Gerald Griffin Street Housing Development

Proposed Residential Development

Daylight and Sunlight Analysis Report

Lands at Gerald Griffin Street,
Blackpool,
Co. Cork

Project document no
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Amendments:
Window 50 (C-201) was increased and now passes the requirements.
Page 22 has been removed as the window sizes facing GG street are to remains as is.
2 Houses to the NE windows 27,28 and 29 have been added and pass the requirements.

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D Design
G General information
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1 Introduction

1.1 Report purpose

This report gives information on daylight and sunlight studies within the proposed new development and assesses the impact on daylight and sunlight to surrounding areas / existing environment. The daylight and sunlight studies are assessed under two categories, these are.

Performance of proposed development:

- Daylight reception analysis of the proposed development
- Sunlight reception analysis of the proposed development

Impact of proposed development on the existing surrounding environment:

- Impact on daylight reception analysis on existing environment
- Impact on sunlight reception analysis on existing environment

1.2 Instruction

DKPartnership (DKP) have been commissioned by Cork City Council to carry out the analysis and report for the proposed development at Gerald Griffin Street, Blackpool, Cork City, Co. Cork.

1.3 Standards and guidelines overview

For this report we applied the recommendations and guidelines of the following documents.

- The Building Research Establishment report, BR 209 (2022) Site Layout Planning for Daylight and Sunlight, A Guide to Good Practice. (referred to as the BRE Report).
- British European Standard BS EN 17037:2018 +A1:2021 also referred to as the UK Annex
- Irish European Standard IS EN 17037:2018

1.4 Brief development description

The proposed scheme comprises 67 social housing units and 1 community facility with associated landscaping, utilities and boundary treatments on a brownfield infill at Gerald Griffin Street/Burkes Avenue, Blackpool. The proposal comprises a 3-storey block facing onto Gerald Griffin Street (within the ACA) with 4 staggered apartment blocks behind building up to 6 stories along Burkes Avenue with 3-4 stories at corner North Monastery Road and Gerald Griffin Avenue.

The scheme includes bicycle stores within the building blocks and external bicycle stands on the south side of the building. No car parking is proposed. A vehicle set down facility is proposed on Gerald Griffin Street, at the existing site vehicle access location. The proposed scheme includes the upgrade of Gerald Griffin Avenue and Burke's Avenue.

1.5 Geographical overview

Image 1.1 the (google maps) site is an overview of the site area with the proposed development approximately outlined in red.

Image 1.1: Proposed development site boundary. Imagery © Google 2024.

2 Executive summary

2.1 Analysis conducted

This report details the achieved calculated daylight and sunlight reception within the new development and the impact on neighbouring receptors. The results are compared for compliance with the recommendations of the relevant guidelines and standards. Daylight and sunlight studies are assessed under two categories, these are.
Performance of proposed development:

- Daylight reception analysis of the proposed development,
- Sunlight reception analysis of the proposed development.

Impact of proposed development on the existing surrounding environment:

- Impact on daylight reception analysis on existing environment,
- Impact on sunlight reception analysis on existing environment,

2.2 Performance of proposed development - Summary of results

Daylight reception analysis of the proposed development

For the daylight assessment, results have been analysed within these standards:

- Assessed in accordance with IS EN17037 / BS EN17307, carried out in accordance with Method 1 and Method 2 described in the methodology section.
- Assessed in accordance with BS EN 17037:2018 National Annex.

The results from table 5.1 are reviewed under each standard below.
The daylight reception assessment has been targeted to all habitable rooms within the proposed development on the ground, first, second and third floor.

IS EN17037 / BS EN17307:
To achieve recommendations outlined in IS EN 17037:2018 / BS EN 17307:2018, a given room must achieve: a target daylight factor of 2.0% or in terms of illuminance 300 lux on over 50% of the floor area for over 50% of the available daylight hours. And a minimum target daylight factor of 0.7% or in terms of illuminance 100 lux on over 95% of the floor area for over 50% of the available daylight hours. From the calculation result table 5.1 we note the majority of the new proposed rooms calculated daylight results achieved in excess of the minimum guidelines.

- Residential rooms achieved an average daylight factor (DF) of 2.7% and an illuminance of 407 lux on over 50% of the floor area for over 50% of the available daylight hours. An average DF of 0.94% and an illuminance of 134lux on over 95% of the floor area for over 50% of the available daylight hours was achieved.
- Overall compliance for proposed development block A=66% - rooms falling below guidelines are rooms facing Gerald Griffin Street.
- Overall compliance for proposed development block B=100%
- Overall compliance for proposed development block C=94%
- Overall compliance for proposed development block D=100%

It is important to note the following:
Within the BS EN 17037 it acknowledges that a rigid application of the European Standard could prove to be a difficult task as it offers only a single target for new buildings and IS EN17037 currently has no specific National Annex. These limitations can sometimes make it unsuitable for use in planning policy or during planning applications. In an urban environment it can more often be the case that complete fulfilment with the guidelines is not attainable. The BRE also states that the advice provided in the guide is not mandatory and should be interpreted flexibly.

The British Annex of BS EN 17037, daylight recommendations differ depending on the function of a room and offers minimum daylight provision targets for kitchens, living rooms and bedrooms. Therefore, Given the similarity of weather, light and design patterns between Ireland and the UK and the lack of specific localisation Annex details in the Irish version, the alternate minimum daylight provision targets set out in the national annex of BS EN 17037 are reviewed next.

BS EN 17037:2018 National Annex:
To achieve the alternate minimum daylight recommendations for Ireland (Dublin), the room in question must achieve: Kitchen 1.3% target daylight factor or in terms of illuminance 200 lux. Living room 1.0% target daylight factor or in terms of illuminance 150 lux, and bedrooms 0.7% target daylight factor or in terms of illuminance 100 lux all over 50% of the floor area for over half the daylight hours. From the calculation result table 5.1 we note that all of the rooms calculated daylight are comfortably in excess of these minimum guidelines.

- Overall compliance for proposed development= 100%
- Given the results and conclusions above we, DKP, deem the proposed development to be in line with the recommendations in BS EN 17037:2018 National Annex.

In summary, in a built-up environment it can often be the case that complete fulfilment with the guidelines is not attainable. The BRE also states that the advice provided within the guide is not mandatory and should be interpreted flexibly. The calculation results have achieved high compliance (i.e. 83%) under IS EN17037 / BS EN17307 and full compliance (100%) under BS EN 17037:2018 National Annex guidelines.

The compensatory measures for rooms falling below IS EN17037 / BS EN17307 recommendations are as follows:
- The nature and unique character of the existing street environment is being retained. (The rooms facing Gerald Griffin Street).
- Internal finishes and fixtures will be of a high quality.
- Lighting and fittings will be high quality modern LED lighting.

Sunlight in amenity areas / Sun on ground reception analysis of the proposed development

Based on the BRE guidelines at least 50% of the amenity space should receive at least two hours of sunlight on the 21st of March. From the calculation results in table 5.4 we note the selected amenity space achieved sunlight above the recommended guidelines, see image 5.5 for receptor/amenity space location. Summary of results are as follows:
- The calculated sunlight on at least 50% of the area on March 21st for the communal amenity area is 4.0 hours.

This confirms the proposed amenity area will be adequately sunlit throughout the year. We conclude that the new amenity space receive sunlight on 50% of the area is in line with the recommendations of the BRE Report - Site Layout and Planning for Daylight and Sunlight - and therefore deem these to be compliant to this element.

2.3 Impact of proposed development on the existing surrounding environment - Summary of results

Impact on daylight reception analysis on existing environment

The BRE recommends that the effects of a new development on daylight reception should not impact any existing VSC by more than 20% or have a maximum change factor in excess of 0.80. From the calculation results we note all selected neighbouring habitable receptors are affected to some degree with regards to daylight reception due to the introduction of the proposed development in their respective habitable rooms facing the proposed development. The calculated change in daylight reception in all of the neighbouring receptors/windows achieved a change factor ranging from 0.80 to 0.95. The BRE report outlines VSC guidelines are intended for use for rooms where daylight is required, including living rooms, kitchens and bedrooms. Properties used for habitable purposes have been assessed therefore properties occupied by commercial units have not been applied to the VSC assessment. Summarized result findings are as follows (see image 6.1-6.6 for receptor locations):
- East / South east receptors: Receptors 1 to 11: Dwellings located on the Gerald Griffin Street with ground floor windows were examined and resulted in a change factor range of 0.80 to 0.95. These receptors are well within the guidelines and the effect is determined as negligible under BRE definitions.
- South / South west receptors: Receptors 12 to 26: Dwellings located on the Gerald Griffin Avenue with ground floor windows were examined and resulted in a change factor range of 0.80 to 0.83. These receptors are within the guidelines and the effect is determined as negligible.
- North east receptors: Receptors 27 to 29: Dwellings located on the Gerald Griffin Avenue (north) with ground floor windows were examined and resulted in a change factor range of 0.80 to 0.88. These receptors are within the guidelines and the effect is determined as negligible.
- Overall, the average change ratio for VSC is 0.84.

We conclude that the new proposed development's effect on daylight reception in the neighbouring rooms are all within the constraints and recommendations of the BRE Report – Site Layout and Planning for Daylight and Sunlight BR209 2022, and we therefore deem the proposed development to be compliant with this element.

Impact on sunlight in existing amenity areas / Sun on ground reception analysis on existing environment

Based on the BRE guidelines at least 50% of the amenity space should receive at least two hours of sunlight on the 21st of March and that and any loss of sunlight should not be greater than 0.8 (20% reduction) times its former size. From the calculation results we note that all the existing amenity spaces received 2 hours of sunlight or more on at least 50% of the area before and after the introduction of the new development. Summary of results are as follows (see image 6.7 for receptor locations):
- North west receptors: Receptor no. 1 is an area of public amenity area. The receptor resulted in a change factor of 097. The change happens in the morning hours of 09.00-12.00. The calculation findings are comfortably within

guidelines, and the effect is determined as negligible under BRE definitions. Receptor no. 2 is a private amenity area. The receptor resulted in a change factor of 1.00, meaning the new proposed development will have no sunlight impact on this area.

- North east receptor: Receptor no. 3 is a private amenity area. The receptor resulted in a change factor of 0.80. The change happens in the afternoon hours of 13.00-17.00. The calculation finding is within the minimum recommended guidelines, and the effect is determined as negligible under BRE definitions.

We conclude that the new proposed development's effect on daylight reception in the neighbouring rooms are all within the constraints and minimum recommendations of the BRE Report – Site Layout and Planning for Daylight and Sunlight BR209 2022, and we therefore deem the proposed development to be compliant with this element.

3 Standards and guidelines

3.1 Standards and guidelines overview

For this report we applied the recommendations and guidelines of the following documents.

- The Building Research Establishment report, BR 209 (2011) Site Layout Planning for Daylight and Sunlight, A Guide to Good Practice. On June 8th, 2022, BR 209 (2011) was replaced with BR 209 (2022) Site Layout Planning for Daylight and Sunlight, A Guide to Good Practice. This report is commonly referenced as the main guide in Ireland/UK in determining the minimum standards of daylight and sunlight and for determining the impact of a development.
- European Standard EN 17037:2018 and British European Standard BS EN 17037:2018 Daylight in buildings, which replaces BS 8206-2:2008. The document contains guidance on interior day lighting and introduces some of the calculation procedures used in the BRE Report.
- IS EN 17037:2018 Daylight in buildings. Irish guidelines.

3.2 BR 209 (2022): Site Layout and Planning for Daylight and Sunlight, A Guide to Good Practice

This document is an updated version of BR 209 (2011) and referred to as the BRE Guidelines. The report contains guidance on how to design developments, whilst minimising the impacts on existing buildings from overshadowing and reduced levels of daylight and sunlight. The BRE guidelines recommend the use of BS EN 17037:2018 for assessing the quality of interior spaces in proposed developments. BS EN 17037 sets out assessment methods for daylight provision and access to sunlight The advice provided within the guide is not mandatory and should not be seen as an instrument of planning policy. Its aim is to help rather than constrain the designer and should be interpreted flexibly since natural lighting is one of many factors in site layout design.

3.3 EN 17037:2018: Daylight in Buildings

EN 17037 is a daylighting standard published by the European Committee for Standardization (CEN) in 2018. It is applicable across all countries within the EU including Ireland with the Irish edition IS EN17037:2018EN 17037. It provides recommendations for daylight within spaces. Recommendations made in EN 17037 regarding daylight and sunlight exposure have been incorporated into the BRE Guidelines.

3.4 IS EN 17037:2018: Daylight in Buildings

Prior to 2018, Ireland had no standard for daylight. In 2018, the National Standards Authority of Ireland adopted EN 17037 to directly become IS EN 17037.

3.5 BS EN 17037:2018: Daylight in buildings

BS EN 17037:2018: Daylight in Buildings is the British version to the European Standard and also contains a national annex. The national annex (NA) attempts to align the guidance and expectations of the European standard with the now superseded BS 8206-2. Within the British Annex it acknowledges that a rigid application of the European Standard could prove to be a difficult task. Within BS EN 17037 NA, daylight recommendations differ depending on the function of a room and offers minimum daylight provision targets for kitchens, living rooms and bedrooms.

The assessment methodology in this report is built around the above-mentioned documents. The methods proposed are outlined in section 4.

4 Approach and methodology

4.1 General approach

This report assesses the daylight and sunlight reception to the proposed development and the impact on daylight and sunlight to surrounding areas. The results are then compared with the relevant guidelines and recommendations. The calculation assessment is split across two distinct parts:

Performance of proposed development

- Daylight reception analysis of the proposed development
- Sunlight reception analysis of the proposed development

Impact of proposed development on the existing surrounding environment:

- Impact on daylight reception analysis on existing environment
- Impact on sunlight reception analysis on existing environment

4.2 Note on the nature and effects of daylight and sunlight

When assessing the effects of proposed building projects on the potential to cause issues relating to light, it is important to recognise the distinction between daylight and sunlight. Daylight is the combination of all direct and indirect sunlight during the daytime, whereas sunlight (for the purposes of this report) comprises only the direct elements of sunlight. For example, on a cloudy or overcast day diffused daylight still comes in through windows, even when sunlight is absent. Any development within a built-up area has the potential to alter the amount of daylight received by nearby residential properties.

Care should be taken when designing new buildings in built-up areas, especially when the proposed development is relatively tall or situated to the south of existing buildings, because in the northern hemisphere the majority of the sunlight comes from the south. In Ireland (and other northern hemisphere countries) south-facing facades will in general, receive the most sunlight, while the north facing facades will receive sunlight on only a handful of occasions, specifically early mornings and late evenings during the summer months. It is therefore important to ensure that new buildings to the south of any development do not cause over shadowing to existing dwellings and therefore reduce their capacity to receive sunlight.

4.3 Assessment methodology

The analyses and assessments in this report are based on the guidelines recommended in the BRE guide (2022), the guide is intended to be used in conjunction with lighting recommendations in BS EN 17037 Daylight in buildings. It should also be noted that although the BRE guide gives numerical guidelines, these should be interpreted flexibly.

The BRE document sets out in its introduction 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." " 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* ".

Throughout this report an effort will be made to differentiate between metrics used to assess daylight (skylight) versus sunlight. The following sub-sections namely 'New buildings' and 'Existing buildings / existing amenity areas' outline the methodology and assessment criteria carried out.

