken for this space on 21 March as recommended in the BRE guideline.

The results show that all 5 amenity spaces located north, northeast and northwest of the proposed scheme meets the BRE recommendations. The detailed results indicate that the existing amenity spaces will not experience any reductions compared to its former value on 21 March.

The following images (Figures 21 & 22) present a comparison between the existing and the proposed configurations. The areas in yellow indicate where at least two hours of sunlight are achieved on the 21 March. The detailed results indicate that the existing amenity spaces will not experience any reductions compared to its former value on 21 March.

It can be concluded that proposed development does not cause any harm to the surrounding amenity spaces and, overall, the results are acceptable.

Table 3. Sunlight on the ground - Existing properties (21 March)

Area with at least 2 hours of sun (%)				
Space	21 March (Existing)	21 March (Proposed)	Ratio	Condition
1	94.14%	94.14%	98.99%	Pass
2	99.38%	97.83%	69.25%	Pass
3	97.62%	96.67%	60.95%	Pass
4	96.97%	96.97%	100.00%	Pass
5	100.00%	100.00%	100.00%	Pass



Figure 20 - Sunlight on the ground - 21 March, the area marked in yellow indicate that the minutes of sunlight on 21 March (Existing configuration)

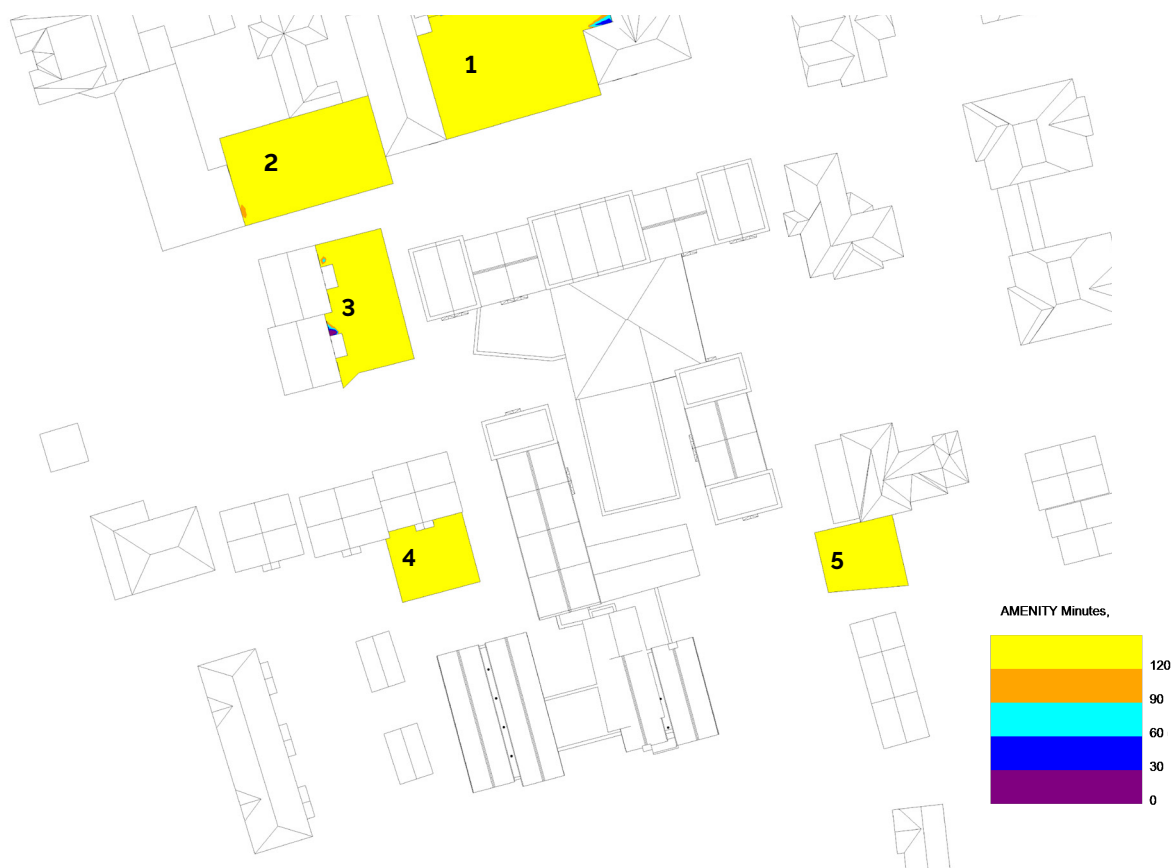


Figure 21 - Sunlight on the ground - 21 March the area marked in yellow indicate that the minutes of sunlight on 21 March.(Proposed configuration)