Ringwood Blarney, Phase 2

Proposed Residential Development

Daylight and Sunlight Analysis Report

Ringwood,
Shean upper,
Blarney,
Co. Cork.

Client
Clockstrike Ltd.

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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 Clockstrike Ltd. to carry out the analysis and report for the proposed development at Ringwood, Shean upper, Blarney, 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 development will consist of a largescale residential development (LRD), representing Phase 2 of development in the Blarney East / Ringwood Expansion Area, and comprising the construction of (i) 323 no. residential dwellings comprising of 157 no. terraced, end-of-terrace, and detached houses; 52 no. duplexes provided in 5 no. 3-storey buildings; and 114 no. apartments provided in 2 no. 5-storey buildings (ii) a primary care centre, over 2 stories and 1,724sqm in area, incorporating GP services (iii) the refurbishment and redevelopment of existing farm outbuildings for conversion to a retail/pharmacy use, 80sqm in area, and café/restaurant use, 380sqm in area; (iv) a new access roadway into the site from the R617 with associated pedestrian and cyclist infrastructure, which will form the 1st phase of the proposed Stoneview Access Link Road, (v) a new signalised junction on the R617 road which will provide a single lane approach to the west and a two lane approach to the east, comprising one lane for through traffic on the R617 and a right turn lane for traffic turning into the site, and associated footpath improvements and cycle lane provision (vi) a new signalised junction on Station Road that reflects the junction permitted under the Phase 1 LRD scheme (Reg. Ref. 2443031) (vii) private, communal, and public open spaces and hard and soft landscaping, boundary treatments and amenity areas, including a new wetland public amenity area, (viii) drainage works and nature-based SuDS measures (ix) foul sewer infrastructure, including 1no. pump station, the diversion of existing foul and water sewers and other new network works, (x) car parking, including EV charging points, bicycle parking, and motorcycle parking bays (xi) 2no. substations all associated ancillary site, drainage and development works.

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 2025.

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. The daylight reception assessment has been targeted to habitable rooms within the proposed development. Receptors / rooms within the proposed development are indicated in image 5.1 to 5.15.

- Apartments: Blocks 1 and 2, all habitable rooms within the proposed blocks on the ground floor and first floor have been assessed. 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.
- Duplex blocks A, B, C, D and E: a selection of habitable rooms on the ground floor which are observed to be in the most daylight challenging positions or rooms positioned with close by obstacles have been assessed. 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.
- Houses: a selection of habitable rooms on the ground floor which are observed to be in the most daylight challenging positions or rooms positioned with close by obstacles have been assessed.

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 all of the proposed rooms calculated daylight results achieved the minimum guidelines or achieved well in excess of the guidelines.

- Apartments: Overall, examined residential rooms for the proposed apartment blocks 1 and 2 achieved on average a daylight factor (DF) of 3.1% and an illuminance of 470 lux on over 50% of the floor area for over 50% of the available daylight hours. An average DF of 1.09% and an illuminance of 155 lux on over 95% of the floor area for over 50% of the available daylight hours was achieved.
- Maisonette blocks A-E: Overall, examined residential rooms for the proposed maisonette blocks achieved on average a daylight factor (DF) of 2.51% and an illuminance of 380 lux on over 50% of the floor area for over 50% of the available daylight hours. An average DF of 0.87% and an illuminance of 125 lux on over 95% of the floor area for over 50% of the available daylight hours was achieved.
- Houses: Overall, examined residential rooms for the proposed houses achieved on average a daylight factor (DF) of 2.75% and an illuminance of 416 lux on over 50% of the floor area for over 50% of the available daylight hours. An average DF of 0.96% and an illuminance of 137 lux on over 95% of the floor area for over 50% of the available daylight hours was achieved.

In an urban environment it can more often be the case that complete fulfilment with the guidelines is not attainable. 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. 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 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 well in excess of these minimum guidelines.

- Overall compliance for proposed development = 100%

In summary, the calculation results have achieved full compliance under IS EN17037 / BS EN17307 and BS EN 17037:2018 National Annex guidelines. This indicates an overall good level of daylight for the proposed development under the guidelines. We conclude, the proposed development can provide a good level of residential daylight amenity to future occupants.

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 5.3 we note the selected amenity spaces all achieved sunlight above the recommended guidelines, see image 5.16-5.17 for receptor/amenity space location. Summary of results are as follows:

- The average public open space amenity area calculated sunlight on at least 50% of the area on March 21st is 8.30 hours.
- The average communal open space amenity area calculated sunlight on at least 50% of the area on March 21st is 7.30 hours.

This confirms the amenity areas proposed will be adequately sunlit throughout the year. We conclude that the new amenity spaces 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 0.82 to 0.99. 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 6.1-6.5 for receptor locations):

- North receptors: Receptor no. 1.0 to 7.2: The private dwellings located in the estate, Aisling Geal, Station Road, with ground floor windows were examined and resulted in a change factor range of 0.82 to 0.96. These receptors are within the guidelines and the effect is determined as negligible under BRE definitions.
- Northwest / West receptors: Receptor no. 8.0 to 24.0: Existing dwellings located along Assumption Terrace, Station Road with ground floor windows were examined and resulted in a change factor range of 0.92 to 0.96. These receptors are comfortably within the guidelines and the effect is determined as negligible under BRE definitions.
- South receptors: Receptor no. 25.0 to 25.1: The private dwellings located at Shean Lower, Blarney with ground floor windows were examined and resulted in a change factor of 0.99. These receptors are also comfortably within the guidelines and the effect is determined as negligible under BRE definitions.
- Overall, the average change ratio for VSC is 0.94.

We conclude that the new proposed development's effect on daylight reception in the neighbouring rooms is 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 0.80 (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 6.6-6.7 for receptor locations):

- North receptors: Receptor no. 1 to 8 are private garden spaces to neighbouring houses in the estate Aisling Geal, Árd Na Greine and Saint John's Terrace. The receptors resulted in a change factor result of 1.00 meaning the new proposed development will have no sunlight impact on these areas.
- West receptors: Receptor no. 9 to 25 are private amenity spaces to houses on Station Road and receptor no.25 along the R617. The receptors resulted in a change factor range of 0.86 to 0.99. The change happens in the early morning hours of 07.00-10.00. The calculation findings are well within the guidelines, and the effect is determined as 'negligible' under BRE definitions.
- Overall, the average change ratio is 0.89.

We conclude that the new proposed development's effect on sunlight reception in the neighbouring amenity areas is 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.

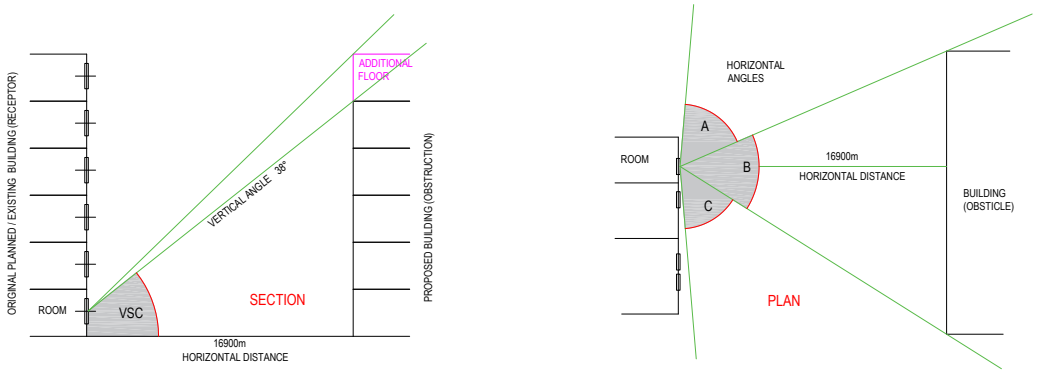


Image 4.1:

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 habitable rooms within the proposed development. Receptors / rooms within the proposed development are indicated in image 5.1 to 5.11 below.

- Apartments: Blocks 1 and 2, all habitable rooms within the proposed blocks on the ground floor and first floor have been assessed. 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.
- Duplex blocks A, B, C, D and E: a selection of habitable rooms on the ground floor which are observed to be in the most daylight challenging positions or rooms positioned with close by obstacles have been assessed. 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.
- Houses: a selection of habitable rooms on the ground floor which are observed to be in the most daylight challenging positions or rooms positioned with close by obstacles have been assessed. 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.



Image 5.1: Master view of all receptors examined within the proposed development.



Image 5.2: Level 00 (ground floor). Apartment block 1 (receptor no. A.1–A.28) and Apartment block 2 (receptor no. B.1–B.28).

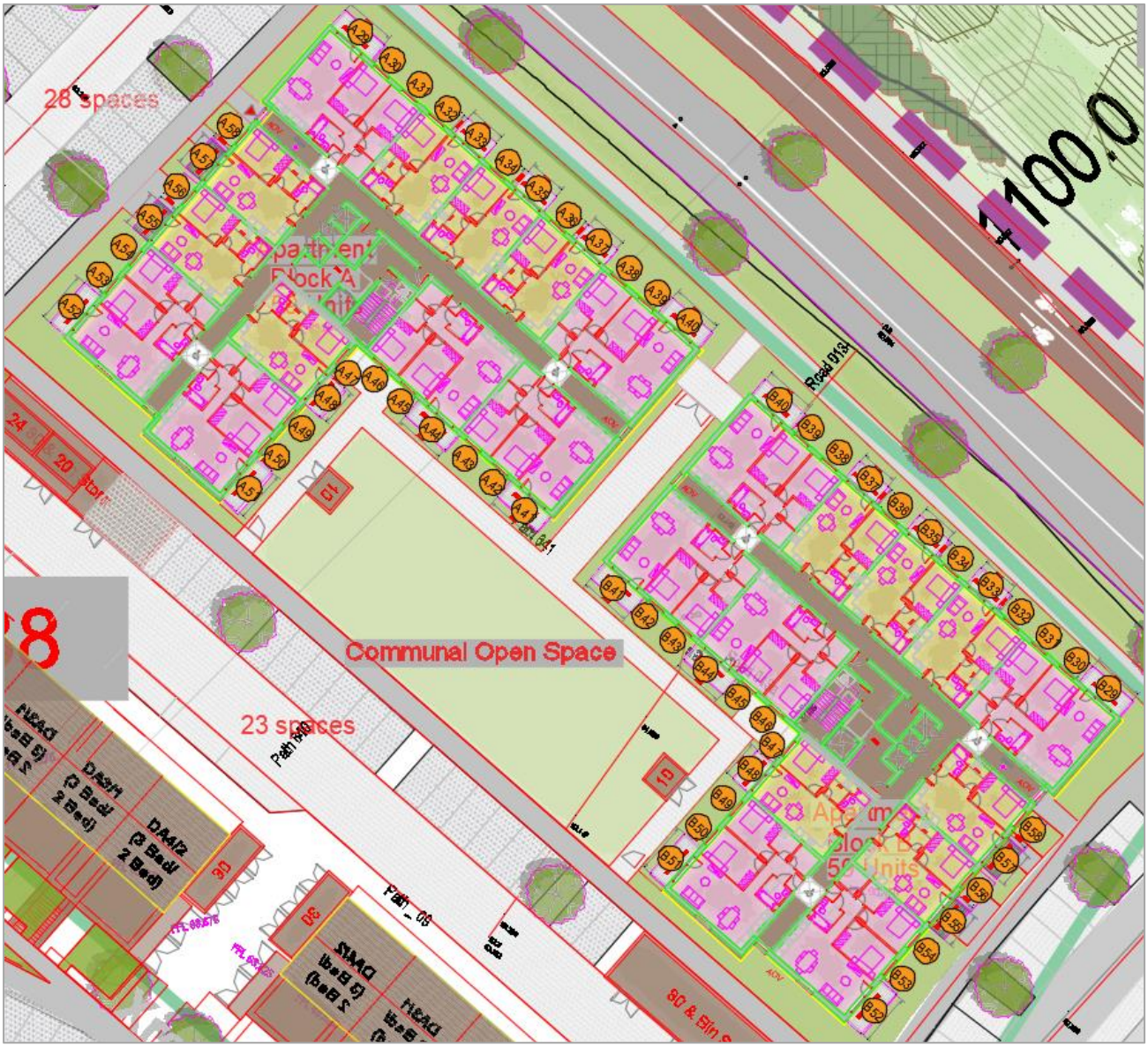


Image 5.3: Level 01 (first floor). Apartment block 1 (receptor no. A.29–A.58) and Apartment block 2 (receptor no. B.29–B.58).