4.4 New buildings

Daylight provision:

Daylight provision within IS EN 17037 guidelines

The IS EN 17037 explains that "*a space is considered to provide adequate daylight if a target illuminance level is achieved across a fraction of the reference plane within a space for at least half of the daylight hours*". These guidelines do not provide different illuminance targets for different room types. Therefore, all rooms have the same daylight provision targets. To achieve the minimum level of daylight provision as per table 4.2, the following must be achieved, taken from IS EN 17037:2018 (table ref A.1).

- A minimum target illuminance of 300 lux must be achieved on over 50% of the floor area for over 50% of the available daylight hours.
- A minimum target illuminance of 100 lux must be achieved on over 95% of the floor area for over 50% of the available daylight hours.
- Both targets above must be satisfied for a space to be deemed compliant with the requirements.

Level of recommendation for vertical and inclined daylight opening	Target illuminance ET lx	Fraction of space for target level Fplane,%	Minimum target illuminance ETM lx	Fraction of space for Minimum target level Fplane,%	Fraction of daylight hours Ftime,%
Minimum	300	50%	100	95%	50%
Medium	500	50%	300	95%	50%
High	750	50%	500	95%	50%

Table 4.2: IS EN 17037:2018 target illuminance levels.

These recommendations can also be expressed in terms of a daylight factor. IS EN 17037:2018 (table ref A.3) provides the corresponding daylight factor relative to a recommended target illuminance and target minimum illuminance depending on the location (capital city for individual countries) for daylight. The Dublin daylight factor target recommendations are replicated in table 4.3.

Nation	Capital	Geographical latitude φ [°]	Median External Diffuse Illuminance *E*v,d,med	*D* to exceed 100 lx	*D* to exceed 300 lx	*D* to exceed 500 lx	*D* to exceed 750 lx
Ireland	Dublin	53,43	14 900	0.7%	2.0%	3.4%	5.0%

Table 4.3: IS EN 17037:2018 target daylight factor levels for Dublin.

Therefore, within IS EN 17037:2018, to achieve the minimum level of daylight provision for vertical openings the following must be achieved:

- A minimum target daylight factor of 2.0% must be achieved on over 50% of the floor area for over 50% of the available daylight hours.
- A minimum target daylight factor of 0.7% must be achieved on over 95% of the floor area for over 50% of the available daylight hours.
- Both targets above must be satisfied for a space to be deemed compliant with the requirements.

Daylight provision within BS EN 17037 National Annex

In the UK, EN 17037 was adopted to form BS EN 17037 and a national annex was also included. The national annex offers additional targets and guidance for daylight provision in residential developments and states " *it is the opinion of the UK committee that the recommendations for daylight provision in a space may not be achievable for some buildings*". The national annex gives specific minimum recommendations for habitable rooms in dwellings in the UK. These are intended for 'hard to light' dwellings. The national annex therefore provides the UK guidance on minimum daylight provision in all UK dwellings, these are 100 lux in bedrooms, 150 lux in living rooms and 200 lux in kitchens, to be exceeded over at least 50% of the assessment points in the room for at least half of the daylight hours.

Habitable room types	BS EN17037 National Annex Minimum target Illuminance	BS EN17037 Corresponding minimum target daylight factor (Dublin)
Kitchen	200 lux	1.3%
Living rooms	150 lux	1.0%
Bedrooms	100 lux	0.7%
Living, Kitchen, Dining	200 lux	1.3%

Table 4.4: BS EN 17037 minimum target Illuminances and daylight factor for dwellings.

Daylight provision within BR 209 (2022) guidelines

The BRE guide is intended to be used in conjunction with recommendations in BS EN 17037. The guide states that "*Daylight provision in new rooms may be checked using either of the methods in BS EN 17037 Daylight in Buildings: direct prediction of illuminance levels using hourly climate data, or the use of the daylight factor*". The two methods to assess daylight provision to the interior which are based on target values.

- Method 1-Daylight factor method: This calculation method uses the daylight factor targets on the 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. The assessment is carried out on a representative day and time during the year, i.e., under standard CIE overcast sky conditions. BS EN 17037 gives the Median External Diffuse Illuminance (Ev,d,med) for the capital cities throughout Europe to account for external local illuminance levels.
- Method 2-Illuminance method: This calculation method uses the illuminance targets on the reference plane. The assessment requires the use of a suitable weather file which accounts for varying sky conditions and sun positions throughout the year and takes into account the orientation of the space

Equivalent daylight factor targets to achieve a target illuminance over at least half of the daylight hours in a year are based on the formula: Target daylight factor (DT)= target illuminance/Ev,d,med x 100 [%].
Where, Ev,d,med is the median diffuse horizontal illuminance from the sky (as recommended for Dublin, Ireland).

The daylight factor (D) addresses daylight provision as a ratio of unobstructed external illuminance under overcast sky conditions. The daylight factor is defined as D =Ei/Eo x 100[%], where,
Ei=illuminance due to daylight at a point on the indoors working plane.
Eo= simultaneous outdoor illuminance on a horizontal plane from an unobstructed hemisphere of overcast sky.

Table 4.5 provides the target illuminances from daylight over at least half of the daylight hours and thus the corresponding calculated daylight factor targets for side lit rooms for Dublin.

Level of recommendation for vertical and inclined daylight opening	Target illuminance (lx) for half of assessment grid	Target illuminance ETM (lx) for 95% of assessment grid	Target daylight factor D for half of assessment grid (Dublin)	Target daylight factor D for 95% of assessment grid (Dublin)
Minimum	300	100	2.0%	0.7%
Medium	500	300	3.4%	2.0%
High	750	500	5.0%	3.4%

Table 4.5: Target illuminances and thus the corresponding calculated daylight factor targets for side lit rooms for Dublin.

The recommendations for rooms are met if both target daylight factors are achieved; the median daylight factor over 50% of the reference plane, and the minimum daylight factor over 95% of the reference plane.

Project calculation parameters

The following values were used in the daylighting calculations.

Element	DKP metrics	Comments
Internal and external factors:		
Ceilings	0.8	Light
Walls	0.5	Medium dark
Floor	0.2	Dark
Exterior walls and obstructions	0.2	
Exterior ground	0.2	
Maintenance factors:		
Glass light diffuse transmittance	0.68	
Glazing maintenance factor	0.92	

Table 4.6: Project calculation parameters.

Sunlight provision:

Sunlight to proposed amenity spaces / Sun on ground

Acceptable criterion within the BRE guidelines for sunlight reception recommends that at least half of the amenity area should receive at least two hours of sunlight on the 21st of March. The minimum sunlight requirement in this report measured in sunlight time 2 hours (120 minutes) multiplied by 50% area m^2 or the minimum requirement = 120 (min) * 0.5a (m^2) = [ ] min·m^2.

Analysis	BRE recommendation, criteria on March 21st	Acceptable sunlight reception parameters
Sunlight reception	Minimum sunlight reception in amenity spaces	At least 50% of the total area to receive at least 2 hours sunshine

Table 4.7: Sunlight to proposed amenity spaces / Sun on ground assessment

The sunlight assessment is executed using a 3D model of the project with the results illustrated in tabular format showing the hourly status of the shadow / sunlight fraction in the relevant amenity spaces. Appendix A provides the 3D images. The impacts of vegetation: It is important to note that according to the BRE Report, calculations do not normally take into account vegetation. The exception is when evergreen vegetation exists that forms a continuous barrier and would be permanent throughout the seasons.

4.5 Existing buildings

Impact on daylight provision:

Daylight provision to surrounding existing buildings

The impact of the proposed development on the existing buildings with respect to daylight can assessed using the following methodologies advised in the BRE guide.

- The distance test: loss of light to windows need not be analysed if the distance from the existing window to the development is three or more times its height above the centre of the existing window.
- The 25° rule: loss of light to windows need not be analysed if the angle to the horizontal subtended by the new development from the centre of the existing window is less than 25° (an angle of 25° equates to a VSC of 27%).
- Vertical Sky Component (VSC) assessment: diffuse daylight of an existing building may be adversely affected by a proposed development if either: the vertical sky component measured at the centre of an existing main window is less than 27%, and less than 0.8 times its former value; or the area of the working plane which can receive direct skylight is reduced to less than 0.8 times its former value.

The impact assessment of daylight is required for windows serving rooms in adjoining dwellings where daylight is required including living rooms, kitchens and bedrooms. Windows to bathrooms, toilets, storerooms, circulation areas and garages need not be assessed. The guidelines also apply to any room that may have a reasonable expectation of daylight, including schools, hospitals, hotels and some offices. To ensure a neighbouring property is not adversely affected, VSC is calculated and assessed in this report. This report assesses the percentage of direct sky illuminance that falls on the assessment point of neighbouring windows that could be affected by the proposed development, image 4.1 represents this.

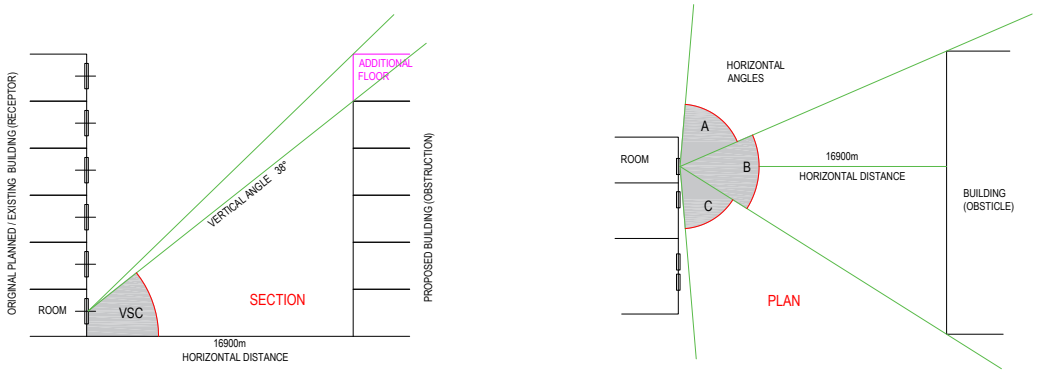


Image 4.1:

VSC gives a measure of daylight received on the outside of a window. Stated within BR 209 (2022) “if the VSC is greater than 27% then enough skylight should still be reaching the window of the existing building. Any reduction

below this level should be kept to a minimum. If the VSC, with the new development in place, is both less than 27% and less than 0.80 times its former value, occupants of the existing building will notice the reduction in the amount of skylight". Table 4.8 details the BRE assessment criteria for daylight reception for existing windows.

Analysis	Description	Acceptable parameters
Daylight reception	Existing daylight incoming angle	Existing angles should not be affected more than 0.8 time its former value or a maximum loss of 20%.

Table 4.8: VSC assessment.

In this report, the VSC of the assessment point on each of the assessed windows will be calculated, both in the baseline state and in the proposed state. The baseline state reflects the current VSC of the window, the proposed state will determine what the VSC of the window would be if the proposed development is built as planned.

Impact on sunlight provision:

Neighbouring Properties – Sunlight on the Ground (Shadow) Gardens and Open spaces

Sunlight provision in existing amenity areas: BRE (2022), recommendations are given as to the quantity of sunlight in amenity areas that is required to produce a well sunlit space throughout the year. " 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 21st of 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 21st of March is less than 0.80 times its former value, then the loss of sunlight is likely to be noticeable". Calculations were conducted in accordance with the BRE guidelines to determine the extent to which the proposed development could affect the shadow / sunlight reception in the selected existing neighbouring amenity spaces. For existing amenity spaces any loss of sunlight should not be greater than 0.8 times its former size on March 21st.

Analysis	Criteria on March 21st	Acceptable sunlight reception parameters
Sunlight reception	Minimum sunlight reception in amenity spaces	At least 80% or 0.8 x its former sunlight reception.

Table 4.9: Sunlight in existing amenity areas.

Sunlight provision in existing amenity areas is recommended to be checked for all open spaces where it is required. BRE recommends spaces such as, gardens, such as the main back garden of a house or communal gardens including courtyards and roof terraces, parks and playing fields, children's playgrounds, outdoor swimming pools and paddling pools, and other areas of recreational water such as marinas and boating lakes, sitting out areas such as those between non-domestic buildings and in public squares, nature reserves (which may have special requirements for sunlight if rare plants are growing there).

Design Model: A 3D model of the proposed development and the surrounding neighbouring properties was provided by the Architect. SketchUp Pro 2023 design model was used to examine potential impacts. The model was geo-referenced to its correct location and an accurate solar daylight system was introduced. The 3D model of the project with the results illustrated in tabular format showing the hourly status of the shadow/sunlight fraction in the relevant amenity spaces is used to undertake the sun light assessment. Appendix A provides the illustrations in hourly sections.

4.6 Summary of analysis

The table below summarises the assessments carried out in this report.

Element	Guidelines	
Performance of proposed development		
Daylight	Daylight – IS EN 17037 / BS EN 17307	To achieve the daylight provision outlined in IS / BS EN 17037:2018 a given room is recommended to achieve: Using method 1: • A target daylight factor of 2.0% must be achieved on over 50% of the floor area for over 50% of the available daylight hours. • A target daylight factor of 0.7% must be achieved on over 95% of the floor area for over 50% of the available daylight hours. Or using method 2: • A target illuminance of 300 lux must be achieved on over 50% of the floor area for over 50% of the available daylight hours. • A target illuminance of 100 lux must be achieved on over 95% of the floor area for over 50% of the available daylight hours.
	Daylight - National annex BS EN 17037	To achieve the alternate minimum daylight provision outlined in the national annex of BS EN 17037:2018, the room is recommended to achieve: • Kitchens, 1.3% target daylight factor or 200 lux over 50% of the floor area for over half the daylight hours. • Living rooms, 1.0% target daylight factor or 150 lux over 50% of the floor area for over half the daylight hours. • Bedrooms, 0.7% target daylight factor or 100 lux over 50% of the floor area for over half the daylight hours.
Sunlight	Sunlight in amenity areas / Sun on ground	To meet the minimum recommendations given in BR 209 (2022), a new amenity space should experience two hours sunlight on March 21st for at least 50% of its area.
Impact of the proposed development on the existing surrounding environment		
Daylight	Vertical Sky Component (VSC)	To meet the recommendations in BR 209 (2022), the VSC with the new development in place, should be greater than 27% or greater than 0.80 times its former value.
Sunlight	Sunlight in existing amenity areas / Sun on ground	To meet the recommendations in BR 209 (2022), an existing amenity space, with the new development in place should experience in excess of two hours sunlight on March 21st for at least 50% of its area and should be greater than 0.80 times the previous value.

Table 4.10: Summary of assessments.

4.7 Note on receptors

The BRE guide states that when assessing the potential effects of a proposed development on existing buildings, only those windows and rooms that have a reasonable expectation of daylight and sunlight need to be considered. Windows and rooms which meet this criterion are considered to be sensitive receptors. the BRE guide clarifies what are considered sensitive receptors with respect to sunlight and daylight as follows: “The guidelines given here are intended for use for rooms in adjoining dwellings where daylight is required, including living rooms, kitchens and bedrooms. Windows to bathrooms, toilets, storerooms, circulation areas and garages need not be analysed”.
The guidelines may also be applied to any existing non-domestic building where the occupants have a reasonable expectation of daylight; this would normally include schools, hospitals, hotels and hostels, small workshops and some offices. Outdoor amenity spaces which have a reasonable expectation of sunlight, whether they are private gardens, communal open spaces or outdoor public amenity areas, are also considered sensitive receptors. Receptors that may be affected by the proposed development are highlighted in the calculation section of each appropriate analysis.