Image 5.4: Level 00 (ground floor). Duplex Block D and E (receptor no. D.1–D.18).

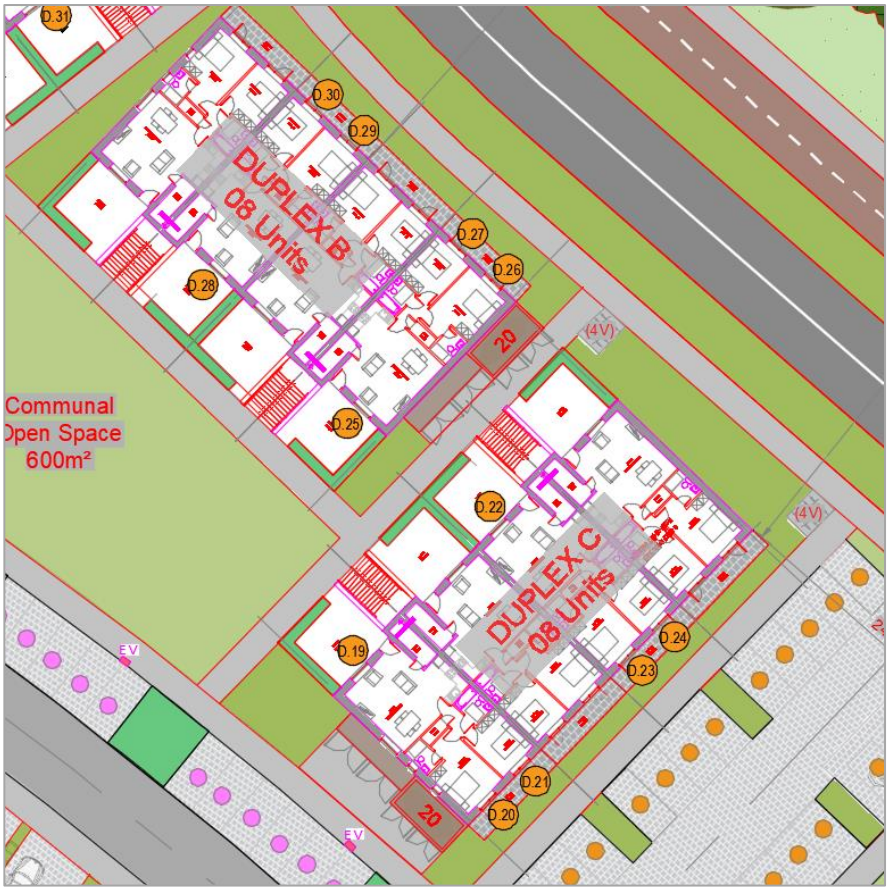


Image 5.5: Level 00 (ground floor). Duplex Block B and C (receptor no. D.19–D.30).



Image 5.6: Level 00 (ground floor). Duplex Block A (receptor no. D.31–D.39).



Image 5.7: Level 00 (ground floor). Houses (receptor no. H1–H18).



Image 5.8: Level 00 (ground floor). Houses (receptor no. H19–H34).



Image 5.9: Level 00 (ground floor). Houses (receptor no. H35–H52).



Image 5.10: Level 00 (ground floor). Houses (receptor no. H53–H61).

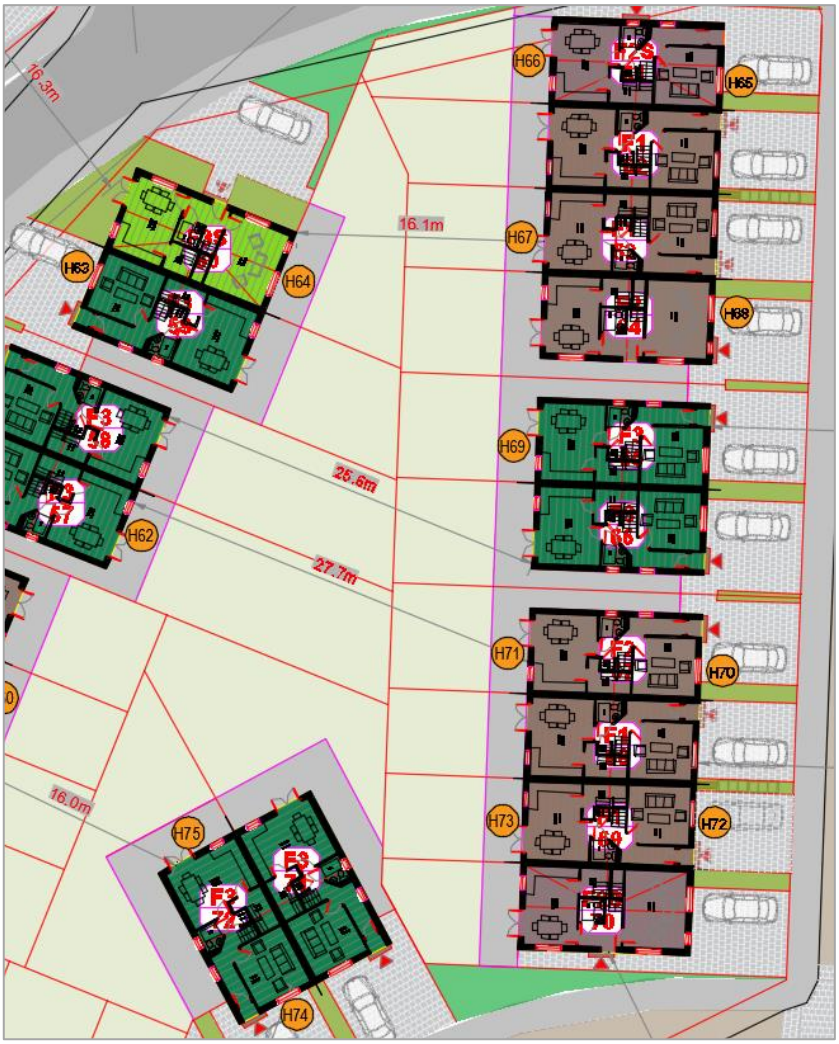


Image 5.11: Level 00 (ground floor). Houses (receptor no. H62–H75).



Image 5.12: Level 00 (ground floor). Houses (receptor no. H76–H85).



Image 5.13: Level 00 (ground floor). Houses (receptor no. H86–H94).



Image 5.14: Level 00 (ground floor). Houses (receptor no. H95–H103).



Image 5.15: Level 00 (ground floor). Houses (receptor no. H104–H123).

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		illuminance	day light factor
									50% sun hrs		50% sun hrs		50% sun hrs		50% sun hrs			
									%	min %	%	min %	lx	min lx	lx	min lx	min lx	min %
A.1	00	Apartment Block 1	Living-Kitchen	9.18	28.5	32.2	1.20	32%	4.36	2.00	1.52	0.70	659	300	217	100	200	1.3
A.2	00	Apartment Block 1	Bed room	3.43	12.6	27.2	1.74	36%	3.28	2.00	1.15	0.70	496	300	164	100	100	0.7
A.3	00	Apartment Block 1	Bed room	3.43	10.8	31.7	2.25	36%	3.69	2.00	1.29	0.70	557	300	184	100	100	0.7
A.4	00	Apartment Block 1	Bed room	3.43	11.2	30.6	1.96	36%	3.55	2.00	1.24	0.70	537	300	177	100	100	0.7
A.5	00	Apartment Block 1	Living-Kitchen	5.75	25.4	22.6	1.13	36%	3.28	2.00	1.15	0.70	496	300	164	100	200	1.3
A.6	00	Apartment Block 1	Bed room	3.43	11.2	30.6	1.96	36%	3.55	2.00	1.24	0.70	537	300	177	100	100	0.7
A.7	00	Apartment Block 1	Living-Kitchen	5.75	25.4	22.6	1.13	36%	3.28	2.00	1.15	0.70	496	300	164	100	200	1.3
A.8	00	Apartment Block 1	Bed room	3.43	11.2	30.6	1.96	36%	3.55	2.00	1.24	0.70	537	300	177	100	100	0.7
A.9	00	Apartment Block 1	Living-Kitchen	5.75	25.4	22.6	1.13	36%	3.28	2.00	1.15	0.70	496	300	164	100	200	1.3
A.10	00	Apartment Block 1	Bed room	3.43	10.8	31.7	2.25	36%	3.69	2.00	1.29	0.70	557	300	184	100	100	0.7
A.11	00	Apartment Block 1	Bed room	3.43	12.6	27.2	1.74	36%	3.28	2.00	1.15	0.70	496	300	164	100	100	0.7
A.12	00	Apartment Block 1	Living-Kitchen	9.18	28.5	32.2	1.20	22%	3.02	2.00	1.05	0.70	456	300	150	100	200	1.3
A.13	00	Apartment Block 1	Living-Kitchen	9.18	28.5	32.2	1.20	18%	2.41	2.00	0.84	0.70	365	300	120	100	200	1.3
A.14	00	Apartment Block 1	Bed room	3.43	12.6	27.2	1.74	28%	2.48	2.00	0.87	0.70	375	300	124	100	100	0.7
A.15	00	Apartment Block 1	Bed room	3.43	10.8	31.7	2.25	28%	2.81	2.00	0.98	0.70	426	300	140	100	100	0.7
A.16	00	Apartment Block 1	Living-Kitchen	5.75	28.5	20.2	1.20	25%	2.14	2.00	0.75	0.70	324	300	107	100	200	1.3
A.17	00	Apartment Block 1	Bed room	3.43	12.6	27.2	1.74	22%	2.01	2.00	0.70	0.70	304	300	100	100	100	0.7
A.18	00	Apartment Block 1	Bed room	3.43	10.8	31.7	2.25	20%	2.01	2.00	0.70	0.70	304	300	100	100	100	0.7
A.19	00	Apartment Block 1	Bed room	3.43	10.8	31.7	2.25	24%	2.41	2.00	0.84	0.70	365	300	120	100	100	0.7
A.20	00	Apartment Block 1	Bed room	3.43	12.6	27.2	1.74	24%	2.14	2.00	0.75	0.70	324	300	107	100	100	0.7
A.21	00	Apartment Block 1	Living-Kitchen	9.18	28.5	32.2	1.20	26%	3.55	2.00	1.24	0.70	537	300	177	100	200	1.3
A.22	00	Apartment Block 1	Living-Kitchen	9.18	28.5	32.2	1.20	27%	3.69	2.00	1.29	0.70	557	300	184	100	200	1.3
A.23	00	Apartment Block 1	Bed room	3.43	12.6	27.2	1.74	28%	2.55	2.00	0.89	0.70	385	300	127	100	100	0.7
A.24	00	Apartment Block 1	Bed room	3.43	10.8	31.7	2.25	28%	2.88	2.00	1.01	0.70	436	300	144	100	100	0.7
A.25	00	Apartment Block 1	Living-Kitchen	5.75	25.4	22.6	1.13	28%	2.61	2.00	0.91	0.70	395	300	130	100	200	1.3
A.26	00	Apartment Block 1	Bed room	3.43	11.2	30.6	1.96	28%	2.81	2.00	0.98	0.70	426	300	140	100	100	0.7
A.27	00	Apartment Block 1	Living-Kitchen	5.75	25.4	22.6	1.13	28%	2.61	2.00	0.91	0.70	395	300	130	100	200	1.3
A.28	00	Apartment Block 1	Bed room	3.43	11.2	30.6	1.96	28%	2.81	2.00	0.98	0.70	426	300	140	100	100	0.7
A.29	01	Apartment Block 1	Living-Kitchen	5.75	28.5	20.2	1.13	37%	3.35	2.00	1.17	0.70	507	300	167	100	200	1.3
A.30	01	Apartment Block 1	Bed room	3.43	12.6	27.2	1.70	37%	3.62	2.00	1.27	0.70	547	300	181	100	100	0.7
A.31	01	Apartment Block 1	Bed room	3.43	10.8	31.7	2.13	37%	4.02	2.00	1.41	0.70	608	300	201	100	100	0.7
A.32	01	Apartment Block 1	Bed room	3.43	11.2	30.6	1.96	37%	3.62	2.00	1.27	0.70	547	300	181	100	100	0.7
A.33	01	Apartment Block 1	Living-Kitchen	5.75	25.4	22.6	1.13	37%	3.42	2.00	1.20	0.70	517	300	171	100	200	1.3
A.34	01	Apartment Block 1	Bed room	3.43	11.2	30.6	1.96	37%	3.62	2.00	1.27	0.70	547	300	181	100	100	0.7
A.35	01	Apartment Block 1	Living-Kitchen	5.75	25.4	22.6	1.13	37%	3.42	2.00	1.20	0.70	517	300	171	100	200	1.3
A.36	01	Apartment Block 1	Bed room	3.43	11.2	30.6	1.96	37%	3.62	2.00	1.27	0.70	547	300	181	100	100	0.7
A.37	01	Apartment Block 1	Living-Kitchen	5.75	25.4	22.6	1.13	37%	3.42	2.00	1.20	0.70	517	300	171	100	200	1.3
A.38	01	Apartment Block 1	Bed room	3.43	10.8	31.7	2.13	37%	4.02	2.00	1.41	0.70	608	300	201	100	100	0.7
A.39	01	Apartment Block 1	Bed room	3.43	12.6	27.2	1.70	37%	3.62	2.00	1.27	0.70	547	300	181	100	100	0.7
A.40	01	Apartment Block 1	Living-Kitchen	5.75	28.5	20.2	1.13	37%	3.35	2.00	1.17	0.70	507	300	167	100	200	1.3
A.41	01	Apartment Block 1	Living-Kitchen	5.75	28.5	20.2	1.13	28%	2.55	2.00	0.89	0.70	385	300	127	100	200	1.3
A.42	01	Apartment Block 1	Bed room	3.43	12.6	27.2	1.70	29%	2.81	2.00	0.98	0.70	426	300	140	100	100	0.7
A.43	01	Apartment Block 1	Bed room	3.43	10.8	31.7	2.13	29%	3.15	2.00	1.10	0.70	476	300	157	100	100	0.7
A.44	01	Apartment Block 1	Living-Kitchen	5.75	28.5	20.2	1.13	26%	2.35	2.00	0.82	0.70	355	300	117	100	200	1.3
A.45	01	Apartment Block 1	Bed room	3.43	12.6	27.2	1.70	23%	2.28	2.00	0.80	0.70	344	300	114	100	100	0.7
A.46	01	Apartment Block 1	Bed room	3.43	10.8	31.7	2.13	21%	2.21	2.00	0.77	0.70	334	300	110	100	100	0.7
A.47	01	Apartment Block 1	Bed room	3.43	11.2	30.6	1.86	19%	2.01	2.00	0.70	0.70	304	300	100	100	100	0.7
A.48	01	Apartment Block 1	Living-Kitchen	5.75	25.4	22.6	1.07	23%	2.21	2.00	0.77	0.70	334	300	110	100	200	1.3
A.49	01	Apartment Block 1	Bed room	3.43	10.8	31.7	2.13	25%	2.68	2.00	0.94	0.70	405	300	134	100	100	0.7
A.50	01	Apartment Block 1	Bed room	3.43	12.6	27.2	1.70	25%	2.41	2.00	0.84	0.70	365	300	120	100	100	0.7
A.51	01	Apartment Block 1	Living-Kitchen	9.18	28.5	32.2	1.13	27%	3.89	2.00	1.36	0.70	588	300	194	100	200	1.3
A.52	01	Apartment Block 1	Living-Kitchen	9.18	28.5	32.2	1.13	28%	4.02	2.00	1.41	0.70	608	300	201	100	200	1.3

A.53	01	Apartment Block 1	Bed room	3.43	12.6	27.2	1.70	29%	2.88	2.00	1.01	0.70	436	300	144	100	100	0.7
A.54	01	Apartment Block 1	Bed room	3.43	10.8	31.7	2.13	29%	3.22	2.00	1.13	0.70	486	300	160	100	100	0.7
A.55	01	Apartment Block 1	Living-Kitchen	5.75	25.4	22.6	1.07	29%	2.88	2.00	1.01	0.70	436	300	144	100	200	1.3
A.56	01	Apartment Block 1	Bed room	3.43	11.2	30.6	1.86	29%	3.08	2.00	1.08	0.70	466	300	154	100	100	0.7
A.57	01	Apartment Block 1	Living-Kitchen	5.75	25.4	22.6	1.07	29%	2.88	2.00	1.01	0.70	436	300	144	100	200	1.3
A.58	01	Apartment Block 1	Bed room	3.43	11.2	30.6	1.86	29%	3.08	2.00	1.08	0.70	466	300	154	100	100	0.7
B.1	00	Apartment Block 2	Living-Kitchen	9.18	28.5	32.2	1.20	36%	4.89	2.00	1.71	0.70	740	300	244	100	200	1.3
B.2	00	Apartment Block 2	Bed room	3.43	12.6	27.2	1.74	36%	3.28	2.00	1.15	0.70	496	300	164	100	100	0.7
B.3	00	Apartment Block 2	Bed room	3.43	10.8	31.7	2.25	36%	3.69	2.00	1.29	0.70	557	300	184	100	100	0.7
B.4	00	Apartment Block 2	Bed room	3.43	11.2	30.6	1.96	36%	3.55	2.00	1.24	0.70	537	300	177	100	100	0.7
B.5	00	Apartment Block 2	Living-Kitchen	5.75	25.4	22.6	1.13	36%	3.28	2.00	1.15	0.70	496	300	164	100	200	1.3
B.6	00	Apartment Block 2	Bed room	3.43	11.2	30.6	1.96	36%	3.55	2.00	1.24	0.70	537	300	177	100	100	0.7
B.7	00	Apartment Block 2	Living-Kitchen	5.75	25.4	22.6	1.13	36%	3.28	2.00	1.15	0.70	496	300	164	100	200	1.3
B.8	00	Apartment Block 2	Bed room	3.43	11.2	30.6	1.96	36%	3.55	2.00	1.24	0.70	537	300	177	100	100	0.7
B.9	00	Apartment Block 2	Living-Kitchen	5.75	25.4	22.6	1.13	36%	3.28	2.00	1.15	0.70	496	300	164	100	200	1.3
B.10	00	Apartment Block 2	Bed room	3.43	10.8	31.7	2.25	36%	3.69	2.00	1.29	0.70	557	300	184	100	100	0.7
B.11	00	Apartment Block 2	Bed room	3.43	12.6	27.2	1.74	36%	3.28	2.00	1.15	0.70	496	300	164	100	100	0.7
B.12	00	Apartment Block 2	Living-Kitchen	9.18	28.5	32.2	1.20	22%	3.02	2.00	1.05	0.70	456	300	150	100	200	1.3
B.13	00	Apartment Block 2	Living-Kitchen	9.18	28.5	32.2	1.20	18%	2.41	2.00	0.84	0.70	365	300	120	100	200	1.3
B.14	00	Apartment Block 2	Bed room	3.43	12.6	27.2	1.74	28%	2.48	2.00	0.87	0.70	375	300	124	100	100	0.7
B.15	00	Apartment Block 2	Bed room	3.43	10.8	31.7	2.25	28%	2.81	2.00	0.98	0.70	426	300	140	100	100	0.7
B.16	00	Apartment Block 2	Living-Kitchen	5.75	28.5	20.2	1.20	25%	2.14	2.00	0.75	0.70	324	300	107	100	200	1.3
B.17	00	Apartment Block 2	Bed room	3.43	12.6	27.2	1.74	22%	2.01	2.00	0.70	0.70	304	300	100	100	100	0.7
B.18	00	Apartment Block 2	Bed room	3.43	10.8	31.7	2.25	20%	2.01	2.00	0.70	0.70	304	300	100	100	100	0.7
B.19	00	Apartment Block 2	Bed room	3.43	10.8	31.7	2.25	24%	2.41	2.00	0.84	0.70	365	300	120	100	100	0.7
B.20	00	Apartment Block 2	Bed room	3.43	12.6	27.2	1.74	24%	2.14	2.00	0.75	0.70	324	300	107	100	100	0.7
B.21	00	Apartment Block 2	Living-Kitchen	9.18	28.5	32.2	1.20	26%	3.55	2.00	1.24	0.70	537	300	177	100	200	1.3
B.22	00	Apartment Block 2	Living-Kitchen	9.18	28.5	32.2	1.20	28%	3.82	2.00	1.34	0.70	578	300	191	100	200	1.3
B.23	00	Apartment Block 2	Bed room	3.43	12.6	27.2	1.74	34%	3.02	2.00	1.05	0.70	456	300	150	100	100	0.7
B.24	00	Apartment Block 2	Bed room	3.43	10.8	31.7	2.25	34%	3.42	2.00	1.20	0.70	517	300	171	100	100	0.7
B.25	00	Apartment Block 2	Living-Kitchen	5.75	25.4	22.6	1.13	34%	3.08	2.00	1.08	0.70	466	300	154	100	200	1.3
B.26	00	Apartment Block 2	Bed room	3.43	11.2	30.6	1.96	34%	3.35	2.00	1.17	0.70	507	300	167	100	100	0.7
B.27	00	Apartment Block 2	Living-Kitchen	5.75	25.4	22.6	1.13	34%	3.08	2.00	1.08	0.70	466	300	154	100	200	1.3
B.28	00	Apartment Block 2	Bed room	3.43	11.2	30.6	1.96	34%	3.35	2.00	1.17	0.70	507	300	167	100	100	0.7
B.29	01	Apartment Block 2	Living-Kitchen	5.75	28.5	20.2	1.13	37%	3.35	2.00	1.17	0.70	507	300	167	100	200	1.3
B.30	01	Apartment Block 2	Bed room	3.43	12.6	27.2	1.70	37%	3.62	2.00	1.27	0.70	547	300	181	100	100	0.7
B.31	01	Apartment Block 2	Bed room	3.43	10.8	31.7	2.13	37%	4.02	2.00	1.41	0.70	608	300	201	100	100	0.7
B.32	01	Apartment Block 2	Bed room	3.43	11.2	30.6	1.96	37%	3.62	2.00	1.27	0.70	547	300	181	100	100	0.7
B.33	01	Apartment Block 2	Living-Kitchen	5.75	25.4	22.6	1.13	37%	3.42	2.00	1.20	0.70	517	300	171	100	200	1.3
B.34	01	Apartment Block 2	Bed room	3.43	11.2	30.6	1.96	37%	3.62	2.00	1.27	0.70	547	300	181	100	100	0.7
B.35	01	Apartment Block 2	Living-Kitchen	5.75	25.4	22.6	1.13	37%	3.42	2.00	1.20	0.70	517	300	171	100	200	1.3
B.36	01	Apartment Block 2	Bed room	3.43	11.2	30.6	1.96	37%	3.62	2.00	1.27	0.70	547	300	181	100	100	0.7
B.37	01	Apartment Block 2	Living-Kitchen	5.75	25.4	22.6	1.13	37%	3.42	2.00	1.20	0.70	517	300	171	100	200	1.3
B.38	01	Apartment Block 2	Bed room	3.43	10.8	31.7	2.13	37%	4.02	2.00	1.41	0.70	608	300	201	100	100	0.7
B.39	01	Apartment Block 2	Bed room	3.43	12.6	27.2	1.70	37%	3.62	2.00	1.27	0.70	547	300	181	100	100	0.7
B.40	01	Apartment Block 2	Living-Kitchen	5.75	28.5	20.2	1.13	37%	3.35	2.00	1.17	0.70	507	300	167	100	200	1.3
B.41	01	Apartment Block 2	Living-Kitchen	5.75	28.5	20.2	1.13	28%	2.55	2.00	0.89	0.70	385	300	127	100	200	1.3
B.42	01	Apartment Block 2	Bed room	3.43	12.6	27.2	1.70	29%	2.81	2.00	0.98	0.70	426	300	140	100	100	0.7
B.43	01	Apartment Block 2	Bed room	3.43	10.8	31.7	2.13	29%	3.15	2.00	1.10	0.70	476	300	157	100	100	0.7
B.44	01	Apartment Block 2	Living-Kitchen	5.75	28.5	20.2	1.13	26%	2.35	2.00	0.82	0.70	355	300	117	100	200	1.3
B.45	01	Apartment Block 2	Bed room	3.43	12.6	27.2	1.70	23%	2.28	2.00	0.80	0.70	344	300	114	100	100	0.7
B.46	01	Apartment Block 2	Bed room	3.43	10.8	31.7	2.13	21%	2.21	2.00	0.77	0.70	334	300	110	100	100	0.7
B.47	01	Apartment Block 2	Bed room	3.43	11.2	30.6	1.86	19%	2.01	2.00	0.70	0.70	304	300	100	100	100	0.7
B.48	01	Apartment Block 2	Living-Kitchen	5.75	25.4	22.6	1.07	23%	2.21	2.00	0.77	0.70	334	300	110	100	200	1.3
B.49	01	Apartment Block 2	Bed room	3.43	10.8	31.7	2.13	25%	2.68	2.00	0.94	0.70	405	300	134	100	100	0.7
B.50	01	Apartment Block 2	Bed room	3.43	12.6	27.2	1.70	25%	2.41	2.00	0.84	0.70	365	300	120	100	100	0.7
B.51	01	Apartment Block 2	Living-Kitchen	9.18	28.5	32.2	1.13	27%	3.89	2.00	1.36	0.70	588	300	194	100	200	1.3
B.52	01	Apartment Block 2	Living-Kitchen	9.18	28.5	32.2	1.13	31%	4.42	2.00	1.55	0.70	669	300	221	100	200	1.3