4.8 Note on the definition of effects

Guidelines from Appendix H in the BRE guidelines is used to categorise the varying degrees of compliance when assessing the impact, a proposed development might have on the daylight and sunlight of an existing environment. The table of definitions given below is used in the results section of this report, for the purposes of categorising the impact on sunlight and daylight.

Effect	Definition of effect
Negligible	Where any loss of daylight / sunlight is well within the guidelines, or only a small number of windows or area of space lose daylight / sunlight but still within the guidelines, then the impact is assessed as negligible.
Minor Adverse	If the level of effect is marginally outside of the criteria as stated in the relevant guidelines, a minor adverse level of effect will be applied if the level of daylight / sunlight is within 5% of the target guideline.
Moderate Adverse	If the level of effect is outside of the criteria as stated in the relevant guidelines, a moderate adverse level of effect will be applied if the level of daylight / sunlight is within 5-10% of the target guideline.
Major Adverse	If the level of effect is outside of the criteria as stated in the relevant guidelines, a moderate adverse level of effect will be applied if the level of daylight / sunlight is in excess of 10% of the target value.
Beneficial Impact	If the ratio of change is > 1.10 (an improvement of 10%), then the impact is assessed as a beneficial impact. Should less significant improvements occur a negligible level of effect will be stated.

Table 4.11: Definition of effects used in the impact assessments.

5 Performance of proposed development – Calculation results and conclusion

The performance of the proposed development calculations is broken into two sections, daylight reception and sunlight reception.

Daylight Reception:

5.1 Receptor selection – Rooms within the proposed development

The daylight reception assessment has been targeted to all habitable rooms within the proposed development on the ground, first, second and third floor. Once a (lowest level) room is compliant, rooms at higher levels with similar configuration / parameters are deemed compliant on the basis that the room daylight factor would have improved due to the better vertical sky view angle of higher located rooms. Receptors / rooms within the proposed development are indicated in image 5.1 to 5.4 below.

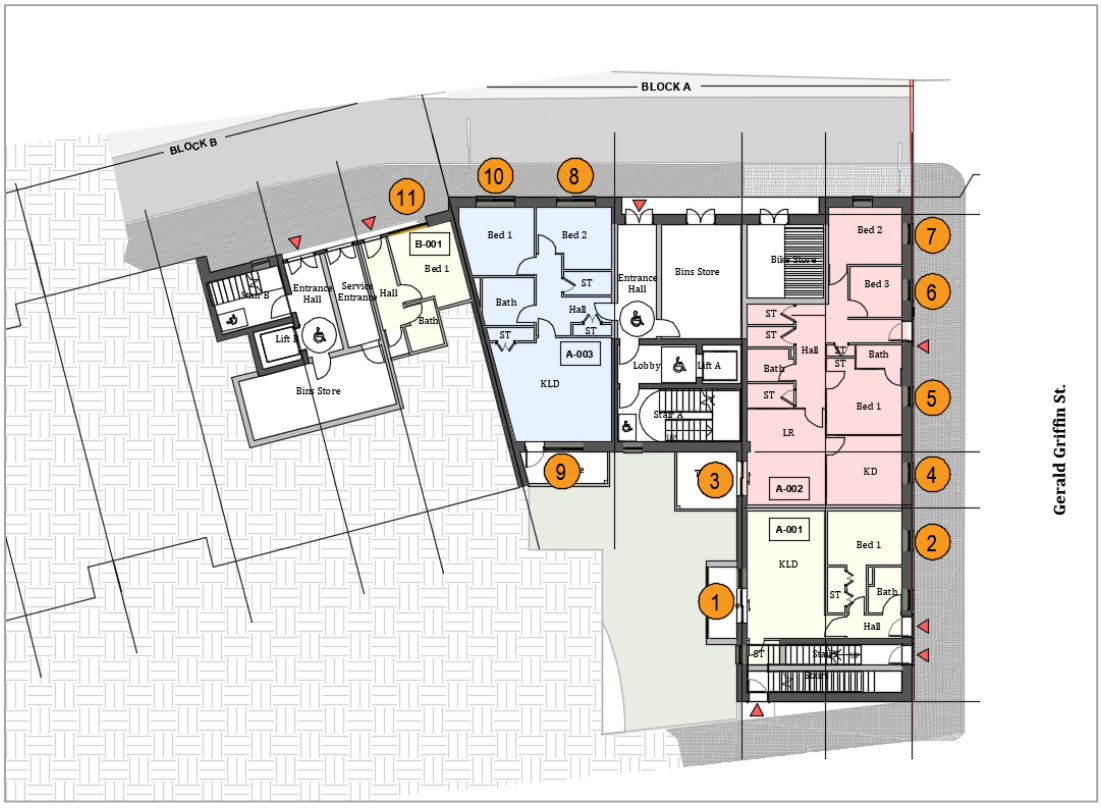


Image 5.1: Level 00 (ground floor). Receptor no. 1 to 11.

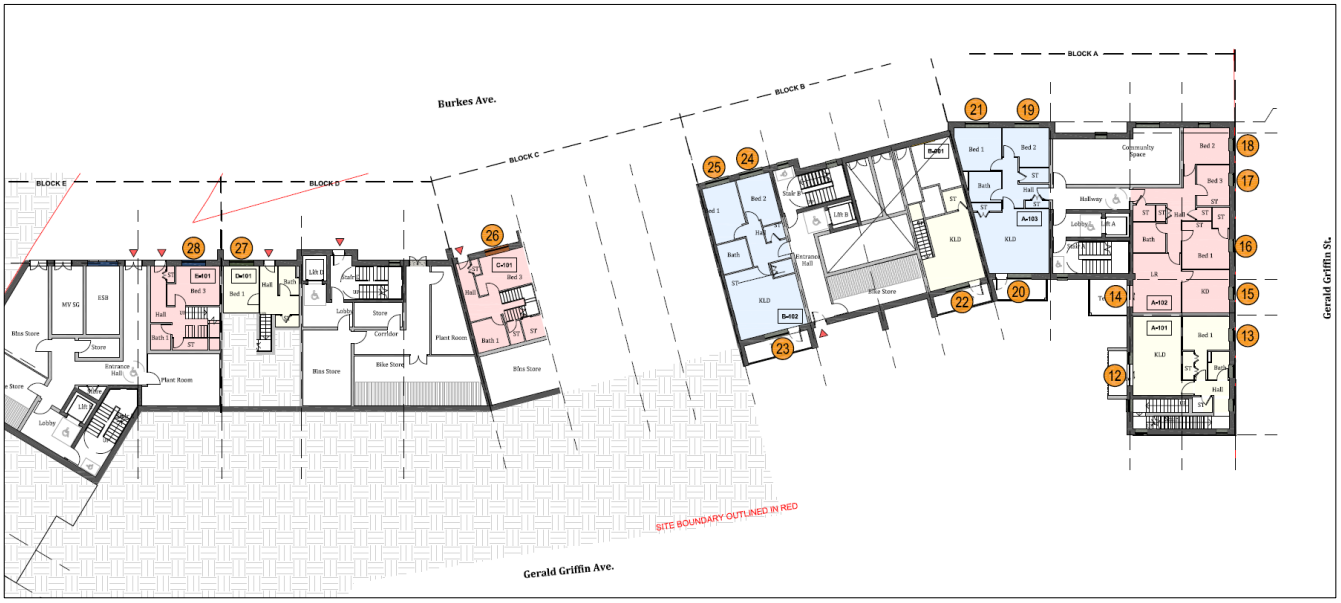


Image 5.2: Level 01 (first floor). Receptor no. 12 to 28.

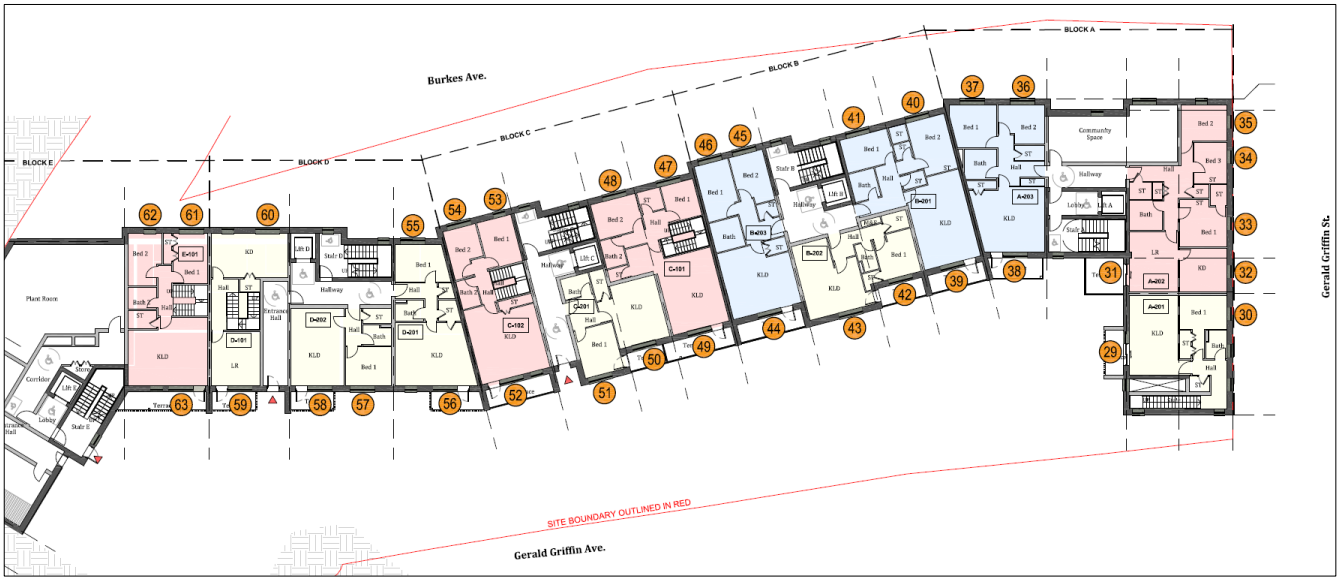


Image 5.3: Level 02 (second floor). Receptor no. 29 to 63.

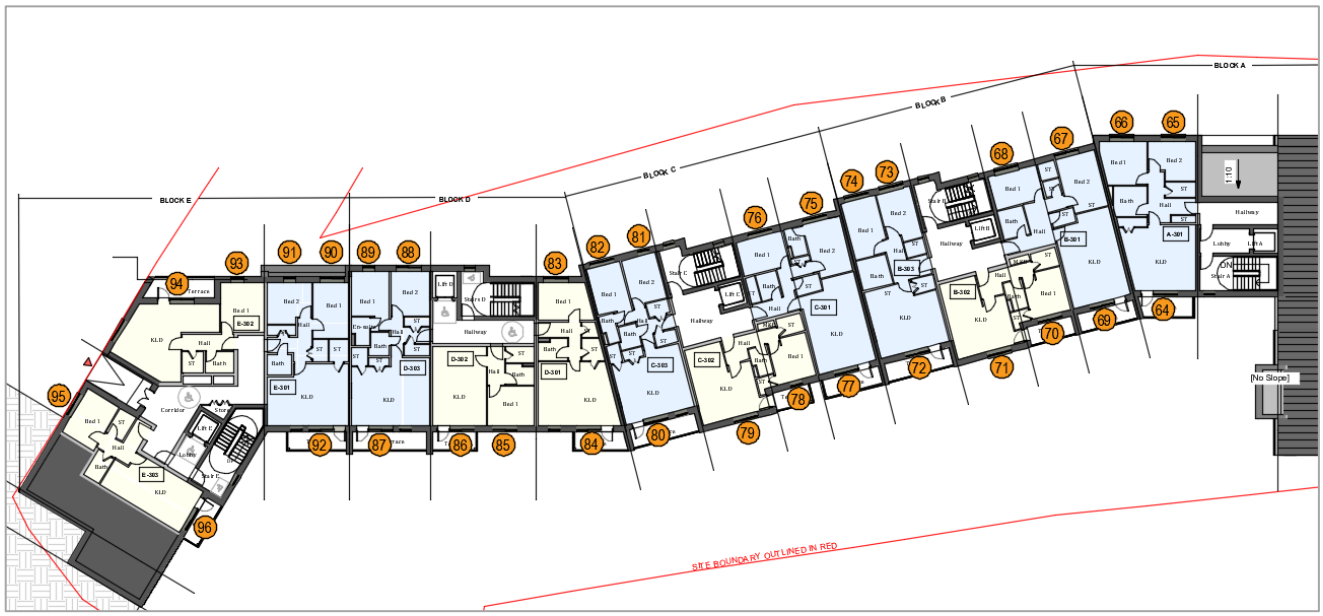


Image 5.4: Level 03 (third floor). Receptor no. 64 to 96.

5.2 Calculation result table

The results table below provide the full calculation results of the selected receptors / rooms. IS EN17037 / BS EN17037 daylight factor and illuminance levels are provided and the National Annex (NA) target values in BS EN17037. The calculation results have been given the following colour code guide depending on its level of resulting compliance within each guideline.