B.53	01	Apartment Block 2	Bed room	3.43	12.6	27.2	1.70	34%	3.42	2.00	1.20	0.70	517	300	171	100	100	0.7
B.54	01	Apartment Block 2	Bed room	3.43	10.8	31.7	2.13	34%	3.75	2.00	1.31	0.70	567	300	187	100	100	0.7
B.55	01	Apartment Block 2	Living-Kitchen	5.75	25.4	22.6	1.07	34%	3.35	2.00	1.17	0.70	507	300	167	100	200	1.3
B.56	01	Apartment Block 2	Bed room	3.43	11.2	30.6	1.86	34%	3.62	2.00	1.27	0.70	547	300	181	100	100	0.7
B.57	01	Apartment Block 2	Living-Kitchen	5.75	25.4	22.6	1.07	34%	3.35	2.00	1.17	0.70	507	300	167	100	200	1.3
B.58	01	Apartment Block 2	Bed room	3.43	11.2	30.6	1.86	34%	3.62	2.00	1.27	0.70	547	300	181	100	100	0.7
D.1	00	Duplex Block E	Living-Kitchen	7.03	28.6	24.6	1.75	34%	3.89	2.00	1.36	0.70	588	300	194	100	200	1.3
D.2	00	Duplex Block E	Bed room	2.66	12.8	20.9	2.23	32%	2.48	2.00	0.87	0.70	375	300	124	100	100	0.7
D.3	00	Duplex Block E	Bed room	2.66	11.4	23.3	2.02	32%	2.61	2.00	0.91	0.70	395	300	130	100	100	0.7
D.4	00	Duplex Block E	Living-Kitchen	3.78	28.6	13.2	1.75	34%	2.08	2.00	0.73	0.70	314	300	104	100	200	1.3
D.5	00	Duplex Block E	Bed room	2.66	12.8	20.9	2.23	30%	2.35	2.00	0.82	0.70	355	300	117	100	100	0.7
D.6	00	Duplex Block E	Bed room	2.66	11.4	23.3	2.02	30%	2.48	2.00	0.87	0.70	375	300	124	100	100	0.7
D.7	00	Duplex Block E	Living-Kitchen	3.78	28.6	13.2	1.75	34%	2.08	2.00	0.73	0.70	314	300	104	100	200	1.3
D.8	00	Duplex Block E	Bed room	2.66	12.8	20.9	2.23	28%	2.14	2.00	0.75	0.70	324	300	107	100	100	0.7
D.9	00	Duplex Block E	Bed room	2.66	11.4	23.3	2.02	28%	2.28	2.00	0.80	0.70	344	300	114	100	100	0.7
D.10	00	Duplex Block D	Living-Kitchen	6.98	28.6	24.4	1.75	27%	3.15	2.00	1.10	0.70	476	300	157	100	200	1.3
D.11	00	Duplex Block D	Bed room	2.66	12.8	20.9	2.23	28%	2.21	2.00	0.77	0.70	334	300	110	100	100	0.7
D.12	00	Duplex Block D	Bed room	2.66	11.4	23.3	2.02	28%	2.35	2.00	0.82	0.70	355	300	117	100	100	0.7
D.13	00	Duplex Block D	Living-Kitchen	3.78	28.6	13.2	1.75	34%	2.08	2.00	0.73	0.70	314	300	104	100	200	1.3
D.14	00	Duplex Block D	Bed room	2.66	12.8	20.9	2.23	28%	2.14	2.00	0.75	0.70	324	300	107	100	100	0.7
D.15	00	Duplex Block D	Bed room	2.66	11.4	23.3	2.02	28%	2.28	2.00	0.80	0.70	344	300	114	100	100	0.7
D.16	00	Duplex Block D	Living-Kitchen	3.78	28.6	13.2	1.75	34%	2.08	2.00	0.73	0.70	314	300	104	100	200	1.3
D.17	00	Duplex Block D	Bed room	2.66	12.8	20.9	2.23	30%	2.35	2.00	0.82	0.70	355	300	117	100	100	0.7
D.18	00	Duplex Block D	Bed room	2.66	11.4	23.3	2.02	30%	2.48	2.00	0.87	0.70	375	300	124	100	100	0.7
D.19	00	Duplex Block C	Living-Kitchen	7.03	28.6	24.6	1.75	31%	3.55	2.00	1.24	0.70	537	300	177	100	200	1.3
D.20	00	Duplex Block C	Bed room	4.01	12.8	31.5	2.23	31%	3.62	2.00	1.27	0.70	547	300	181	100	100	0.7
D.21	00	Duplex Block C	Bed room	2.66	11.4	23.3	2.02	31%	2.55	2.00	0.89	0.70	385	300	127	100	100	0.7
D.22	00	Duplex Block C	Living-Kitchen	3.83	28.6	13.4	1.75	30%	1.94	2.00	0.68	0.70	294	300	97	100	200	1.3
D.23	00	Duplex Block C	Bed room	2.66	12.8	20.9	2.23	32%	2.48	2.00	0.87	0.70	375	300	124	100	100	0.7
D.24	00	Duplex Block C	Bed room	2.66	11.4	23.3	2.02	32%	2.61	2.00	0.91	0.70	395	300	130	100	100	0.7
D.25	00	Duplex Block B	Living-Kitchen	3.83	28.6	13.4	1.75	31%	2.01	2.00	0.70	0.70	304	300	100	100	200	1.3
D.26	00	Duplex Block B	Bed room	2.66	12.8	20.9	2.23	36%	2.81	2.00	0.98	0.70	426	300	140	100	100	0.7
D.27	00	Duplex Block B	Bed room	2.66	11.4	23.3	2.02	36%	2.95	2.00	1.03	0.70	446	300	147	100	100	0.7
D.28	00	Duplex Block B	Living-Kitchen	3.83	28.6	13.4	1.75	31%	2.01	2.00	0.70	0.70	304	300	100	100	200	1.3
D.29	00	Duplex Block B	Bed room	2.66	12.8	20.9	2.23	36%	2.81	2.00	0.98	0.70	426	300	140	100	100	0.7
D.30	00	Duplex Block B	Bed room	2.66	11.4	23.3	2.02	36%	2.95	2.00	1.03	0.70	446	300	147	100	100	0.7
D.31	00	Duplex Block A	Living-Kitchen	3.83	28.6	13.4	1.75	30%	1.94	2.00	0.68	0.70	294	300	97	100	200	1.3
D.32	00	Duplex Block A	Bed room	2.66	11.4	23.3	2.02	35%	2.88	2.00	1.01	0.70	436	300	144	100	100	0.7
D.33	00	Duplex Block A	Bed room	2.66	12.8	20.9	2.23	35%	2.68	2.00	0.94	0.70	405	300	134	100	100	0.7
D.34	00	Duplex Block A	Living-Kitchen	3.83	28.6	13.4	1.75	32%	2.01	2.00	0.70	0.70	304	300	100	100	200	1.3
D.35	00	Duplex Block A	Bed room	2.66	11.4	23.3	2.02	34%	2.81	2.00	0.98	0.70	426	300	140	100	100	0.7
D.36	00	Duplex Block A	Bed room	2.66	12.8	20.9	2.23	34%	2.68	2.00	0.94	0.70	405	300	134	100	100	0.7
D.37	00	Duplex Block A	Living-Kitchen	3.83	28.6	13.4	1.75	32%	2.01	2.00	0.70	0.70	304	300	100	100	200	1.3
D.38	00	Duplex Block A	Bed room	2.66	11.4	23.3	2.02	33%	2.75	2.00	0.96	0.70	415	300	137	100	100	0.7
D.39	00	Duplex Block A	Bed room	2.66	12.8	20.9	2.23	33%	2.55	2.00	0.89	0.70	385	300	127	100	100	0.7
H1	00	House 148	Living-Kitchen	6.10	17.0	35.9	2.78	30%	4.42	2.00	1.55	0.70	669	300	221	100	200	1.3
H2	00	House 149	Living-Kitchen	2.59	15.1	17.1	2.13	32%	2.21	2.00	0.77	0.70	334	300	110	100	200	1.3
H3	00	House 151	Living-Kitchen	3.81	19.1	20.0	2.48	31%	2.68	2.00	0.94	0.70	405	300	134	100	200	1.3
H4	00	House 152	Living-Kitchen	2.59	15.1	17.1	2.13	34%	2.35	2.00	0.82	0.70	355	300	117	100	200	1.3
H5	00	House 154	Living-Kitchen	3.81	19.1	20.0	2.48	31%	2.68	2.00	0.94	0.70	405	300	134	100	200	1.3
H6	00	House 156	Living-Kitchen	8.61	20.5	42.0	1.54	21%	3.75	2.00	1.31	0.70	567	300	187	100	200	1.3
H7	00	House 156	Living-Kitchen	4.16	20.4	20.4	1.54	26%	2.28	2.00	0.80	0.70	344	300	114	100	200	1.3
H8	00	House 157	Living-Kitchen	4.16	20.4	20.4	1.54	30%	2.61	2.00	0.91	0.70	395	300	130	100	200	1.3
H9	00	House 157	Living-Kitchen	8.61	20.5	42.0	1.54	27%	4.76	2.00	1.66	0.70	719	300	237	100	200	1.3
H10	00	House 137	Living-Kitchen	4.29	28.1	15.3	1.77	29%	2.08	2.00	0.73	0.70	314	300	104	100	200	1.3
H11	00	House 136	Living-Kitchen	7.20	21.3	33.8	2.34	29%	4.29	2.00	1.50	0.70	648	300	214	100	200	1.3
H12	00	House 138	Living-Kitchen	2.59	15.1	17.1	2.13	32%	2.21	2.00	0.77	0.70	334	300	110	100	200	1.3

H13	00	House 140	Living-Kitchen	3.81	19.1	20.0	2.48	30%	2.55	2.00	0.89	0.70	385	300	127	100	200	1.3
H14	00	House 141	Living-Kitchen	2.59	15.1	17.1	2.13	32%	2.21	2.00	0.77	0.70	334	300	110	100	200	1.3
H15	00	House 143	Living-Kitchen	3.81	19.1	20.0	2.48	30%	2.55	2.00	0.89	0.70	385	300	127	100	200	1.3
H16	00	House 144	Living-Kitchen	2.59	15.1	17.1	2.13	32%	2.21	2.00	0.77	0.70	334	300	110	100	200	1.3
H17	00	House 146	Living-Kitchen	4.29	28.1	15.3	1.77	31%	2.21	2.00	0.77	0.70	334	300	110	100	200	1.3
H18	00	House 147	Living-Kitchen	6.48	20.0	32.4	2.36	29%	3.95	2.00	1.38	0.70	598	300	197	100	200	1.3
H19	00	House 128	Living-Kitchen	6.48	20.0	32.4	2.36	34%	4.82	2.00	1.69	0.70	730	300	241	100	200	1.3
H20	00	House 128	Living-Kitchen	6.81	28.1	24.3	1.77	28%	3.22	2.00	1.13	0.70	486	300	160	100	200	1.3
H21	00	House 130	Living-Kitchen	3.81	19.1	20.0	2.48	30%	2.55	2.00	0.89	0.70	385	300	127	100	200	1.3
H22	00	House 132	Living-Kitchen	2.59	15.1	17.1	2.13	34%	2.35	2.00	0.82	0.70	355	300	117	100	200	1.3
H23	00	House 133	Living-Kitchen	3.81	19.1	20.0	2.48	30%	2.55	2.00	0.89	0.70	385	300	127	100	200	1.3
H24	00	House 135	Living-Kitchen	6.81	28.1	24.3	1.77	31%	3.55	2.00	1.24	0.70	537	300	177	100	200	1.3
H25	00	House 118	Living-Kitchen	7.20	21.3	33.8	2.34	31%	4.56	2.00	1.59	0.70	689	300	227	100	200	1.3
H26	00	House 119	Living-Kitchen	4.29	28.1	15.3	1.77	30%	2.21	2.00	0.77	0.70	334	300	110	100	200	1.3
H27	00	House 121	Living-Kitchen	2.59	15.1	17.1	2.13	31%	2.14	2.00	0.75	0.70	324	300	107	100	200	1.3
H28	00	House 122	Living-Kitchen	3.81	19.1	20.0	2.48	30%	2.55	2.00	0.89	0.70	385	300	127	100	200	1.3
H29	00	House 124	Living-Kitchen	3.24	15.1	21.4	2.13	31%	2.68	2.00	0.94	0.70	405	300	134	100	200	1.3
H30	00	House 125	Living-Kitchen	4.29	28.1	15.3	1.77	28%	2.08	2.00	0.73	0.70	314	300	104	100	200	1.3
H31	00	House 127	Living-Kitchen	8.61	20.5	42.0	1.54	27%	4.82	2.00	1.69	0.70	730	300	241	100	200	1.3
H32	00	House 127	Living-Kitchen	4.16	20.4	20.4	1.54	26%	2.28	2.00	0.80	0.70	344	300	114	100	200	1.3
H33	00	House 126	Living-Kitchen	4.16	20.4	20.4	1.54	26%	2.28	2.00	0.80	0.70	344	300	114	100	200	1.3
H34	00	House 126	Living-Kitchen	8.61	20.5	42.0	1.54	26%	4.62	2.00	1.62	0.70	699	300	231	100	200	1.3
H35	00	House 106	Living-Kitchen	3.81	19.1	20.0	2.48	29%	2.41	2.00	0.84	0.70	365	300	120	100	200	1.3
H36	00	House 106	Living-Kitchen	2.59	15.1	17.1	2.13	30%	2.08	2.00	0.73	0.70	314	300	104	100	200	1.3
H37	00	House 103	Living-Kitchen	2.59	15.1	17.1	2.13	32%	2.21	2.00	0.77	0.70	334	300	110	100	200	1.3
H38	00	House 103	Living-Kitchen	3.81	19.1	20.0	2.48	30%	2.55	2.00	0.89	0.70	385	300	127	100	200	1.3
H39	00	House 101	Living-Kitchen	3.81	19.1	20.0	2.48	30%	2.55	2.00	0.89	0.70	385	300	127	100	200	1.3
H40	00	House 99	Living-Kitchen	3.81	19.1	20.0	2.48	30%	2.55	2.00	0.89	0.70	385	300	127	100	200	1.3
H41	00	House 99	Living-Kitchen	2.59	15.1	17.1	2.13	34%	2.35	2.00	0.82	0.70	355	300	117	100	200	1.3
H42	00	House 96	Living-Kitchen	3.24	15.2	21.3	2.13	34%	2.88	2.00	1.01	0.70	436	300	144	100	200	1.3
H43	00	House 96	Living-Kitchen	4.29	28.1	15.3	1.77	31%	2.21	2.00	0.77	0.70	334	300	110	100	200	1.3
H44	00	House 96	Living-Kitchen	4.29	28.1	15.3	1.77	31%	2.21	2.00	0.77	0.70	334	300	110	100	200	1.3
H45	00	House 91	Living-Kitchen	3.24	15.2	21.3	2.13	34%	2.88	2.00	1.01	0.70	436	300	144	100	200	1.3
H46	00	House 90	Living-Kitchen	6.81	28.1	24.3	1.77	30%	3.48	2.00	1.22	0.70	527	300	174	100	200	1.3
H47	00	House 117	Living-Kitchen	7.20	21.3	33.8	2.34	30%	4.49	2.00	1.57	0.70	679	300	224	100	200	1.3
H48	00	House 114	Living-Kitchen	3.81	19.1	20.0	2.48	31%	2.61	2.00	0.91	0.70	395	300	130	100	200	1.3
H49	00	House 112	Living-Kitchen	2.59	15.1	17.1	2.13	31%	2.14	2.00	0.75	0.70	324	300	107	100	200	1.3
H50	00	House 111	Living-Kitchen	3.81	19.1	20.0	2.48	31%	2.61	2.00	0.91	0.70	395	300	130	100	200	1.3
H51	00	House 108	Living-Kitchen	3.81	19.1	20.0	2.48	29%	2.48	2.00	0.87	0.70	375	300	124	100	200	1.3
H52	00	House 108	Living-Kitchen	2.59	15.1	17.1	2.13	31%	2.14	2.00	0.75	0.70	324	300	107	100	200	1.3
H53	00	House 78	Living-Kitchen	6.48	20.0	32.4	2.36	31%	4.29	2.00	1.50	0.70	648	300	214	100	200	1.3
H54	00	House 77	Living-Kitchen	3.81	19.1	20.0	2.48	29%	2.41	2.00	0.84	0.70	365	300	120	100	200	1.3
H55	00	House 75	Living-Kitchen	3.81	19.1	20.0	2.48	27%	2.28	2.00	0.80	0.70	344	300	114	100	200	1.3
H56	00	House 75	Living-Kitchen	2.59	15.1	17.1	2.13	32%	2.21	2.00	0.77	0.70	334	300	110	100	200	1.3
H57	00	House 73	Living-Kitchen	6.10	17.0	35.9	2.78	26%	3.75	2.00	1.31	0.70	567	300	187	100	200	1.3
H58	00	House 53	Living-Kitchen	2.59	15.1	17.1	2.13	31%	2.14	2.00	0.75	0.70	324	300	107	100	200	1.3
H59	00	House 53	Living-Kitchen	3.81	19.1	20.0	2.48	27%	2.28	2.00	0.80	0.70	344	300	114	100	200	1.3
H60	00	House 55	Living-Kitchen	3.81	19.1	20.0	2.48	27%	2.28	2.00	0.80	0.70	344	300	114	100	200	1.3
H61	00	House 56	Living-Kitchen	2.59	15.1	17.1	2.13	31%	2.14	2.00	0.75	0.70	324	300	107	100	200	1.3
H62	00	House 57	Living-Kitchen	3.81	19.1	20.0	2.48	29%	2.48	2.00	0.87	0.70	375	300	124	100	200	1.3
H63	00	House 59	Living-Kitchen	2.59	15.1	17.1	2.13	30%	2.08	2.00	0.73	0.70	314	300	104	100	200	1.3
H64	00	House 60	Living-Kitchen	6.10	17.0	35.9	2.78	28%	4.09	2.00	1.43	0.70	618	300	204	100	200	1.3
H65	00	House 61	Living-Kitchen	2.59	15.1	17.1	2.13	32%	2.21	2.00	0.77	0.70	334	300	110	100	200	1.3
H66	00	House 61	Living-Kitchen	3.81	19.1	20.0	2.48	30%	2.55	2.00	0.89	0.70	385	300	127	100	200	1.3
H67	00	House 63	Living-Kitchen	3.81	19.1	20.0	2.48	28%	2.35	2.00	0.82	0.70	355	300	117	100	200	1.3
H68	00	House 64	Living-Kitchen	7.20	21.3	33.8	2.34	25%	3.62	2.00	1.27	0.70	547	300	181	100	200	1.3
H69	00	House 65	Living-Kitchen	3.81	19.1	20.0	2.48	29%	2.48	2.00	0.87	0.70	375	300	124	100	200	1.3
H70	00	House 67	Living-Kitchen	2.59	15.1	17.1	2.13	32%	2.21	2.00	0.77	0.70	334	300	110	100	200	1.3