Compliance hierarchy

☑☑	>=100%
☑	<100% , >95%
☑	<95% , >90%
!!	<90% , >80%
x	<80%

Receptor	Level/Floor	Block /Unit ID	Room / type	glass area	room area	glass ratio	Dept/Width	∑ VSC ∟ (total)	ISEN17037 DAY LIGHT FACTOR				ISEN17037 ILLUMINANCE				BSEN17037 - ANNEX			
									50% area		95% area		50% area		95% area					
									50% sun hrs		50% sun hrs		50% sun hrs		50% sun hrs		illuminance		day light factor	
				m2	m2	%			%	min %	%	min %	lx	min lx	lx	min lx	lx	min lx	%	min %
1	00	A-001	Living-Kitchen	4.17	26.0	16.1	3.49	25%	2.14	2.00	0.75	0.70	324	300	107	100	477	200	3.20	1.3
2	00	A-001	Bed room	0.99	10.6	9.3	2.63	32%	1.27	2.00	0.45	0.70	193	300	64	100	283	100	1.90	0.7
3	00	A-002	Living-Kitchen	3.13	18.9	16.6	3.25	24%	2.01	2.00	0.70	0.70	304	300	100	100	447	200	3.00	1.3
4	00	A-002	Living-Kitchen	0.99	13.7	7.3	2.85	32%	1.07	2.00	0.38	0.70	162	300	53	100	238	200	1.60	1.3
5	00	A-002	Bed room	0.99	12.9	7.7	2.77	32%	1.14	2.00	0.40	0.70	172	300	57	100	253	100	1.70	0.7
6	00	A-002	Bed room	0.99	7.0	14.1	3.57	32%	1.68	2.00	0.59	0.70	253	300	84	100	373	100	2.50	0.7
7	00	A-002	Bed room	2.43	11.4	21.3	3.84	30%	2.75	2.00	0.96	0.70	415	300	137	100	611	100	4.10	0.7
8	00	A-003	Bed room	2.67	9.4	28.5	4.85	28%	3.15	2.00	1.10	0.70	476	300	157	100	700	100	4.70	0.7
9	00	A-003	Living-Kitchen	4.17	25.8	16.2	2.49	23%	2.01	2.00	0.70	0.70	304	300	100	100	447	200	3.00	1.3
10	00	A-003	Bed room	2.67	13.3	20.0	3.29	28%	2.55	2.00	0.89	0.70	385	300	127	100	566	100	3.80	0.7
11	00	B-001	Bed room	3.25	11.9	27.4	3.01	28%	3.28	2.00	1.15	0.70	496	300	164	100	730	100	4.90	0.7
12	01	A-101	Living-Kitchen	4.17	26.0	16.1	3.49	26%	2.28	2.00	0.80	0.70	344	300	114	100	507	200	3.40	1.3
13	01	A-101	Bed room	0.99	10.6	9.3	2.63	34%	1.34	2.00	0.47	0.70	203	300	67	100	298	100	2.00	0.7
14	01	A-102	Living-Kitchen	3.13	19.1	16.4	3.26	25%	2.08	2.00	0.73	0.70	314	300	104	100	462	200	3.10	1.3
15	01	A-102	Living-Kitchen	0.99	13.7	7.3	2.85	34%	1.14	2.00	0.40	0.70	172	300	57	100	253	200	1.70	1.3
16	01	A-102	Bed room	0.99	12.9	7.7	2.77	34%	1.21	2.00	0.42	0.70	182	300	60	100	268	100	1.80	0.7
17	01	A-102	Bed room	0.99	7.0	14.1	3.57	34%	1.81	2.00	0.63	0.70	274	300	90	100	402	100	2.70	0.7
18	01	A-102	Bed room	2.43	11.4	21.3	3.84	34%	3.15	2.00	1.10	0.70	476	300	157	100	700	100	4.70	0.7
19	01	A-103	Bed room	2.67	9.4	28.5	4.85	29%	3.28	2.00	1.15	0.70	496	300	164	100	730	100	4.90	0.7
20	01	A-103	Living-Kitchen	4.17	26.0	16.1	2.47	24%	2.08	2.00	0.73	0.70	314	300	104	100	462	200	3.10	1.3
21	01	A-103	Bed room	2.67	13.3	20.0	3.29	29%	2.61	2.00	0.91	0.70	395	300	130	100	581	100	3.90	0.7
22	01	B-001	Living-Kitchen	4.17	25.4	16.4	2.32	22%	2.01	2.00	0.70	0.70	304	300	100	100	447	200	3.00	1.3
23	01	B-102	Living-Kitchen	4.17	27.8	15.0	2.81	25%	2.08	2.00	0.73	0.70	314	300	104	100	462	200	3.10	1.3
24	01	B-102	Bed room	2.67	10.1	26.4	2.78	30%	3.22	2.00	1.13	0.70	486	300	160	100	715	100	4.80	0.7
25	01	B-102	Bed room	2.67	10.1	26.4	2.78	30%	3.22	2.00	1.13	0.70	486	300	160	100	715	100	4.80	0.7
26	01	C-102	Bed room	2.67	11.4	23.4	3.84	31%	3.15	2.00	1.10	0.70	476	300	157	100	700	100	4.70	0.7
27	01	D-101	Bed room	2.67	11.3	23.6	2.61	31%	3.15	2.00	1.10	0.70	476	300	157	100	700	100	4.70	0.7
28	01	E-101	Bed room	2.67	11.8	22.5	3.56	31%	3.08	2.00	1.08	0.70	466	300	154	100	685	100	4.60	0.7
29	02	A-201	Living-Kitchen	4.17	26.0	16.1	3.49	27%	2.35	2.00	0.82	0.70	355	300	117	100	522	200	3.50	1.3
30	02	A-201	Bed room	0.99	10.6	9.3	2.63	37%	1.47	2.00	0.52	0.70	223	300	74	100	328	100	2.20	0.7
31	02	A-202	Living-Kitchen	3.13	19.6	16.0	3.18	26%	2.08	2.00	0.73	0.70	314	300	104	100	462	200	3.10	1.3
32	02	A-202	Living-Kitchen	0.99	13.7	7.3	2.85	37%	1.21	2.00	0.42	0.70	182	300	60	100	268	200	1.80	1.3
33	02	A-202	Bed room	0.99	12.9	7.7	2.77	37%	1.27	2.00	0.45	0.70	193	300	64	100	283	100	1.90	0.7
34	02	A-202	Bed room	0.99	7.0	14.1	3.57	37%	1.94	2.00	0.68	0.70	294	300	97	100	432	100	2.90	0.7
35	02	A-202	Bed room	2.43	11.4	21.3	3.84	37%	3.35	2.00	1.17	0.70	507	300	167	100	745	100	5.00	0.7
36	02	A-203	Bed room	2.67	9.4	28.5	4.85	30%	3.35	2.00	1.17	0.70	507	300	167	100	745	100	5.00	0.7
37	02	A-203	Bed room	2.67	13.3	20.0	3.29	30%	2.68	2.00	0.94	0.70	405	300	134	100	596	100	4.00	0.7
38	02	A-203	Living-Kitchen	4.17	26.5	15.7	2.42	24%	2.01	2.00	0.70	0.70	304	300	100	100	447	200	3.00	1.3
39	02	B-201	Living-Kitchen	4.17	32.2	13.0	1.89	30%	2.21	2.00	0.77	0.70	334	300	110	100	492	200	3.30	1.3
40	02	B-201	Bed room	2.67	12.5	21.4	2.74	33%	3.08	2.00	1.08	0.70	466	300	154	100	685	100	4.60	0.7

41	02	B-201	Bed room	2.67	11.2	23.8	4.20	33%	3.35	2.00	1.17	0.70	507	300	167	100	745	100	5.00	0.7
42	02	B-202	Bed room	2.93	9.6	30.5	3.56	22%	2.68	2.00	0.94	0.70	405	300	134	100	596	100	4.00	0.7
43	02	B-202	Living-Kitchen	4.07	24.5	16.6	2.62	33%	2.95	2.00	1.03	0.70	446	300	147	100	656	200	4.40	1.3
44	02	B-203	Living-Kitchen	4.17	25.5	16.4	3.07	25%	2.21	2.00	0.77	0.70	334	300	110	100	492	200	3.30	1.3
45	02	B-203	Bed room	2.67	10.1	26.4	2.78	32%	3.48	2.00	1.22	0.70	527	300	174	100	775	100	5.20	0.7
46	02	B-203	Bed room	2.67	10.1	26.4	2.78	32%	3.48	2.00	1.22	0.70	527	300	174	100	775	100	5.20	0.7
47	02	C 101	Bed room	2.67	8.1	32.9	3.27	32%	4.09	2.00	1.43	0.70	618	300	204	100	909	100	6.10	0.7
48	02	C 101	Bed room	2.67	11.4	23.4	3.84	32%	3.22	2.00	1.13	0.70	486	300	160	100	715	100	4.80	0.7
49	02	C 101	Living-Kitchen	4.17	27.0	15.4	2.18	24%	2.08	2.00	0.73	0.70	314	300	104	100	462	200	3.10	1.3
50	02	C-201	Living-Kitchen	3.78	19.7	19.1	2.55	32%	3.08	2.00	1.08	0.70	466	300	154	100	685	200	4.60	1.3
51	02	C-201	Bed room	4.07	12.8	31.8	2.67	33%	4.69	2.00	1.64	0.70	709	300	234	100	1043	100	7.00	0.7
52	02	C-102	Living-Kitchen	5.96	31.3	19.0	2.50	25%	2.68	2.00	0.94	0.70	405	300	134	100	596	200	4.00	1.3
53	02	C-102	Bed room	2.67	11.3	23.6	2.61	32%	3.15	2.00	1.10	0.70	476	300	157	100	700	100	4.70	0.7
54	02	C-102	Bed room	2.67	7.3	36.6	3.64	32%	4.29	2.00	1.50	0.70	648	300	214	100	954	100	6.40	0.7
55	02	D-201	Bed room	2.67	11.8	22.6	3.71	32%	3.08	2.00	1.08	0.70	466	300	154	100	685	100	4.60	0.7
56	02	D-201	Living-Kitchen	5.96	31.7	18.8	2.64	33%	3.55	2.00	1.24	0.70	537	300	177	100	790	200	5.30	1.3
57	02	D-202	Bed room	2.93	12.2	24.1	3.60	29%	3.08	2.00	1.08	0.70	466	300	154	100	685	100	4.60	0.7
58	02	D-202	Living-Kitchen	4.17	25.1	16.6	2.14	27%	2.41	2.00	0.84	0.70	365	300	120	100	536	200	3.60	1.3
59	02	D-101	Living-Kitchen	4.17	17.6	23.7	2.67	25%	2.81	2.00	0.98	0.70	426	300	140	100	626	200	4.20	1.3
60	02	D-101	Living-Kitchen	4.32	22.1	19.6	3.96	33%	3.28	2.00	1.15	0.70	496	300	164	100	730	200	4.90	1.3
61	02	E-101	Bed room	2.67	11.5	23.2	2.44	33%	3.28	2.00	1.15	0.70	496	300	164	100	730	100	4.90	0.7
62	02	E-101	Bed room	1.66	10.1	16.4	2.78	33%	2.28	2.00	0.80	0.70	344	300	114	100	507	100	3.40	0.7
63	02	E-101	Living-Kitchen	5.96	29.9	19.9	3.04	26%	2.95	2.00	1.03	0.70	446	300	147	100	656	200	4.40	1.3
64	03	A-301	Living-Kitchen	4.17	26.5	15.7	2.42	25%	2.14	2.00	0.75	0.70	324	300	107	100	477	200	3.20	1.3
65	03	A-301	Bed room	2.67	9.4	28.5	4.85	31%	3.48	2.00	1.22	0.70	527	300	174	100	775	100	5.20	0.7
66	03	A-301	Bed room	2.67	13.3	20.0	3.29	31%	2.81	2.00	0.98	0.70	426	300	140	100	626	100	4.20	0.7
67	03	B-301	Bed room	2.67	12.5	21.4	2.74	34%	3.15	2.00	1.10	0.70	476	300	157	100	700	100	4.70	0.7
68	03	B-301	Bed room	2.67	11.2	23.8	4.20	34%	3.42	2.00	1.20	0.70	517	300	171	100	760	100	5.10	0.7
69	03	B-301	Living-Kitchen	4.17	32.2	13.0	1.89	31%	2.28	2.00	0.80	0.70	344	300	114	100	507	200	3.40	1.3
70	03	B-302	Bed room	2.93	9.6	30.5	3.56	23%	2.81	2.00	0.98	0.70	426	300	140	100	626	100	4.20	0.7
71	03	B-302	Living-Kitchen	4.07	24.5	16.6	2.62	34%	3.02	2.00	1.05	0.70	456	300	150	100	671	200	4.50	1.3
72	03	B-303	Living-Kitchen	4.17	25.5	16.4	3.07	26%	2.28	2.00	0.80	0.70	344	300	114	100	507	200	3.40	1.3
73	03	B-303	Bed room	2.67	10.1	26.4	2.78	33%	3.55	2.00	1.24	0.70	537	300	177	100	790	100	5.30	0.7
74	03	B-303	Bed room	2.67	10.1	26.4	2.78	33%	3.55	2.00	1.24	0.70	537	300	177	100	790	100	5.30	0.7
75	03	C-301	Bed room	2.67	12.4	21.5	2.63	33%	3.08	2.00	1.08	0.70	466	300	154	100	685	100	4.60	0.7
76	03	C-301	Bed room	2.67	11.3	23.6	4.01	33%	3.28	2.00	1.15	0.70	496	300	164	100	730	100	4.90	0.7
77	03	C-301	Living-Kitchen	4.17	28.0	14.9	2.11	26%	2.14	2.00	0.75	0.70	324	300	107	100	477	200	3.20	1.3
78	03	C-302	Bed room	1.79	9.6	18.6	3.56	32%	2.48	2.00	0.87	0.70	375	300	124	100	551	100	3.70	0.7
79	03	C-302	Living-Kitchen	4.07	26.5	15.4	2.42	34%	2.88	2.00	1.01	0.70	436	300	144	100	641	200	4.30	1.3
80	03	C-303	Living-Kitchen	5.96	27.9	21.3	2.74	25%	2.95	2.00	1.03	0.70	446	300	147	100	656	200	4.40	1.3
81	03	C-303	Bed room	1.66	10.6	15.6	2.63	32%	2.14	2.00	0.75	0.70	324	300	107	100	477	100	3.20	0.7
82	03	C-303	Bed room	2.67	10.6	25.1	2.63	32%	3.42	2.00	1.20	0.70	517	300	171	100	760	100	5.10	0.7
83	03	D-301	Bed room	2.67	12.2	21.9	3.60	32%	3.15	2.00	1.10	0.70	476	300	157	100	700	100	4.70	0.7
84	03	D-301	Living-Kitchen	5.96	30.5	19.5	2.74	34%	3.75	2.00	1.31	0.70	567	300	187	100	834	200	5.60	1.3
85	03	D-302	Bed room	2.93	12.2	24.1	3.60	30%	3.22	2.00	1.13	0.70	486	300	160	100	715	100	4.80	0.7
86	03	D-302	Living-Kitchen	4.17	25.1	16.6	2.14	28%	2.55	2.00	0.89	0.70	385	300	127	100	566	200	3.80	1.3
87	03	D-303	Living-Kitchen	5.96	29.6	20.1	2.95	26%	2.88	2.00	1.01	0.70	436	300	144	100	641	200	4.30	1.3
88	03	D-303	Bed room	2.67	11.2	23.9	2.92	34%	3.42	2.00	1.20	0.70	517	300	171	100	760	100	5.10	0.7
89	03	D-303	Bed room	1.66	10.5	15.8	2.96	34%	2.28	2.00	0.80	0.70	344	300	114	100	507	100	3.40	0.7
90	03	E-301	Bed room	2.67	10.6	25.1	2.63	34%	3.55	2.00	1.24	0.70	537	300	177	100	790	100	5.30	0.7
91	03	E-301	Bed room	1.66	9.5	17.5	4.12	34%	2.41	2.00	0.84	0.70	365	300	120	100	536	100	3.60	0.7
92	03	E-301	Living-Kitchen	5.96	29.3	20.4	3.11	27%	3.08	2.00	1.08	0.70	466	300	154	100	685	200	4.60	1.3
93	03	E-302	Bed room	1.66	14.0	11.8	2.78	36%	2.01	2.00	0.70	0.70	304	300	100	100	447	100	3.00	0.7
94	03	E-302	Living-Kitchen	7.10	31.5	22.5	3.17	29%	3.62	2.00	1.27	0.70	547	300	181	100	805	200	5.40	1.3
95	03	E-303	Bed room	2.93	12.3	23.8	3.96	34%	3.55	2.00	1.24	0.70	537	300	177	100	790	100	5.30	0.7
96	03	E-303	Living-Kitchen	4.17	25.8	16.1	1.69	31%	2.61	2.00	0.91	0.70	395	300	130	100	581	200	3.90	1.3

Table 5.1: Calculation results: Daylight performance of proposed development.

5.3 Daylight reception of proposed development conclusion

For the daylight assessment, results have been analysed within these standards:

- Assessed in accordance with IS EN17037 / BS EN17307, carried out in accordance with Method 1 and Method 2 described in the methodology section.
- Assessed in accordance with BS EN 17037:2018 National Annex.

The results from table 5.1 are reviewed under each standard below.
The daylight reception assessment has been targeted to all habitable rooms within the proposed development on the ground, first, second and third floor.

IS EN17037 / BS EN17307:
To achieve recommendations outlined in IS EN 17037:2018 / BS EN 17307:2018, a given room must achieve: a target daylight factor of 2.0% or in terms of illuminance 300 lux on over 50% of the floor area for over 50% of the available daylight hours. And a minimum target daylight factor of 0.7% or in terms of illuminance 100 lux on over 95% of the floor area for over 50% of the available daylight hours. From the calculation result table 5.1 we note the majority of the new proposed rooms calculated daylight results achieved in excess of the minimum guidelines.

- Residential rooms achieved an average daylight factor (DF) of 2.7% and an illuminance of 407 lux on over 50% of the floor area for over 50% of the available daylight hours. An average DF of 0.94% and an illuminance of 134lux on over 95% of the floor area for over 50% of the available daylight hours was achieved.
- Overall compliance for proposed development block A=66% - rooms falling below guidelines are rooms facing Gerald Griffin Street.
- Overall compliance for proposed development block B=100%
- Overall compliance for proposed development block C=94%
- Overall compliance for proposed development block D=100%

It is important to note the following:
Within the BS EN 17037 it acknowledges that a rigid application of the European Standard could prove to be a difficult task as it offers only a single target for new buildings and IS EN17037 currently has no specific National Annex. These limitations can sometimes make it unsuitable for use in planning policy or during planning applications. In an urban environment it can more often be the case that complete fulfilment with the guidelines is not attainable. The BRE also states that the advice provided in the guide is not mandatory and should be interpreted flexibly.
The British Annex of BS EN 17037, daylight recommendations differ depending on the function of a room and offers minimum daylight provision targets for kitchens, living rooms and bedrooms. Therefore, Given the similarity of weather, light and design patterns between Ireland and the UK and the lack of specific localisation Annex details in the Irish version, the alternate minimum daylight provision targets set out in the national annex of BS EN 17037 are reviewed next.

BS EN 17037:2018 National Annex:
To achieve the alternate minimum daylight recommendations for Ireland (Dublin), the room in question must achieve: Kitchen 1.3% target daylight factor or in terms of illuminance 200 lux. Living room 1.0% target daylight factor or in terms of illuminance 150 lux, and bedrooms 0.7% target daylight factor or in terms of illuminance 100 lux all over 50% of the floor area for over half the daylight hours. From the calculation result table 5.1 we note that all of the rooms calculated daylight are comfortably in excess of these minimum guidelines.

- Overall compliance for proposed development= 100%
- Given the results and conclusions above we, DKP, deem the proposed development to be in line with the recommendations in BS EN 17037:2018 National Annex.

In summary, in a built-up environment it can often be the case that complete fulfilment with the guidelines is not attainable due. The BRE also states that the advice provided within the guide is not mandatory and should be interpreted flexibly. The calculation results have achieved high compliance (i.e. 85%) under IS EN17037 / BS EN17307 and full compliance (100%) under BS EN 17037:2018 National Annex guidelines.

The compensatory measures for rooms falling below IS EN17037 / BS EN17307 recommendations are as follows:

- The nature and unique character of the existing street environment is being retained. (The rooms facing Gerald Griffin Street).
- Internal finishes and fixtures will be of a high quality.
- Lighting and fittings will be high quality modern LED lighting.

5.4 Calculation result table II

The rooms failing recommendations outlined in IS EN 17037:2018 / BS EN 17307:2018 are receptor no. 2, 4, 5, 6, 13, 15, 16, 17, 30, 32, 33, and 34. These rooms all face Gerald Griffin Street. The daylight analysis found the window/ glass area to be smaller in area (m2) compared to the rest of the proposed blocks. For comparison purposes the receptors were examined again with window areas proposed in the first planning application. The results table below provide the calculation results of the receptors / rooms. IS EN17037 / BS EN17037 daylight factor and illuminance levels are provided.

Receptor	Level/Floor	Block /Unit ID	Room / type	glass area m2	room area m2	glass ratio %	Dept/Width	∑ VSC ∟ (total)	ISEN17037 DAY LIGHT FACTOR				ISEN17037 ILLUMINANCE			
									50% area 50% sun hrs		95% area 50% sun hrs		50% area 50% sun hrs		95% area 50% sun hrs	
									%	min %	%	min %	lx	min lx	lx	min lx
2	00	A-001	Bed room	2.66	10.6	25.0	2.63	32%	3.35	2.00	1.17	0.70	507	300	167	100
4	00	A-002	Living-Kitchen	2.66	13.7	19.5	2.85	32%	2.81	2.00	0.98	0.70	426	300	140	100
5	00	A-002	Bed room	2.66	12.9	20.6	2.77	32%	2.95	2.00	1.03	0.70	446	300	147	100
6	00	A-002	Bed room	2.66	7.0	37.8	3.57	32%	4.42	2.00	1.55	0.70	669	300	221	100
13	01	A-101	Bed room	2.66	10.6	25.0	2.63	34%	3.55	2.00	1.24	0.70	537	300	177	100
15	01	A-102	Living-Kitchen	2.66	13.7	19.5	2.85	34%	3.02	2.00	1.05	0.70	456	300	150	100
16	01	A-102	Bed room	2.66	12.9	20.6	2.77	34%	3.15	2.00	1.10	0.70	476	300	157	100
17	01	A-102	Bed room	2.66	7.0	37.8	3.57	34%	4.76	2.00	1.66	0.70	719	300	237	100
30	02	A-201	Bed room	2.66	10.6	25.0	2.63	37%	3.82	2.00	1.34	0.70	578	300	191	100
32	02	A-202	Living-Kitchen	2.66	13.7	19.5	2.85	37%	3.22	2.00	1.13	0.70	486	300	160	100
33	02	A-202	Bed room	2.66	12.9	20.6	2.77	37%	3.35	2.00	1.17	0.70	507	300	167	100
34	02	A-202	Bed room	2.66	7.0	37.8	3.57	37%	5.09	2.00	1.78	0.70	770	300	254	100

Table 5.2: Calculation results: Daylight performance of proposed development, second examination.

From the calculation result table 5.2 we note all of the new proposed rooms calculated daylight results achieved in well excess of the minimum guidelines.

Sunlight Reception

Sunlight in the new proposed amenity areas:

5.5 **Receptor selection - Amenity spaces within the proposed development**
Image 5.5 below indicates the communal open space amenity area that have been selected and analysed on the basis that the shadow casted from the proposed development may affect the amenity areas given its geographical location in relation to the development. These areas are identified below and labelled for reference in the results.

Image 5.5: New proposed amenity space within the development.

Receptor	Amenity Description	Amenity area (m²)
A	Communal open space	960.0

Table 5.3: List of new proposed amenity spaces.

5.6 Calculation result table

The result table below provides a summary of the calculation results of the proposed amenity areas. It shows the overall hours of sunlight on March 21st together with the 'to-be-achieved' BRE minimum sunlight standards. Appendix B provides the full calculation results of the proposed amenity areas. The calculation results have been given the following colour code guide depending on its level of resulting compliance.

Compliance guide

☑	0%	Over /equal to
☑	5%	Within
!!	10%	Within
x	10%	In excess of

Amenity space ID ref	Amenity space area (m²)	Achieved daily sun time * area	Achieved total sun time (hrs)	Required sun hours @ 50% area	Achieved sun hours on @ 50% area
A	960.0	258624.0	4.49	2.0	4.0

Table 5.4: Calculation results: Summary table of sunlight analysis of proposed amenity space communal.

5.7 Sunlight reception – amenity areas of the proposed development conclusion

Based on the BRE guidelines at least 50% of the amenity space should receive at least two hours of sunlight on the 21st of March. From the calculation results in table 5.4 we note the selected amenity space achieved sunlight above the recommended guidelines, see image 5.5 for receptor/amenity space location. Summary of results are as follows:

- The calculated sunlight on at least 50% of the area on March 21st for the communal amenity area is 4.0 hours.

This confirms the proposed amenity area will be adequately sunlit throughout the year. We conclude that the new amenity space receive sunlight on 50% of the area is in line with the recommendations of the BRE Report - Site Layout and Planning for Daylight and Sunlight - and therefore deem these to be compliant to this element.

6 Impact of proposed development – Calculation results and conclusion

The impact of the proposed development calculations and assessments is broken into two sections, impact on daylight reception and impact on sunlight reception.

Impact on Daylight Reception:

Vertical sky component (VSC):

6.1 **Receptor selection – Buildings / windows neighbouring the proposed development**
The VSC assessment has been targeted to habitable neighbouring windows / rooms / dwellings that are perceived to be in challenging locations i.e., ground floor rooms and dwellings/rooms in the vicinity of the new proposed development on the basis that if these habitable rooms pass the minimum requirements all rooms at higher levels will definitely pass the minimum recommendations as a result of the improving vertical sky view angle. Image 6.1-6.6 below indicates the windows that have been selected and analysed. The windows are identified and labelled for reference in the results.

Image 6.1: Daylight impact: Neighbouring receptors – Overall view (receptor no. 1 - 29).

Image 6.2: Daylight impact: Neighbouring receptors – (receptor no. 1 - 11 & 27 - 29). Imagery © Google 2024.

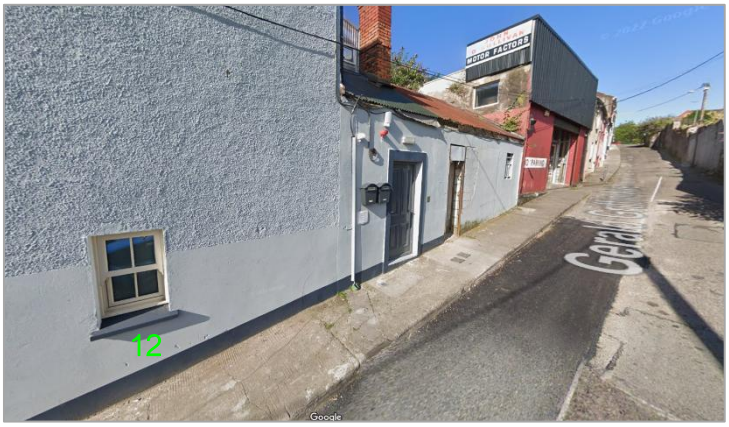


Image 6.3: Daylight impact: Neighbouring receptors – (receptor no. 12). Imagery © Google 2024.

Image 6.4: Daylight impact: Neighbouring receptors – (receptor no. 13 - 18). Imagery © Google 2024.

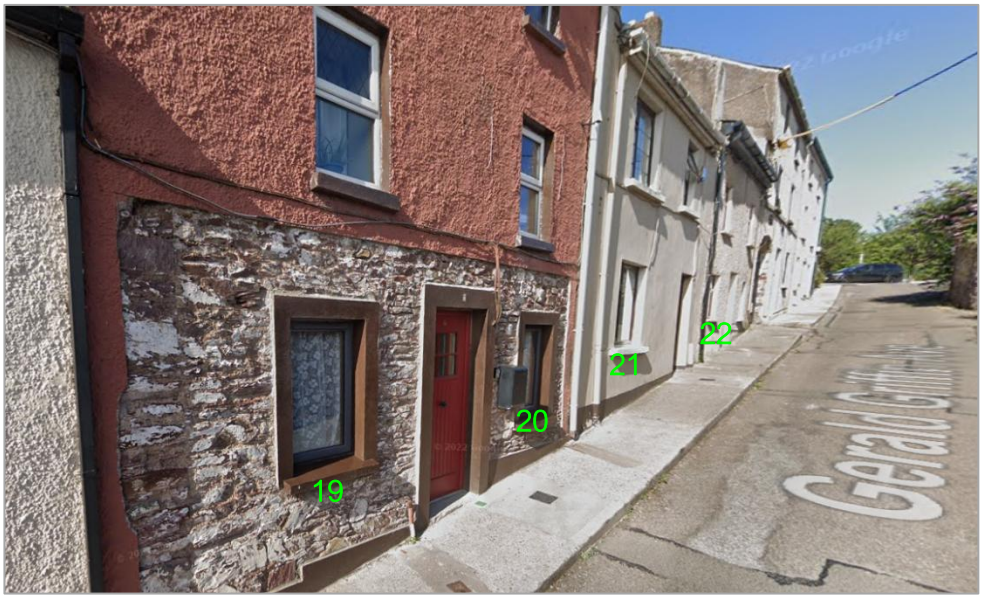


Image 6.5: Daylight impact: Neighbouring receptors – (receptor no. 19 - 22). Imagery © Google 2024.

Image 6.6: Daylight impact: Neighbouring receptors – (receptor no. 23 - 26). Imagery © Google 2024.

Receptor/window *	Level	Location / Address	Dwelling description
1, 2	00	Allinetts Court, Gerald Griffin Street, Blackpool, Cork	Residential
3, 4	00	18/19 Gerald Griffin Street, Blackpool, Cork	Residential
5	00	20 Gerald Griffin Street, Blackpool, Cork	Residential
6, 7, 8, 9	00	21 Gerald Griffin Street, Blackpool, Cork	Residential
10, 11	00	22 Gerald Griffin Street, Blackpool, Cork	Residential
12	00	84 Gerald Griffin Street, Blackpool, Cork	Residential
13, 14	00	4 Gerald Griffin Avenue, Cork	Residential
15, 16	00	5 Gerald Griffin Avenue, Cork	Residential
17, 18	00	6 Gerald Griffin Avenue, Cork	Residential
19, 20	00	7 Gerald Griffin Avenue, Cork	Residential
21	00	8 Gerald Griffin Avenue, Cork	Residential
22, 23	00	9 Gerald Griffin Avenue, Cork	Residential
24	00	10 Gerald Griffin Avenue, Cork	Residential
25, 26	00	11 Gerald Griffin Avenue, Cork	Residential
27, 28	00	88 Gerald Griffin St, Blackpool, Cork	Residential
29	00	89 Gerald Griffin St, Blackpool, Cork	Residential

Table 6.1: List of receptors selected for analysis.

* The BRE report outlines VSC guidelines are intended for use for rooms where daylight is required, including living rooms, kitchens and bedrooms. Windows to bathrooms, toilets, storerooms, circulation areas and garages need not be analysed or commercial premises.

* The windows have been calculated as ground floor receptors. On the basis that if these habitable rooms pass the minimum requirements all rooms at higher levels will definitely pass the minimum recommendations as a result of the improving vertical sky view angle.

* A number of the windows selected here could potentially be windows to a bathroom, WC, storeroom or circulation area and the room may not need to be examined. However, for the purpose of this report they have all been presumed as potentially habitable.

6.2 Calculation result table

The VSC has been calculated for potentially affected windows within the neighbouring/adjacent properties. Locations of receptors are based on guideline recommendations for the closest facades which have windows with potential for impact. The change factor or effect on daylight reception in an existing habitable room should not be affected by more than 20% i.e., a maximum change factor of 0.8. The column named comment/effect describes the level of change an assessed window will experience, based on its compliance with the BRE target. A list of definitions can be found in section 4.8 of this report. To identify the status of the change factor in the tables below we use the following colour code guide depending on its level of resulting compliance status. The summary result table below provides the VSC calculation results. Appendix C provides the full calculation result table.