H71	00	House 67	Living-Kitchen	3.81	19.1	20.0	2.48	28%	2.41	2.00	0.84	0.70	365	300	120	100	200	1.3
H72	00	House 69	Living-Kitchen	2.59	15.1	17.1	2.13	33%	2.28	2.00	0.80	0.70	344	300	114	100	200	1.3
H73	00	House 69	Living-Kitchen	3.81	19.1	20.0	2.48	25%	2.14	2.00	0.75	0.70	324	300	107	100	200	1.3
H74	00	House 72	Living-Kitchen	2.59	15.2	17.0	2.13	34%	2.35	2.00	0.82	0.70	355	300	117	100	200	1.3
H75	00	House 72	Living-Kitchen	3.81	19.1	20.0	2.48	27%	2.28	2.00	0.80	0.70	344	300	114	100	200	1.3
H76	00	House 88	Living-Kitchen	2.59	15.1	17.1	2.13	32%	2.21	2.00	0.77	0.70	334	300	110	100	200	1.3
H77	00	House 88	Living-Kitchen	3.81	19.1	20.0	2.48	27%	2.28	2.00	0.80	0.70	344	300	114	100	200	1.3
H78	00	House 86	Living-Kitchen	3.81	19.1	20.0	2.48	27%	2.28	2.00	0.80	0.70	344	300	114	100	200	1.3
H79	00	House 86	Living-Kitchen	2.59	15.1	17.1	2.13	32%	2.21	2.00	0.77	0.70	334	300	110	100	200	1.3
H80	00	House 84	Living-Kitchen	3.81	19.1	20.0	2.48	27%	2.35	2.00	0.82	0.70	355	300	117	100	200	1.3
H81	00	House 83	Living-Kitchen	6.48	20.0	32.4	2.36	32%	4.42	2.00	1.55	0.70	669	300	221	100	200	1.3
H82	00	House 82	Living-Kitchen	6.10	17.0	35.9	2.78	30%	4.36	2.00	1.52	0.70	659	300	217	100	200	1.3
H83	00	House 81	Living-Kitchen	2.59	15.1	17.1	2.13	33%	2.28	2.00	0.80	0.70	344	300	114	100	200	1.3
H84	00	House 80	Living-Kitchen	6.09	20.5	29.7	1.54	29%	3.69	2.00	1.29	0.70	557	300	184	100	200	1.3
H85	00	House 79	Living-Kitchen	4.16	20.4	20.4	1.54	29%	2.55	2.00	0.89	0.70	385	300	127	100	200	1.3
H86	00	House 28	Living-Kitchen	6.10	17.0	35.9	2.78	27%	4.02	2.00	1.41	0.70	608	300	201	100	200	1.3
H87	00	House 27	Living-Kitchen	2.59	15.1	17.1	2.13	31%	2.14	2.00	0.75	0.70	324	300	107	100	200	1.3
H88	00	House 25	Living-Kitchen	3.81	19.1	20.0	2.48	29%	2.48	2.00	0.87	0.70	375	300	124	100	200	1.3
H89	00	House 24	Living-Kitchen	2.59	15.1	17.1	2.13	31%	2.14	2.00	0.75	0.70	324	300	107	100	200	1.3
H90	00	House 22	Living-Kitchen	6.81	28.1	24.3	1.77	30%	3.42	2.00	1.20	0.70	517	300	171	100	200	1.3
H91	00	House 21	Living-Kitchen	3.24	15.2	21.3	2.13	33%	2.81	2.00	0.98	0.70	426	300	140	100	200	1.3
H92	00	House 20	Living-Kitchen	3.81	19.1	20.0	2.48	33%	2.81	2.00	0.98	0.70	426	300	140	100	200	1.3
H93	00	House 18	Living-Kitchen	2.59	15.1	17.1	2.13	34%	2.35	2.00	0.82	0.70	355	300	117	100	200	1.3
H94	00	House 17	Living-Kitchen	3.81	19.1	20.0	2.48	32%	2.75	2.00	0.96	0.70	415	300	137	100	200	1.3
H95	00	House 14	Living-Kitchen	3.81	19.1	20.0	2.48	32%	2.75	2.00	0.96	0.70	415	300	137	100	200	1.3
H96	00	House 13	Living-Kitchen	2.59	15.1	17.1	2.13	31%	2.14	2.00	0.75	0.70	324	300	107	100	200	1.3
H97	00	House 11	Living-Kitchen	3.81	19.1	20.0	2.48	32%	2.75	2.00	0.96	0.70	415	300	137	100	200	1.3
H98	00	House 9	Living-Kitchen	2.59	15.1	17.1	2.13	31%	2.14	2.00	0.75	0.70	324	300	107	100	200	1.3
H99	00	House 8	Living-Kitchen	3.81	19.1	20.0	2.48	32%	2.75	2.00	0.96	0.70	415	300	137	100	200	1.3
H100	00	House 5	Living-Kitchen	3.81	19.1	20.0	2.48	32%	2.75	2.00	0.96	0.70	415	300	137	100	200	1.3
H101	00	House 4	Living-Kitchen	2.59	15.1	17.1	2.13	31%	2.14	2.00	0.75	0.70	324	300	107	100	200	1.3
H102	00	House 2	Living-Kitchen	4.29	28.1	15.3	1.77	32%	2.35	2.00	0.82	0.70	355	300	117	100	200	1.3
H103	00	House 1	Living-Kitchen	6.48	20.0	32.4	2.36	31%	4.36	2.00	1.52	0.70	659	300	217	100	200	1.3
H104	00	House 52	Living-Kitchen	6.48	20.0	32.4	2.36	32%	4.49	2.00	1.57	0.70	679	300	224	100	200	1.3
H105	00	House 51	Living-Kitchen	4.29	28.1	15.3	1.77	29%	2.08	2.00	0.73	0.70	314	300	104	100	200	1.3
H106	00	House 50	Living-Kitchen	3.81	19.1	20.0	2.48	29%	2.41	2.00	0.84	0.70	365	300	120	100	200	1.3
H107	00	House 50	Living-Kitchen	2.59	15.1	17.1	2.13	32%	2.21	2.00	0.77	0.70	334	300	110	100	200	1.3
H108	00	House 48	Living-Kitchen	3.81	19.1	20.0	2.48	27%	2.35	2.00	0.82	0.70	355	300	117	100	200	1.3
H109	00	House 47	Living-Kitchen	3.24	16.0	20.3	2.18	32%	2.68	2.00	0.94	0.70	405	300	134	100	200	1.3
H110	00	House 46	Living-Kitchen	6.10	17.0	35.9	2.78	29%	4.22	2.00	1.48	0.70	638	300	211	100	200	1.3
H111	00	House 29	Living-Kitchen	2.59	15.1	17.1	2.13	31%	2.14	2.00	0.75	0.70	324	300	107	100	200	1.3
H112	00	House 29	Living-Kitchen	3.81	19.1	20.0	2.48	27%	2.35	2.00	0.82	0.70	355	300	117	100	200	1.3
H113	00	House 32	Living-Kitchen	3.81	19.1	20.0	2.48	27%	2.35	2.00	0.82	0.70	355	300	117	100	200	1.3
H114	00	House 32	Living-Kitchen	2.59	15.1	17.1	2.13	31%	2.14	2.00	0.75	0.70	324	300	107	100	200	1.3
H115	00	House 35	Living-Kitchen	3.81	19.1	20.0	2.48	27%	2.35	2.00	0.82	0.70	355	300	117	100	200	1.3
H116	00	House 36	Living-Kitchen	2.59	15.1	17.1	2.13	31%	2.14	2.00	0.75	0.70	324	300	107	100	200	1.3
H117	00	House 38	Living-Kitchen	6.10	17.0	35.9	2.78	28%	4.15	2.00	1.45	0.70	628	300	207	100	200	1.3
H118	00	House 39	Living-Kitchen	6.10	17.0	35.9	2.78	28%	4.15	2.00	1.45	0.70	628	300	207	100	200	1.3
H119	00	House 40	Living-Kitchen	2.59	15.1	17.1	2.13	30%	2.08	2.00	0.73	0.70	314	300	104	100	200	1.3
H120	00	House 41	Living-Kitchen	3.81	19.1	20.0	2.48	27%	2.35	2.00	0.82	0.70	355	300	117	100	200	1.3
H121	00	House 43	Living-Kitchen	2.59	15.1	17.1	2.13	30%	2.08	2.00	0.73	0.70	314	300	104	100	200	1.3
H122	00	House 43	Living-Kitchen	3.81	19.1	20.0	2.48	27%	2.35	2.00	0.82	0.70	355	300	117	100	200	1.3
H123	00	House 45	Living-Kitchen	3.81	19.1	20.0	2.48	27%	2.35	2.00	0.82	0.70	355	300	117	100	200	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. The daylight reception assessment has been targeted to habitable rooms within the proposed development. Receptors / rooms within the proposed development are indicated in image 5.1 to 5.15.

- Apartments: Blocks 1 and 2, all habitable rooms within the proposed blocks on the ground floor and first floor have been assessed. 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.
- Duplex blocks A, B, C, D and E: a selection of habitable rooms on the ground floor which are observed to be in the most daylight challenging positions or rooms positioned with close by obstacles have been assessed. 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.
- Houses: a selection of habitable rooms on the ground floor which are observed to be in the most daylight challenging positions or rooms positioned with close by obstacles have been assessed.

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 all of the proposed rooms calculated daylight results achieved the minimum guidelines or achieved well in excess of the guidelines.

- Apartments: Overall, examined residential rooms for the proposed apartment blocks 1 and 2 achieved on average a daylight factor (DF) of 3.1% and an illuminance of 470 lux on over 50% of the floor area for over 50% of the available daylight hours. An average DF of 1.09% and an illuminance of 155 lux on over 95% of the floor area for over 50% of the available daylight hours was achieved.
- Maisonette blocks A-E: Overall, examined residential rooms for the proposed maisonette blocks achieved on average a daylight factor (DF) of 2.51% and an illuminance of 380 lux on over 50% of the floor area for over 50% of the available daylight hours. An average DF of 0.87% and an illuminance of 125 lux on over 95% of the floor area for over 50% of the available daylight hours was achieved.
- Houses: Overall, examined residential rooms for the proposed houses achieved on average a daylight factor (DF) of 2.75% and an illuminance of 416 lux on over 50% of the floor area for over 50% of the available daylight hours. An average DF of 0.96% and an illuminance of 137 lux on over 95% of the floor area for over 50% of the available daylight hours was achieved.

In an urban environment it can more often be the case that complete fulfilment with the guidelines is not attainable. 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. 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 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 well in excess of these minimum guidelines.

- Overall compliance for proposed development = 100%

In summary, the calculation results have achieved full compliance under IS EN17037 / BS EN17307 and BS EN 17037:2018 National Annex guidelines. This indicates an overall good level of daylight for the proposed development under the guidelines. We conclude, the proposed development can provide a good level of residential daylight amenity to future occupants.

Sunlight Reception

Sunlight in the new proposed amenity areas:

5.4 **Receptor selection - Amenity spaces within the proposed development**
Image 5.16-5.17 below indicates the public open space and communal open space amenity areas 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 5.16: New proposed amenity spaces within the development. Public Open space.



Image 5.17: New proposed amenity spaces within the development. Communal Open space.

Receptor	Amenity Description	Amenity area (m²)
A	Public open space 1	5,864.0
B	Public open space 2	789.0
C	Public open space 3	1,681.0
D	Public open space 4	767.0
E	Public open space 5	695.0
F	Public open space 6	737.0
G	Communal open space 1	600.0
H	Communal open space 2	747.0
I	Communal open space 3	173.0

Table 5.2: List of new proposed amenity spaces.

5.5 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	5864.0	3032860.8	8.62	2.0	9.0
B	789.0	348422.4	7.36	2.0	8.0
C	1681.0	992462.4	9.84	2.0	11.0
D	767.0	346990.8	7.54	2.0	7.0
E	695.0	311499.0	7.47	2.0	7.0
F	737.0	332976.6	7.53	2.0	8.0
G	600.0	298080.0	8.28	2.0	8.0
H	747.0	221410.8	4.94	2.0	6.0
I	173.0	78991.8	7.61	2.0	8.0

Table 5.3: Calculation results: Summary table of sunlight analysis of proposed open space amenity areas.

5.6 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 5.3 we note the selected amenity spaces all achieved sunlight above the recommended guidelines, see image 5.16-5.17 for receptor/amenity space location. Summary of results are as follows:

- The average public open space amenity area calculated sunlight on at least 50% of the area on March 21st is 8.30 hours.
- The average communal open space amenity area calculated sunlight on at least 50% of the area on March 21st is 7.30 hours.

This confirms the amenity areas proposed will be adequately sunlit throughout the year. We conclude that the new amenity spaces 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 the most 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 6.1-6.5 below indicates the windows that have been selected and analysed. The windows are identified and labelled for reference in the results.

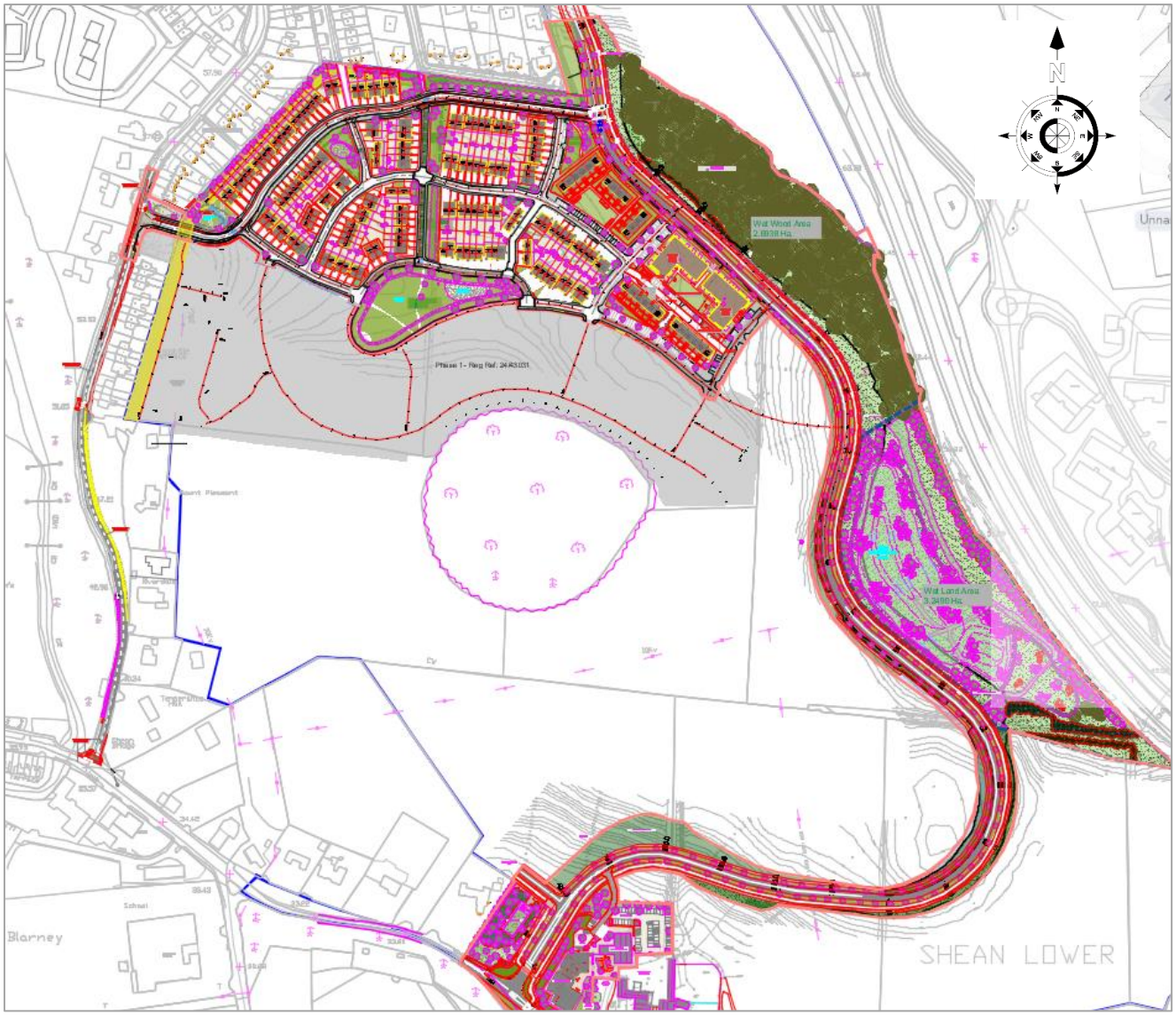


Image 6.1: Daylight impact: Neighbouring receptors – Overall view (receptor no. 1 - 25).