Compliance guide

☑	0%	Over /equal to
☑	5%	Within
!!	10%	Within
x	10%	In excess of

Receptor ID	Existing baseline VSC value [%]	Proposed VSC value [%]	Change factor	Comment / Effect of proposed development
Receptor 1	24%	23%	0.95	Negligible
Receptor 2	26%	24%	0.93	Negligible
Receptor 3	28%	25%	0.87	Negligible
Receptor 4	29%	25%	0.86	Negligible
Receptor 5	30%	24%	0.81	Negligible
Receptor 6	30%	24%	0.80	Negligible
Receptor 7	30%	24%	0.80	Negligible
Receptor 8	30%	24%	0.81	Negligible
Receptor 9	30%	25%	0.83	Negligible
Receptor 10	28%	25%	0.87	Negligible
Receptor 11	27%	25%	0.90	Negligible
Receptor 12	28%	22%	0.80	Negligible
Receptor 13	32%	27%	0.83	Negligible
Receptor 14	32%	27%	0.83	Negligible
Receptor 15	32%	27%	0.83	Negligible
Receptor 16	33%	27%	0.82	Negligible
Receptor 17	33%	27%	0.82	Negligible
Receptor 18	33%	27%	0.82	Negligible
Receptor 19	33%	26%	0.80	Negligible
Receptor 20	33%	27%	0.81	Negligible
Receptor 21	33%	27%	0.81	Negligible
Receptor 22	33%	27%	0.81	Negligible
Receptor 23	33%	27%	0.81	Negligible
Receptor 24	33%	27%	0.82	Negligible
Receptor 25	33%	27%	0.82	Negligible
Receptor 26	33%	27%	0.82	Negligible
Receptor 27	33%	26%	0.80	Negligible
Receptor 28	33%	28%	0.86	Negligible
Receptor 29	33%	29%	0.88	Negligible

Table 6.2: Calculation results: Summary table of VSC results.

6.3 Impact on daylight reception conclusion

The BRE recommends that the effects of a new development on daylight reception should not impact any existing VSC by more than 20% or have a maximum change factor in excess of 0.80. From the calculation results we note all selected neighbouring habitable receptors are affected to some degree with regards to daylight reception due to the introduction of the proposed development in their respective habitable rooms facing the proposed development. The calculated change in daylight reception in all of the neighbouring receptors/windows achieved a change factor ranging from 0.80 to 0.95. The BRE report outlines VSC guidelines are intended for use for rooms where daylight is required, including living rooms, kitchens and bedrooms. Properties used for habitable purposes have been assessed therefore properties occupied by commercial units have not been applied to the VSC assessment. Summarized result findings are as follows (see image 6.1-6.6 for receptor locations):

- East / South east receptors: Receptors 1 to 11: Dwellings located on the Gerald Griffin Street with ground floor windows were examined and resulted in a change factor range of 0.80 to 0.95. These receptors are well within the guidelines and the effect is determined as negligible under BRE definitions.
- South / South west receptors: Receptors 12 to 26: Dwellings located on the Gerald Griffin Avenue with ground floor windows were examined and resulted in a change factor range of 0.80 to 0.83. These receptors are within the guidelines and the effect is determined as negligible.
- North east receptors: Receptors 27 to 29: Dwellings located on the Gerald Griffin Avenue (north) with ground floor windows were examined and resulted in a change factor range of 0.80 to 0.88. These receptors are within the guidelines and the effect is determined as negligible.
- Overall, the average change ratio for VSC is 0.84.

We conclude that the new proposed development's effect on daylight reception in the neighbouring rooms are all within the constraints and recommendations of the BRE Report – Site Layout and Planning for Daylight and Sunlight BR209 2022, and we therefore deem the proposed development to be compliant with this element.

Impact on Sunlight Reception:

Sunlight in existing amenity areas:

6.4 **Receptor selection – Existing amenity spaces**

The sunlight reception assessment is targeted to neighbouring amenity spaces that might be affected by the introduction of the new proposed development. BR 209 (2022) outlines sunlight checks should include gardens, parks & playing fields, playgrounds, swimming pools, areas of recreational water, moorings, sitting out areas and nature reserves. Image 6.7 below indicates the neighbouring amenity areas selected and analysed on the basis that the shadow casted from the new development may impact these amenity areas given its geographical location in relation to the proposed development. These areas are identified below and labelled for reference in the results. From observation there is no existing amenity areas located East and South.

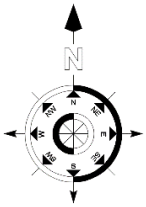


Image 6.7: Sunlight impact: Existing neighbouring amenity spaces. Imagery © Google 2024.

Image 6.8: Sunlight impact: Existing neighbouring amenity spaces. 2D drawing view.

Receptor	Location / Address	Amenity description	Approx. area (m^2)
1	Redemption Rd, Blackpool, Cork	Public open space amenity area	250
2	Iona, 30 Redemption Rd, Blackpool, Cork	Private amenity area	200
3	88-89 Gerald Griffin St, Blackpool, Cork	Private amenity area	180

Table 6.3: Sunlight impact: List of existing neighbouring amenity spaces.

6.5 Calculation result table

The table below provides a summary of the calculation results of the selected amenity space before and after the introduction of the new proposed development. Under the BRE guidelines any loss of sunlight in existing neighbouring amenity spaces as a result of the new development should not be greater than 0.8 times (maximum 20% reduction) its former size. The column named comment/effect describes the level of effect an assessed window will experience, based on its compliance with the BRE target. A list of definitions can be found in the section 4.8 of this report. Appendix D provides the full calculation results of the amenity areas. To identify the status of the change factor the following colour code guide is used depending on its level of resulting compliance status.

Compliance guide

☑	0%	Over /equal to
☑	5%	Within
!!	10%	Within
x	10%	In excess of

Amenity space ID	Amenity space area (m^2)	EXISTING STATUS			NEW STATUS			Change factor	Comment / effect of proposed development
		sun hours * amenity space area (Sun Hr*m^2)	total sun hours (Sun Hr)	sun hours on 50% of the area	sun hours * amenity space area (Sun Hr*m^2)	total sun hours (Sun Hr)	sun hours on 50% of the area		
1	250	110850	7.39	8.0	106650	7.11	8.0	0.97	Negligible
2	200	81240	6.77	9.0	81240	6.77	9.0	1.00	Negligible
3	180	44280	4.10	6.0	31104	2.88	3.0	0.80	Negligible

Table 6.4: Calculation results: summary table of sunlight impact of existing neighbouring amenity spaces.

6.6 Impact on sunlight reception conclusion

Based on the BRE guidelines at least 50% of the amenity space should receive at least two hours of sunlight on the 21st of March and that and any loss of sunlight should not be greater than 0.8 (20% reduction) times its former size. From the calculation results we note that all the existing amenity spaces received 2 hours of sunlight or more on at least 50% of the area before and after the introduction of the new development. Summary of results are as follows (see image 6.7 for receptor locations):

- North west receptors: Receptor no. 1 is an area of public amenity area. The receptor resulted in a change factor of 097. The change happens in the morning hours of 09.00-12.00. The calculation findings are comfortably within guidelines, and the effect is determined as negligible under BRE definitions. Receptor no. 2 is a private amenity area. The receptor resulted in a change factor of 1.00, meaning the new proposed development will have no sunlight impact on this area.
- North east receptor: Receptor no. 3 is a private amenity area. The receptor resulted in a change factor of 0.80. The change happens in the afternoon hours of 13.00-17.00. The calculation finding is within the minimum recommended guidelines, and the effect is determined as negligible under BRE definitions.

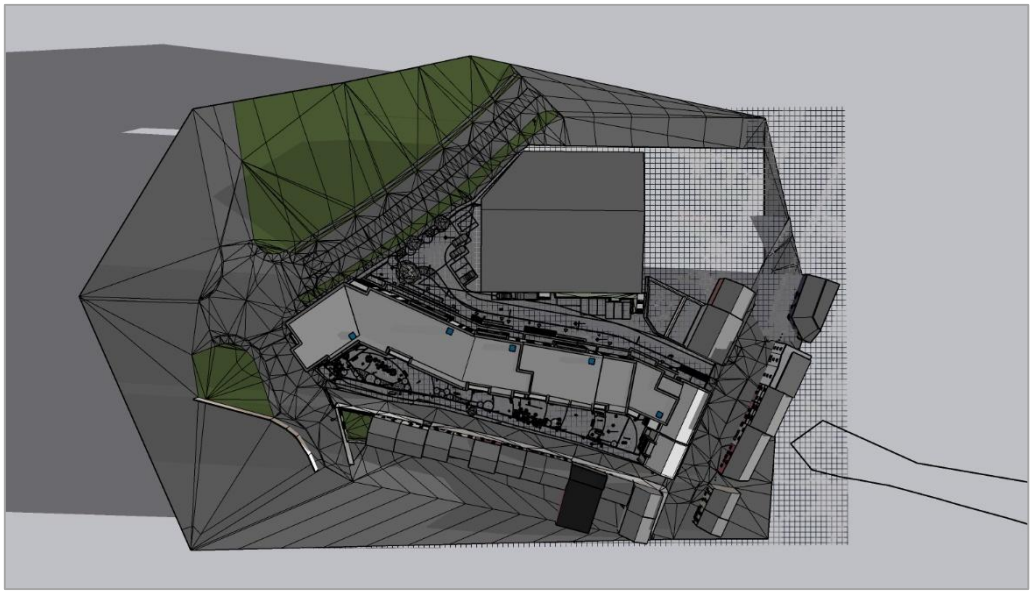
We conclude that the new proposed development's effect on daylight reception in the neighbouring rooms are all within the constraints and minimum recommendations of the BRE Report – Site Layout and Planning for Daylight and Sunlight BR209 2022, and we therefore deem the proposed development to be compliant with this element.

Appendix A

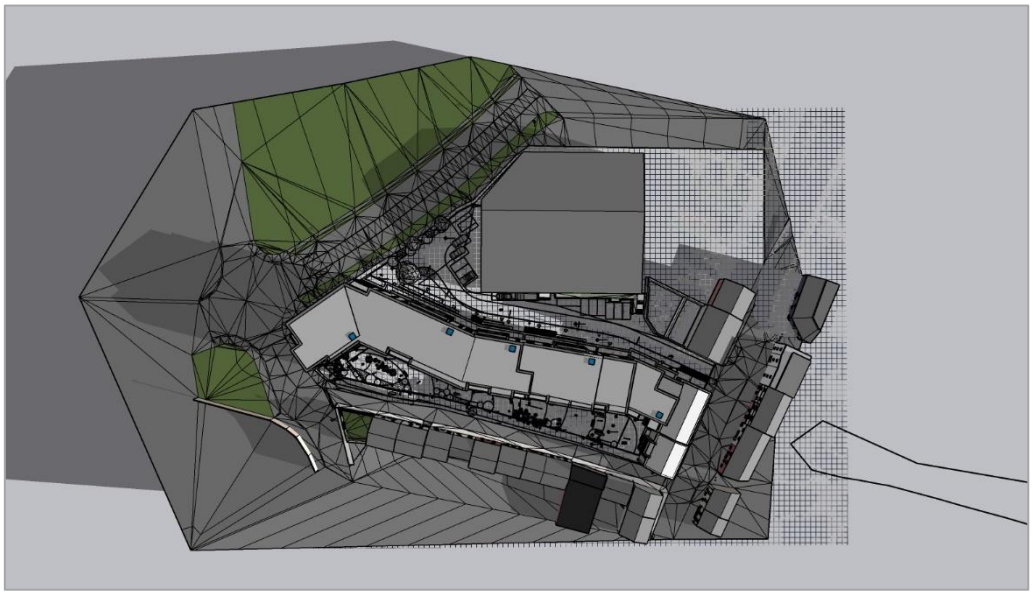
Sunlight analysis illustrations: plotted in one hourly illustration time frames for March 21st (Spring equinox).

Proposed status: 07:00 to 18:00 hours.