Image 6.2: Daylight impact: Neighbouring receptors (receptor no. 1.0 – 6.2).

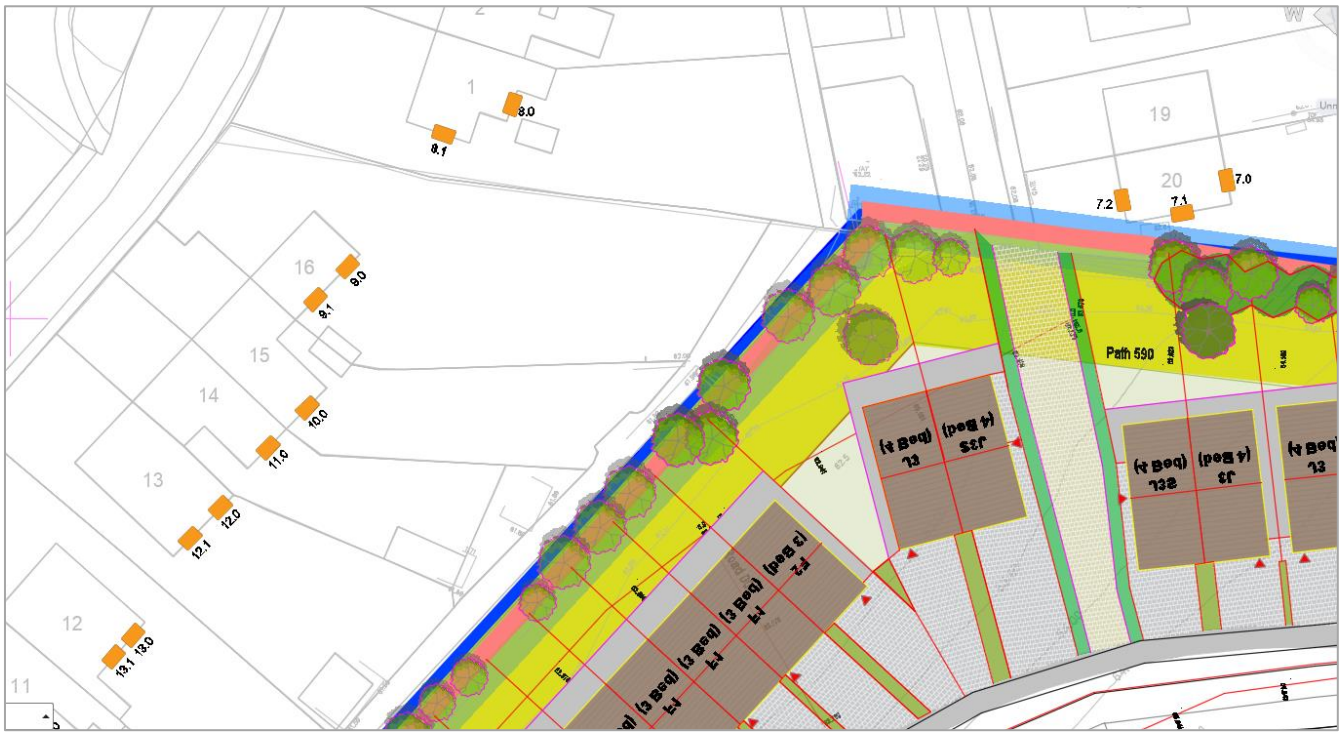


Image 6.3: Daylight impact: Neighbouring receptors (receptor no. 7.0 – 13.1).



Image 6.4: Daylight impact: Neighbouring receptors (receptor no. 14.0 – 24.0).



Image 6.5: Daylight impact: Neighbouring receptors (receptor no. 25.0-25.1).

Receptor/window *	Level	Location / Address	Dwelling description
1.0, 1.1	00	14 Aisling Geal, Station Rd, Blarney, Cork	Residential
2.0, 2.1	00	15 Aisling Geal, Station Rd, Blarney, Cork	Residential
3.0, 3.1	00	16 Aisling Geal, Station Rd, Blarney, Cork	Residential
4.0, 4.1	00	17 Aisling Geal, Station Rd, Blarney, Cork	Residential
5.0, 5.1	00	18 Aisling Geal, Station Rd, Blarney, Cork	Residential
6.0, 6.1, 6.2	00	19 Aisling Geal, Station Rd, Blarney, Cork	Residential
7.0, 7.1, 7.2	00	20 Árd Na Greine, Shean Upper, Cork	Residential
8.0, 8.1	00	1 Saint John's Terrace, Station Rd, Blarney, Cork	Residential
9.0, 9.1	00	16 Station Assumption Terrace, Station Rd, Blarney, Cork	Residential
10.0	00	15 Station Assumption Terrace, Station Rd, Blarney, Cork	Residential
11.0	00	14 Station Assumption Terrace, Station Rd, Blarney, Cork	Residential
12.0, 12.1	00	13 Station Assumption Terrace, Station Rd, Blarney, Cork	Residential
13.0, 13.1	00	12 Station Assumption Terrace, Station Rd, Blarney, Cork	Residential
14.0	00	11 Station Assumption Terrace, Station Rd, Blarney, Cork	Residential
15.0, 15.1	00	10 Station Assumption Terrace, Station Rd, Blarney, Cork	Residential
16.0	00	9 Station Assumption Terrace, Station Rd, Blarney, Cork	Residential
17.0	00	8 Station Assumption Terrace, Station Rd, Blarney, Cork	Residential
18.0, 18.1	00	7 Station Assumption Terrace, Station Rd, Blarney, Cork	Residential
19.0	00	6 Station Assumption Terrace, Station Rd, Blarney, Cork	Residential
20.0, 20.1	00	5 Station Assumption Terrace, Station Rd, Blarney, Cork	Residential
21.0, 21.1	00	4 Station Assumption Terrace, Station Rd, Blarney, Cork	Residential
22.0, 22.1	00	3 Station Assumption Terrace, Station Rd, Blarney, Cork	Residential
23.0, 23.1	00	2 Station Assumption Terrace, Station Rd, Blarney, Cork	Residential
24.0	00	1 Station Assumption Terrace, Station Rd, Blarney, Cork	Residential
25.0, 25.1	00	Summerfield, Shean Lower, Blarney, Co. 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.
* Some 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 1.0	37%	35%	0.96	Negligible
Receptor 1.1	37%	35%	0.96	Negligible
Receptor 2.0	37%	35%	0.95	Negligible
Receptor 2.1	37%	35%	0.95	Negligible
Receptor 3.0	37%	35%	0.95	Negligible
Receptor 3.1	37%	35%	0.95	Negligible
Receptor 4.0	37%	35%	0.95	Negligible
Receptor 4.1	37%	35%	0.95	Negligible
Receptor 5.0	37%	34%	0.93	Negligible
Receptor 5.1	37%	34%	0.93	Negligible
Receptor 6.0	33%	32%	0.96	Negligible
Receptor 6.1	36%	31%	0.87	Negligible
Receptor 6.2	34%	31%	0.90	Negligible
Receptor 7.0	34%	31%	0.93	Negligible
Receptor 7.1	37%	30%	0.82	Negligible
Receptor 7.2	37%	34%	0.91	Negligible
Receptor 8.0	35%	33%	0.95	Negligible
Receptor 8.1	34%	32%	0.95	Negligible
Receptor 9.0	36%	34%	0.94	Negligible
Receptor 9.1	36%	34%	0.94	Negligible
Receptor 10.0	36%	33%	0.92	Negligible
Receptor 11.0	36%	33%	0.92	Negligible
Receptor 12.0	36%	33%	0.92	Negligible
Receptor 12.1	36%	33%	0.92	Negligible
Receptor 13.0	36%	33%	0.92	Negligible
Receptor 13.1	36%	33%	0.92	Negligible
Receptor 14.0	36%	34%	0.93	Negligible
Receptor 15.0	36%	34%	0.93	Negligible
Receptor 15.1	36%	34%	0.93	Negligible
Receptor 16.0	36%	34%	0.93	Negligible
Receptor 17.0	36%	34%	0.92	Negligible
Receptor 18.0	36%	34%	0.93	Negligible
Receptor 18.1	36%	34%	0.93	Negligible
Receptor 19.0	36%	34%	0.94	Negligible
Receptor 20.0	36%	34%	0.94	Negligible
Receptor 20.1	36%	34%	0.94	Negligible
Receptor 21.0	36%	34%	0.96	Negligible
Receptor 21.1	36%	34%	0.96	Negligible
Receptor 22.0	36%	34%	0.96	Negligible
Receptor 22.1	36%	34%	0.96	Negligible
Receptor 23.0	36%	34%	0.96	Negligible
Receptor 23.1	36%	34%	0.96	Negligible
Receptor 24.0	36%	34%	0.96	Negligible
Receptor 25.0	37%	36%	0.99	Negligible
Receptor 25.1	37%	36%	0.99	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 0.82 to 0.99. 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 6.1-6.5 for receptor locations):

- North receptors: Receptor no. 1.0 to 7.2: The private dwellings located in the estate, Aisling Geal, Station Road, with ground floor windows were examined and resulted in a change factor range of 0.82 to 0.96. These receptors are within the guidelines and the effect is determined as negligible under BRE definitions.
- Northwest / West receptors: Receptor no. 8.0 to 24.0: Existing dwellings located along Assumption Terrace, Station Road with ground floor windows were examined and resulted in a change factor range of 0.92 to 0.96. These receptors are comfortably within the guidelines and the effect is determined as negligible under BRE definitions.
- South receptors: Receptor no. 25.0 to 25.1: The private dwellings located at Shean Lower, Blarney with ground floor windows were examined and resulted in a change factor of 0.99. These receptors are also comfortably within the guidelines and the effect is determined as negligible under BRE definitions.
- Overall, the average change ratio for VSC is 0.94.

We conclude that the new proposed development's effect on daylight reception in the neighbouring rooms is 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 6.6-6.7 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.



Image 6.6: Sunlight impact: Existing neighbouring amenity spaces. Receptor no. 1 - 24.



Image 6.7: Sunlight impact: Existing neighbouring amenity spaces. Receptor no. 25.

Receptor	Location / Address	Amenity description	Approx. area (m^2)
1	14 Aisling Geal, Station Rd, Blarney, Cork	Private garden space	150
2	15 Aisling Geal, Station Rd, Blarney, Cork	Private garden space	135
3	16 Aisling Geal, Station Rd, Blarney, Cork	Private garden space	150
4	17 Aisling Geal, Station Rd, Blarney, Cork	Private garden space	260
5	18 Aisling Geal, Station Rd, Blarney, Cork	Private garden space	160
6	19 Aisling Geal, Station Rd, Blarney, Cork	Private garden space	670
7	20 Árd Na Greine, Shean Upper, Cork	Private garden space	200
8	1 Saint John's Terrace, Station Rd, Blarney, Cork	Private garden space	370
9	16 Station Assumption Terrace, Station Rd, Blarney, Cork	Private garden space	550
10	15 Station Assumption Terrace, Station Rd, Blarney, Cork	Private garden space	245
11	14 Station Assumption Terrace, Station Rd, Blarney, Cork	Private garden space	175
12	13 Station Assumption Terrace, Station Rd, Blarney, Cork	Private garden space	290
13	12 Station Assumption Terrace, Station Rd, Blarney, Cork	Private garden space	215
14	11 Station Assumption Terrace, Station Rd, Blarney, Cork	Private garden space	120
15	10 Station Assumption Terrace, Station Rd, Blarney, Cork	Private garden space	175
16	9 Station Assumption Terrace, Station Rd, Blarney, Cork	Private garden space	200
17	8 Station Assumption Terrace, Station Rd, Blarney, Cork	Private garden space	245
18	7 Station Assumption Terrace, Station Rd, Blarney, Cork	Private garden space	165
19	6 Station Assumption Terrace, Station Rd, Blarney, Cork	Private garden space	155
20	5 Station Assumption Terrace, Station Rd, Blarney, Cork	Private garden space	200
21	4 Station Assumption Terrace, Station Rd, Blarney, Cork	Private garden space	190
22	3 Station Assumption Terrace, Station Rd, Blarney, Cork	Private garden space	165
23	2 Station Assumption Terrace, Station Rd, Blarney, Cork	Private garden space	150
24	1 Station Assumption Terrace, Station Rd, Blarney, Cork	Private garden space	148
25	Summerfield, Shean Lower, Blarney, Co. Cork	Private garden space	1,700