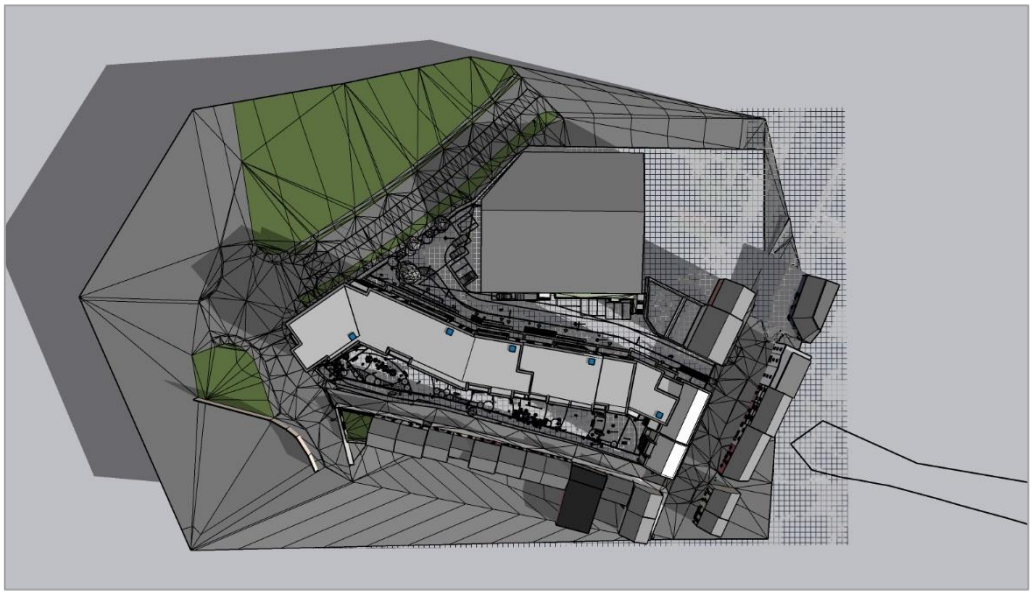
07.00 March 21st



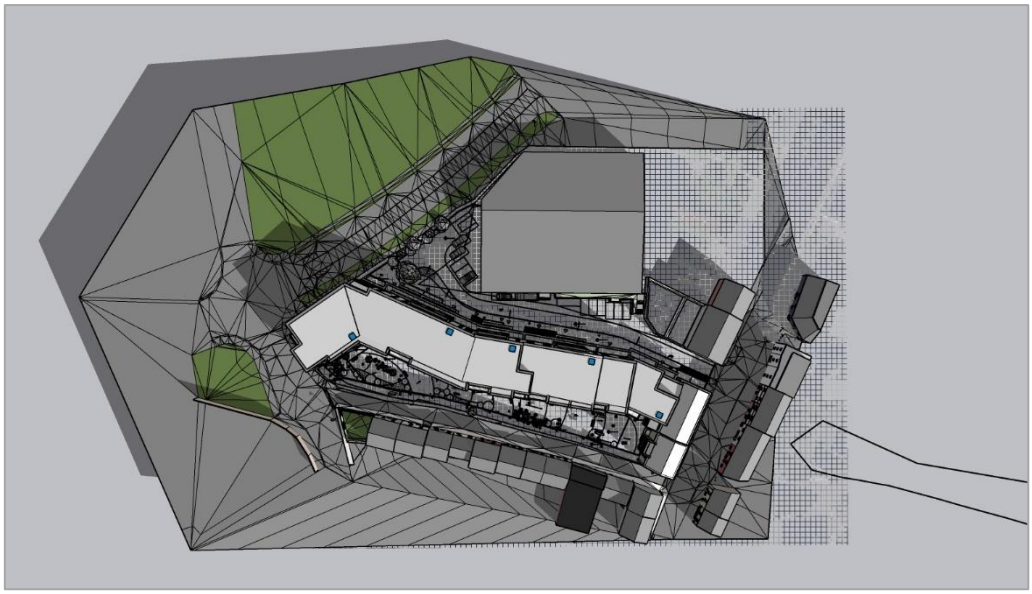
08.00 March 21st



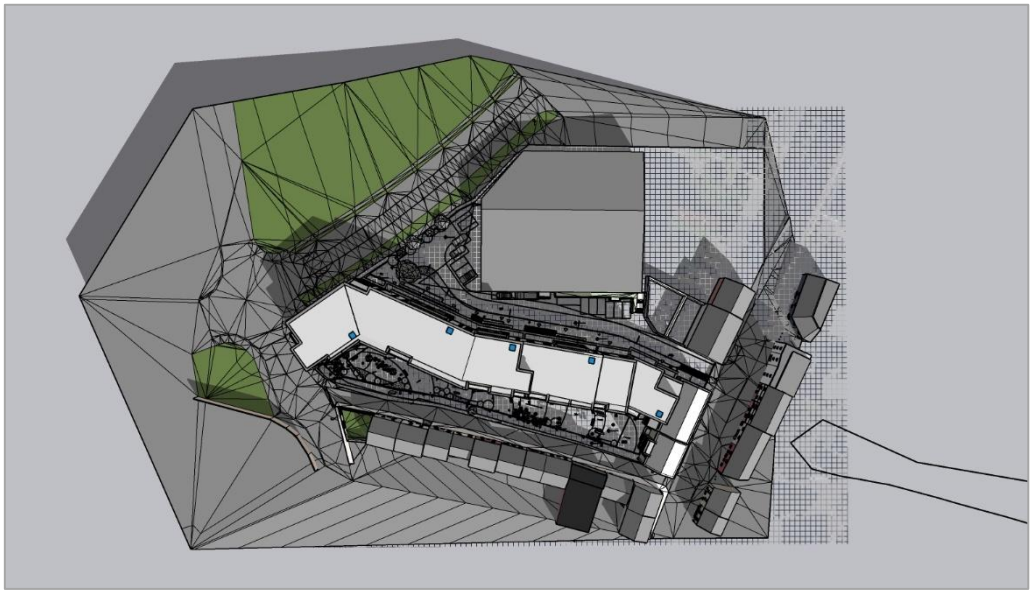
09.00 March 21st



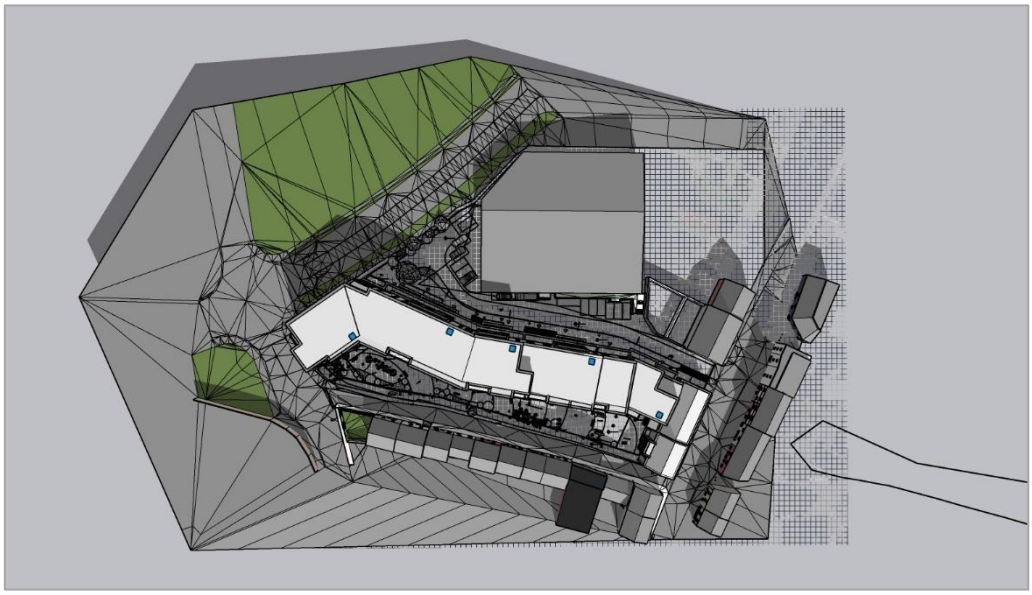
10.00 March 21st



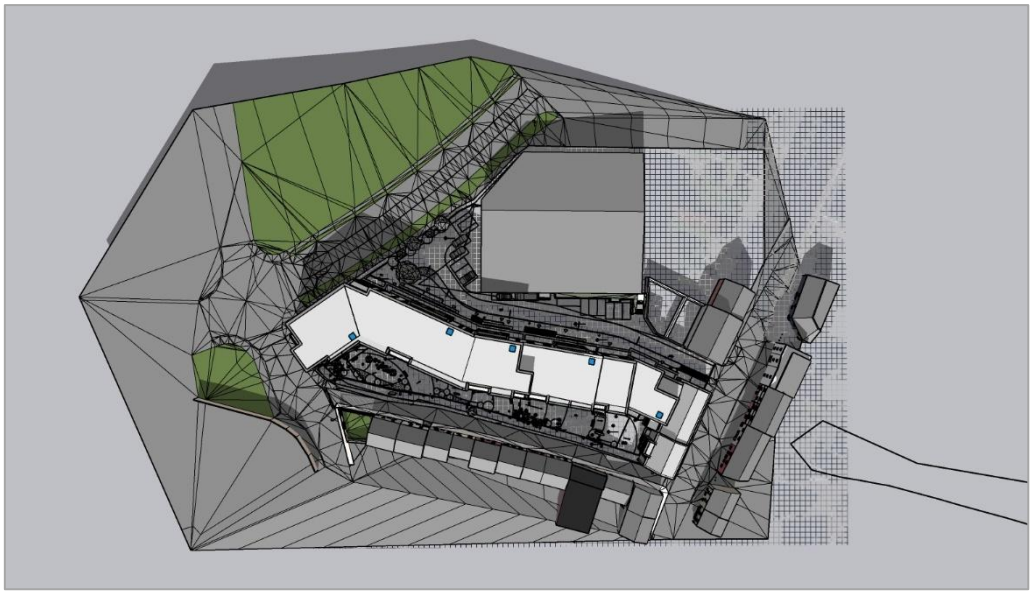
11.00 March 21st



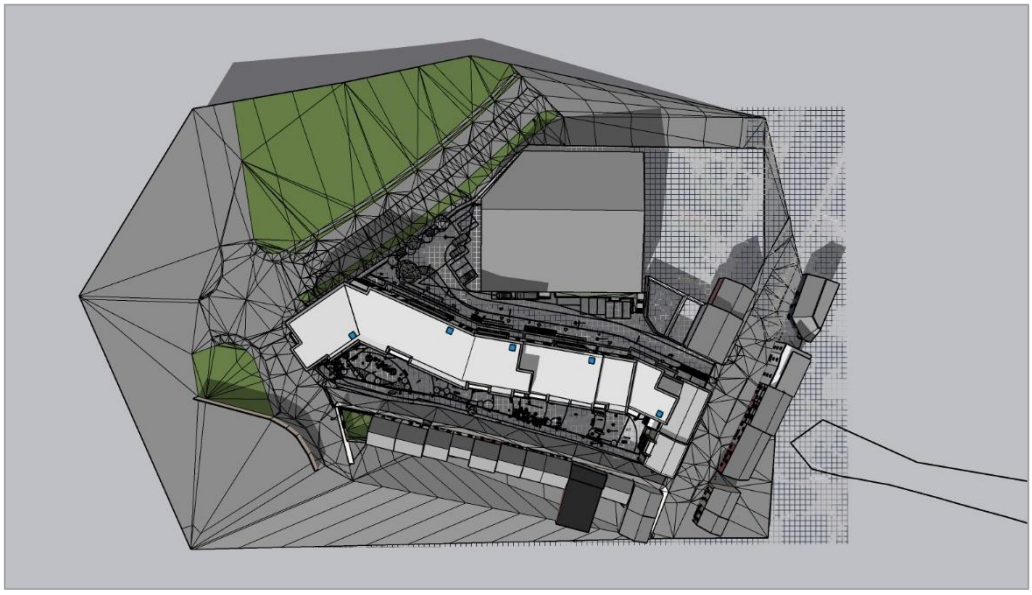
12.00 March 21st



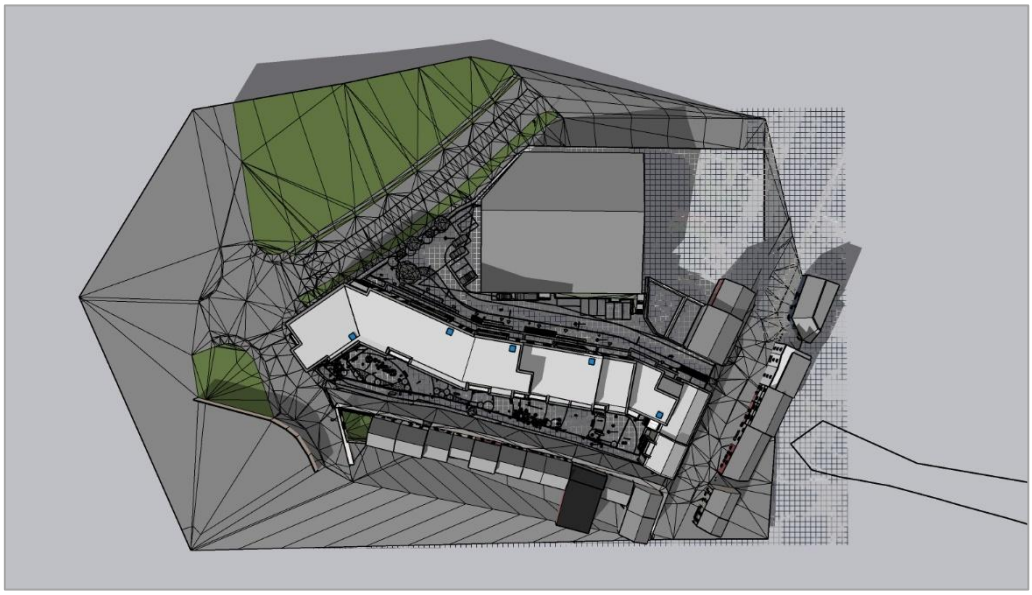
13.00 March 21st



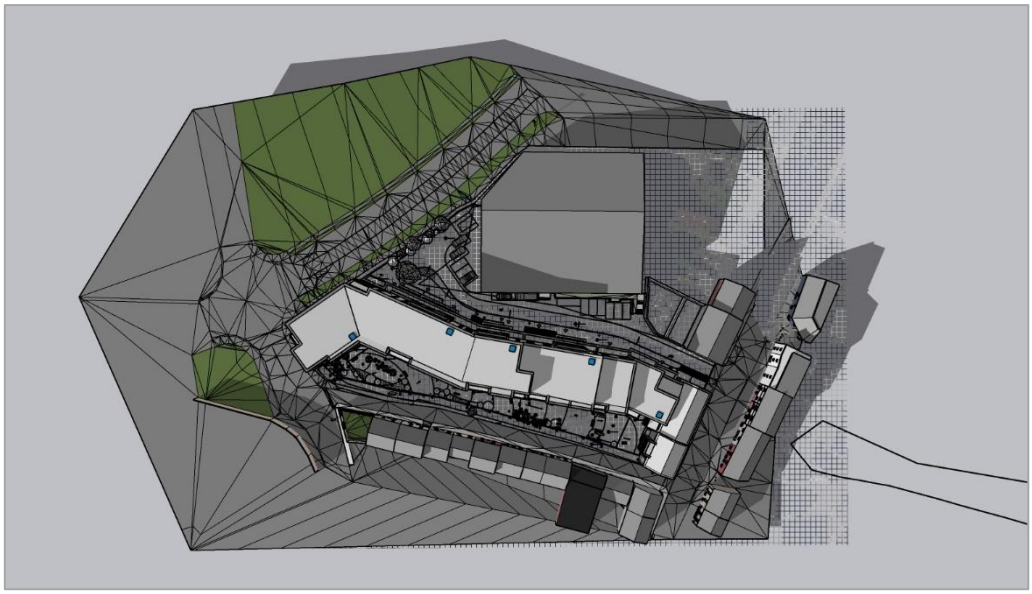
14.00 March 21st



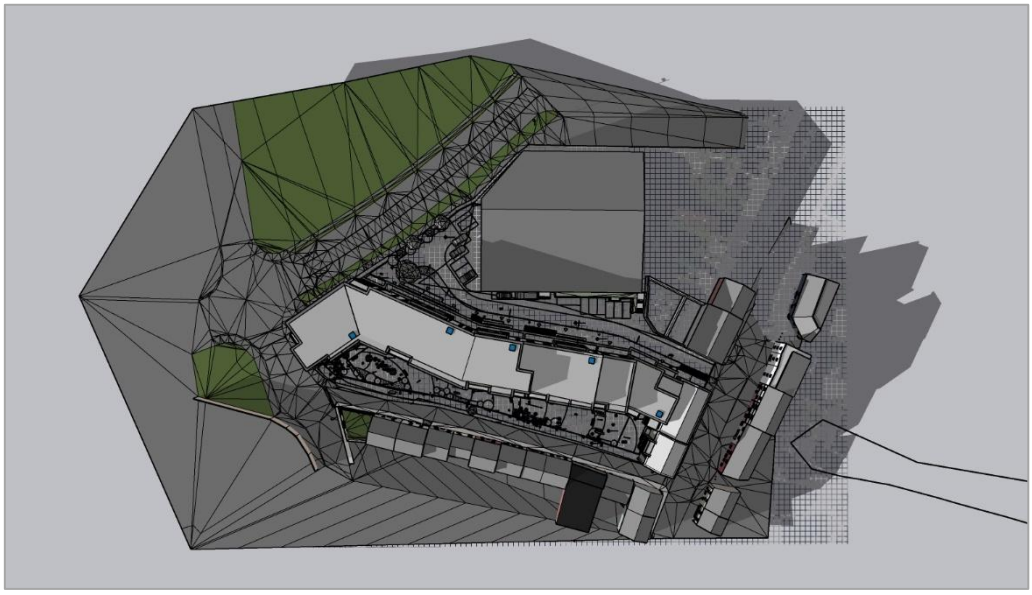
15.00 March 21st



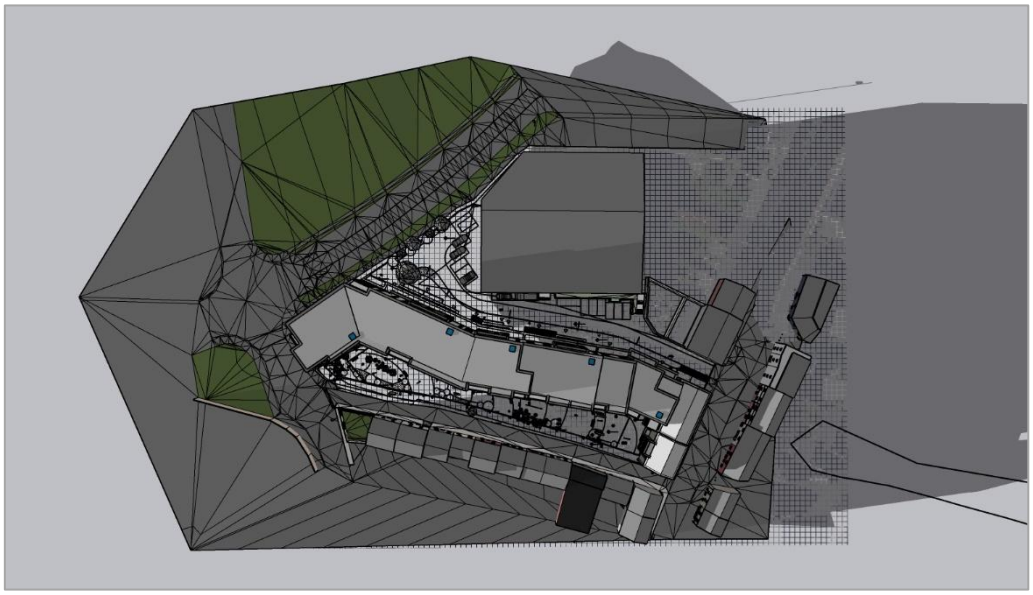
16.00 March 21st



17.00 March 21st



18.00 March 21st



Appendix B

Sunlight calculation results of the developments proposed amenity areas providing the overall hours of sunlight on March 21st together with the recommended BRE sunlight standards.

A				960.00	m2
NEW STATUS				March 21st	
Time	Shadow	Sunlight	Sun time	Sun area	Sun time.area
24 Hr	% / %		min	m2	min*m2
6.00	100%	0%	60	0	0
7.00	88%	12%	60	115	6,912
8.00	43%	57%	60	547	32,832
9.00	31%	69%	60	662	39,744
10.00	35%	65%	60	624	37,440
11.00	46%	54%	60	518	31,104
12.00	55%	45%	60	432	25,920
13.00	61%	39%	60	374	22,464
14.00	65%	35%	60	336	20,160
15.00	69%	31%	60	298	17,856
16.00	77%	23%	60	221	13,248
17.00	86%	14%	60	134	8,064
18.00	95%	5%	60	48	2,880
19.00	100%	0%	60	0	0

Required sun hours @ 50% area	2
Achieved sun hours on @ 50% area	4.00
Achieved total sun time (hrs)	4.49
Achieved daily sun time * area	258624

Appendix C

Daylight calculation results of existing VSC and the VSC after the introduction of the new proposed development.

Receptor 1	EXISTING										NEW										
VSC test distance 33 m	Section 1		Section 2		Section 3		Section 4		∑ Hor	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor	∑ VSC	
Target distance 20m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	133	40	34	13	13	5			180	24%	133	40	34	27	13	5			180	23%	0.95

Receptor 2	EXISTING										NEW										
VSC test distance 33 m	Section 1		Section 2		Section 3		Section 4		∑ Hor	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor	∑ VSC	
Target distance 16m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	105	40	57	13	18	5			180	26%	105	40	57	27	18	5			180	24%	0.93

Receptor 3	EXISTING										NEW										
VSC test distance 33 m	Section 1		Section 2		Section 3		Section 4		∑ Hor	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor	∑ VSC	
Target distance 13m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	96	33	62	12	22	5			180	28%	96	33	62	39	22	5			180	25%	0.87

Receptor 4	EXISTING										NEW										
VSC test distance 33 m	Section 1		Section 2		Section 3		Section 4		∑ Hor	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor	∑ VSC	
Target distance 14m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	86	33	70	12	24	5			180	29%	86	33	70	39	24	5			180	25%	0.86

Receptor 5	EXISTING										NEW										
VSC test distance 33 m	Section 1		Section 2		Section 3		Section 4		∑ Hor	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor	∑ VSC	
Target distance 14m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	54	21	90	15	36	21			180	30%	54	21	90	44	36	21			180	24%	0.81

Receptor 6	EXISTING										NEW										
VSC test distance 33 m	Section 1		Section 2		Section 3		Section 4		∑ Hor	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor	∑ VSC	
Target distance 14m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	48	21	91	15	41	21			180	30%	48	21	91	44	41	21			180	24%	0.80

Receptor 7	EXISTING										NEW										
VSC test distance 33 m	Section 1		Section 2		Section 3		Section 4		∑ Hor	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor	∑ VSC	
Target distance 14m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	42	21	91	15	47	21			180	30%	42	21	91	44	47	21			180	24%	0.80

Receptor 8	EXISTING										NEW										
VSC test distance 33 m	Section 1		Section 2		Section 3		Section 4		∑ Hor	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor	∑ VSC	
Target distance 14m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	37	21	88	15	55	21			180	30%	37	21	88	44	55	21			180	24%	0.81

Receptor 9	EXISTING										NEW										
VSC test distance 33 m	Section 1		Section 2		Section 3		Section 4		∑ Hor	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor	∑ VSC	
Target distance 14m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	33	21	86	15	61	21			180	30%	33	21	86	44	61	21			180	25%	0.83

Receptor 10	EXISTING										NEW										
VSC test distance 33 m	Section 1		Section 2		Section 3		Section 4		∑ Hor	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor	∑ VSC	
Target distance 12m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	89	32	66	13	25	14			180	28%	89	32	66	37	25	14			180	25%	0.87

Receptor 11	EXISTING										NEW										
VSC test distance 33 m	Section 1		Section 2		Section 3		Section 4		∑ Hor	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor	∑ VSC	
Target distance 12m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	104	32	55	13	21	14			180	27%	104	32	55	37	21	14			180	25%	0.90

Receptor 12	EXISTING										NEW										
VSC test distance 33 m	Section 1		Section 2		Section 3		Section 4		∑ Hor	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor	∑ VSC	
Target distance 8m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	49	24	60	14	71	28			180	28%	49	24	60	53	71	31			180	22%	0.80

Receptor 13	EXISTING										NEW										
VSC test distance 51 m	Section 1		Section 2		Section 3		Section 4		∑ Hor	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor	∑ VSC	
Target distance 17m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	180	12							180	32%	15	5	32	18	92	34	41	24	180	27%	0.83

Receptor 14	EXISTING										NEW										
VSC test distance 51 m	Section 1		Section 2		Section 3		Section 4		∑ Hor	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor	∑ VSC	
Target distance 17m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	180	12							180	32%	15	5	27	18	97	34	41	24	180	27%	0.83

Receptor 15

VSC test distance 51 m	EXISTING										NEW										
	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	
Target distance 17m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	180	12							180	32%	15	5	27	18	97	34	41	24	180	27%	0.83

Receptor 16

VSC test distance 51 m	EXISTING										NEW										
	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	
Target distance 17m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	85	10	95	12					180	33%	34	10	104	37	28	17	14	10	180	27%	0.82

Receptor 17

VSC test distance 51 m	EXISTING										NEW										
	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	
Target distance 17m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	85	10	95	12					180	33%	32	10	104	37	28	17	16	10	180	27%	0.82

Receptor 18

VSC test distance 51 m	EXISTING										NEW										
	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	
Target distance 17m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	75	10	105	12					180	33%	13	10	98	37	36	18	33	10	180	27%	0.82

Receptor 19

VSC test distance 51 m	EXISTING										NEW										
	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	
Target distance 16m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	100	10	80	12					180	33%	29	10	94	39	42	21	15	10	180	26%	0.80

Receptor 20

VSC test distance 51 m	EXISTING										NEW										
	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	
Target distance 16m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	105	10	75	12					180	33%	30	10	83	39	52	21	15	10	180	27%	0.81

Receptor 21

VSC test distance 51 m	EXISTING										NEW										
	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	
Target distance 16m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	110	10	70	12					180	33%	32	10	81	39	52	21	15	10	180	27%	0.81

Receptor 22

VSC test distance 51 m	EXISTING										NEW										
	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	
Target distance 16m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	120	10	60	12					180	33%	30	10	96	39	22	21	32	10	180	27%	0.81

Receptor 23

VSC test distance 51 m	EXISTING										NEW										
	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	
Target distance 16m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	125	10	55	12					180	33%	37	10	90	39	34	21	19	10	180	27%	0.81

Receptor 24

VSC test distance 51 m	EXISTING										NEW										
	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	
Target distance 17m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	180	10							180	33%	16	10	47	27	77	35	40	12	180	27%	0.82

Receptor 25

VSC test distance 51 m	EXISTING										NEW										
	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	
Target distance 17m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	180	10							180	33%	16	10	45	27	79	35	40	12	180	27%	0.82

Receptor 26

VSC test distance 51 m	EXISTING										NEW										
	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	
Target distance 18m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	180	10							180	33%	119	33	22	10	39	12			180	27%	0.82

Receptor 27

VSC test distance 51 m	EXISTING										NEW										
	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	
Target distance 8m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	45	11	77	13	58	6			180	33%	45	11	104	39	31	16			180	26%	0.80

Receptor 28

VSC test distance 51 m	EXISTING										NEW										
	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	
Target distance 8m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	76	5	61	22	43	7			180	33%	67	38	61	22	43	7	9	5	180	28%	0.86

Receptor 29

VSC test distance 51 m	EXISTING										NEW										
	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	
Target distance 17m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	69	4	62	22	49	7			180	33%	61	35	62	22	49	7	8	4	180	29%	0.88

Appendix D

Sunlight calculation results of existing amenity spaces before and after the introduction of the new proposed development.

1					250 m2							
EXISTING STATUS					March 21st	**NEW STATUS**					March 21st	change
Time	Shadow	Sunlight	Sun time	Sun area	time * area	Time	Shadow	Sunlight	Sun time	Sun area	time * area	time * area
24 Hr	% / %		min	m2	min*m2	24 Hr	% / %		min	m2	min*m2	min*m2
6.00	100%	0%	60	0	0	6.00	100%	0%	60	0	0	0
7.00	89%	11%	60	28	1,650	7.00	89%	11%	60	28	1,650	0
8.00	58%	42%	60	105	6,300	8.00	58%	42%	60	105	6,300	0
9.00	28%	72%	60	180	10,800	9.00	35%	65%	60	163	9,750	-1,050
10.00	19%	81%	60	203	12,150	10.00	31%	69%	60	173	10,350	-1,800
11.00	17%	83%	60	208	12,450	11.00	25%	75%	60	188	11,250	-1,200
12.00	17%	83%	60	208	12,450	12.00	18%	82%	60	205	12,300	-150
13.00	17%	83%	60	208	12,450	13.00	17%	83%	60	208	12,450	0
14.00	19%	81%	60	203	12,150	14.00	19%	81%	60	203	12,150	0
15.00	19%	81%	60	203	12,150	15.00	19%	81%	60	203	12,150	0
16.00	46%	54%	60	135	8,100	16.00	46%	54%	60	135	8,100	0
17.00	56%	44%	60	110	6,600	17.00	56%	44%	60	110	6,600	0
18.00	76%	24%	60	60	3,600	18.00	76%	24%	60	60	3,600	0
19.00	100%	0%	60	0	0	19.00	100%	0%	60	0	0	0
Required sun hours @ 50% area (hr)					2	Required sun hours @ 50% area (hr)					2	
Achieved sun hours on (hrs) @ 50% area					8.00	Achieved sun hours on (hrs) @ 50% area					8.00	
Achieved total sun time (hrs)					7.39	Achieved total sun time (hrs)					7.11	0.97
Achieved daily sun time * area					110850	Achieved daily sun time * area					106650	0.97

2					200 m2							
EXISTING STATUS					March 21st	**NEW STATUS**					March 21st	change
Time	Shadow	Sunlight	Sun time	Sun area	time * area	Time	Shadow	Sunlight	Sun time	Sun area	time * area	time * area
24 Hr	% / %		min	m2	min*m2	24 Hr	% / %		min	m2	min*m2	min*m2
6.00	100%	0%	60	0	0	6.00	100%	0%	60	0	0	0
7.00	90%	10%	60	20	1,200	7.00	90%	10%	60	20	1,200	0
8.00	48%	52%	60	104	6,240	8.00	48%	52%	60	104	6,240	0
9.00	29%	71%	60	142	8,520	9.00	29%	71%	60	142	8,520	0
10.00	28%	72%	60	144	8,640	10.00	28%	72%	60	144	8,640	0
11.00	28%	72%	60	144	8,640	11.00	28%	72%	60	144	8,640	0
12.00	28%	72%	60	144	8,640	12.00	28%	72%	60	144	8,640	0
13.00	28%	72%	60	144	8,640	13.00	28%	72%	60	144	8,640	0
14.00	26%	74%	60	148	8,880	14.00	26%	74%	60	148	8,880	0
15.00	34%	66%	60	132	7,920	15.00	34%	66%	60	132	7,920	0
16.00	47%	53%	60	106	6,360	16.00	47%	53%	60	106	6,360	0
17.00	59%	41%	60	82	4,920	17.00	59%	41%	60	82	4,920	0
18.00	78%	22%	60	44	2,640	18.00	78%	22%	60	44	2,640	0
19.00	100%	0%	60	0	0	19.00	100%	0%	60	0	0	0
Required sun hours @ 50% area (hr)					2	Required sun hours @ 50% area (hr)					2	
Achieved sun hours on (hrs) @ 50% area					9.00	Achieved sun hours on (hrs) @ 50% area					9.00	
Achieved total sun time (hrs)					6.77	Achieved total sun time (hrs)					6.77	1.00
Achieved daily sun time * area					81240	Achieved daily sun time * area					81240	1.00

3					180 m2							
EXISTING STATUS					March 21st	**NEW STATUS**					March 21st	change
Time	Shadow	Sunlight	Sun time	Sun area	time * area	Time	Shadow	Sunlight	Sun time	Sun area	time * area	time * area
24 Hr	% / %		min	m2	min*m2	24 Hr	% / %		min	m2	min*m2	min*m2
6.00	100%	0%	60	0	0	6.00	100%	0%	60	0	0	0
7.00	100%	0%	60	0	0	7.00	100%	0%	60	0	0	0
8.00	100%	0%	60	0	0	8.00	100%	0%	60	0	0	0
9.00	100%	0%	60	0	0	9.00	100%	0%	60	0	0	0
10.00	95%	5%	60	9	540	10.00	95%	5%	60	9	540	0
11.00	43%	57%	60	103	6,156	11.00	43%	57%	60	103	6,156	0
12.00	30%	70%	60	126	7,560	12.00	30%	70%	60	126	7,560	0
13.00	43%	57%	60	103	6,156	13.00	48%	52%	60	94	5,616	-540
14.00	40%	60%	60	108	6,480	14.00	55%	45%	60	81	4,860	-1,620
15.00	35%	65%	60	117	7,020	15.00	71%	29%	60	52	3,132	-3,888
16.00	47%	53%	60	95	5,724	16.00	85%	15%	60	27	1,620	-4,104
17.00	57%	43%	60	77	4,644	17.00	85%	15%	60	27	1,620	-3,024
18.00	100%	0%	60	0	0	18.00	100%	0%	60	0	0	0
19.00	100%	0%	60	0	0	19.00	100%	0%	60	0	0	0
Required sun hours @ 50% area (hr)					2	Required sun hours @ 50% area (hr)					2	
Achieved sun hours on (hrs) @ 50% area					6.00	Achieved sun hours on (hrs) @ 50% area					3.00	
Achieved total sun time (hrs)					4.1	Achieved total sun time (hrs)					2.88	0.80
Achieved daily sun time * area					44280	Achieved daily sun time * area					31104	0.80

End of Report