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 (m²)	EXISTING STATUS			NEW STATUS			Change factor	Comment / effect of proposed development
		sun hours * amenity space area (Sun Hr*m²)	total sun hours (Sun Hr)	sun hours on 50% of the area	sun hours * amenity space area (Sun Hr*m²)	total sun hours (Sun Hr)	sun hours on 50% of the area		
1	150	81360	9.04	10.0	81360	9.04	10.0	1.00	Negligible
2	135	73224	9.04	10.0	73224	9.04	10.0	1.00	Negligible
3	150	81360	9.04	10.0	81360	9.04	10.0	1.00	Negligible
4	260	141024	9.04	10.0	141024	9.04	10.0	1.00	Negligible
5	160	86784	9.04	10.0	86784	9.04	10.0	1.00	Negligible
6	670	303108	7.54	9.0	303108	7.54	9.0	1.00	Negligible
7	200	90480	7.54	9.0	90480	7.54	9.0	1.00	Negligible
8	370	191586	8.63	10.0	191586	8.63	10.0	1.00	Negligible
9	550	315150	9.55	11.0	304590	9.23	10.0	0.97	Negligible
10	245	140385	9.55	11.0	121716	8.28	9.0	0.87	Negligible
11	175	100275	9.55	11.0	85785	8.17	9.0	0.86	Negligible
12	290	166344	9.56	11.0	142158	8.17	9.0	0.86	Negligible
13	215	123324	9.56	11.0	105393	8.17	9.0	0.86	Negligible
14	120	68832	9.56	11.0	58824	8.17	9.0	0.86	Negligible
15	175	100380	9.56	11.0	85785	8.17	9.0	0.86	Negligible
16	200	114720	9.56	11.0	98040	8.17	9.0	0.86	Negligible
17	245	140532	9.56	11.0	120099	8.17	9.0	0.86	Negligible
18	165	94644	9.56	11.0	80883	8.17	9.0	0.86	Negligible
19	155	88908	9.56	11.0	75981	8.17	9.0	0.86	Negligible
20	200	114720	9.56	11.0	98040	8.17	9.0	0.86	Negligible
21	190	106704	9.36	11.0	92568	8.12	9.0	0.87	Negligible
22	165	92664	9.36	11.0	80388	8.12	9.0	0.87	Negligible
23	150	84240	9.36	11.0	74520	8.28	9.0	0.89	Negligible
24	148	83116.8	9.36	11.0	78144	8.80	10.0	0.94	Negligible
25	1,700	952680	9.34	11.0	946560	9.28	10.0	0.99	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 0.80 (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 6.6-6.7 for receptor locations):

- North receptors: Receptor no. 1 to 8 are private garden spaces to neighbouring houses in the estate Aisling Geal, Árd Na Greine and Saint John's Terrace. The receptors resulted in a change factor result of 1.00 meaning the new proposed development will have no sunlight impact on these areas.
- West receptors: Receptor no. 9 to 25 are private amenity spaces to houses on Station Road and receptor no.25 along the R617. The receptors resulted in a change factor range of 0.86 to 0.99. The change happens in the early morning hours of 07.00-10.00. The calculation findings are well within the guidelines, and the effect is determined as 'negligible' under BRE definitions.
- Overall, the average change ratio is 0.89.

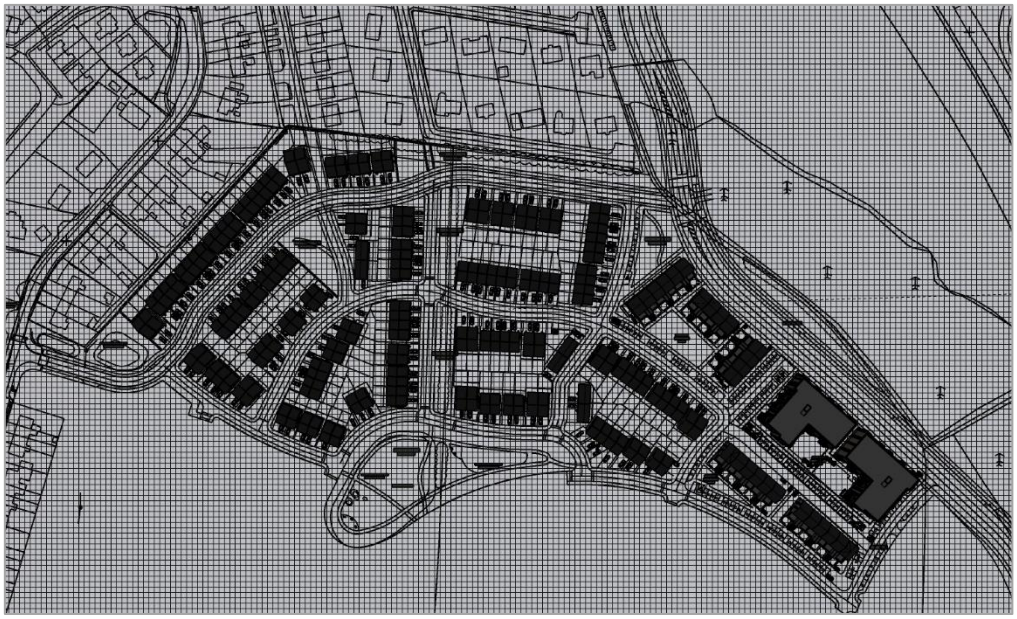
We conclude that the new proposed development's effect on sunlight reception in the neighbouring amenity areas is all within the constraints and minimum recommendations of the BRE Report – Site Layout and Planning for Daylight and Sunlight BR209 2022, and we therefore deem the proposed development to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

Appendix A

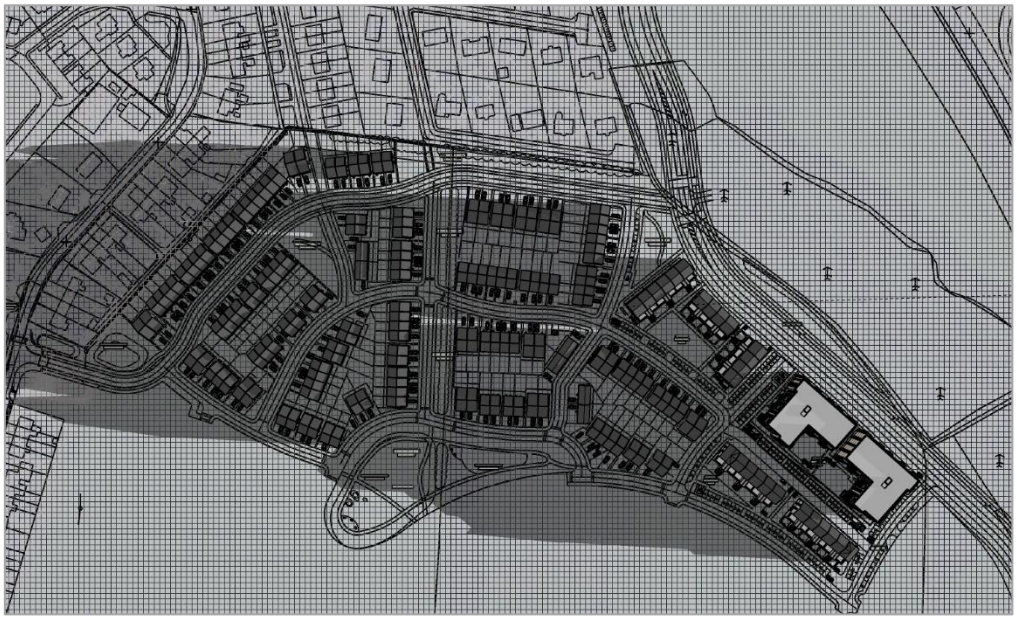
Sunlight analysis illustrations: plotted in one hourly illustration time frames for March 21st (Spring equinox).

Proposed status: 06:00 to 19:00 hours.

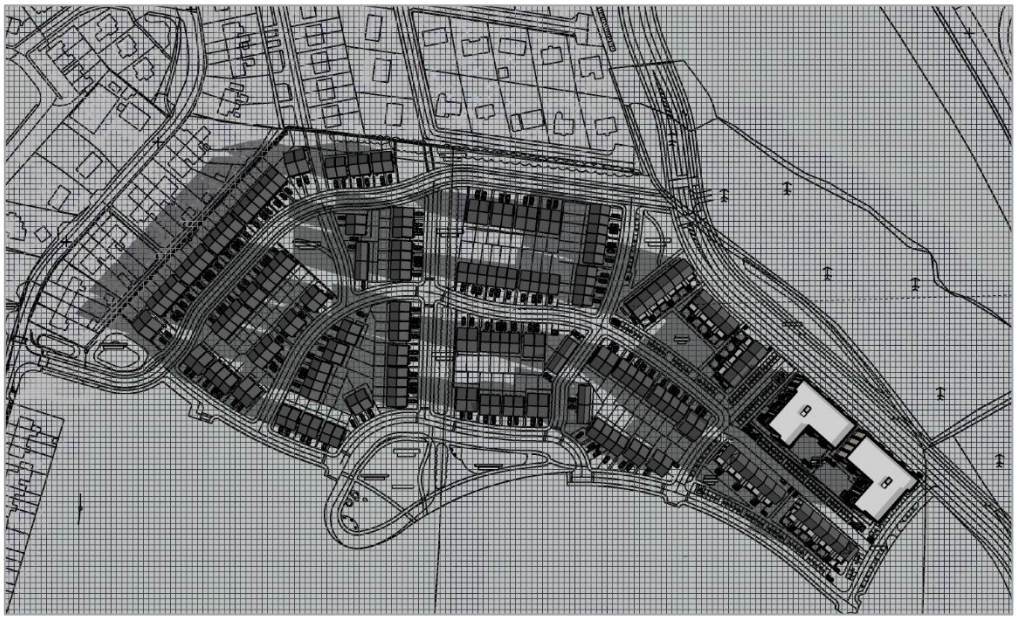
06.00 March 21st



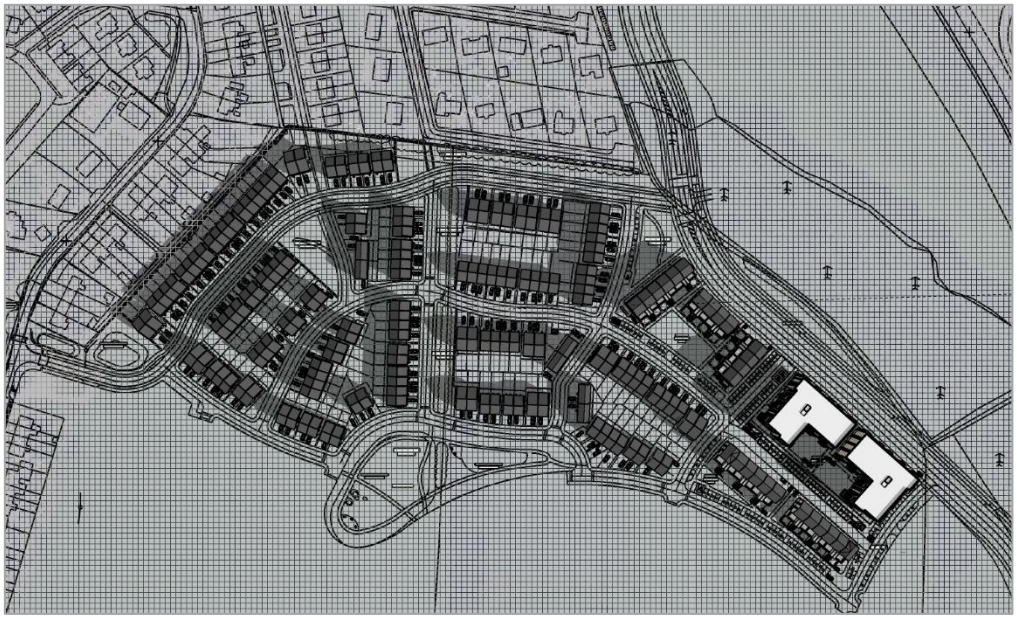
07.00 March 21st



08.00 March 21st



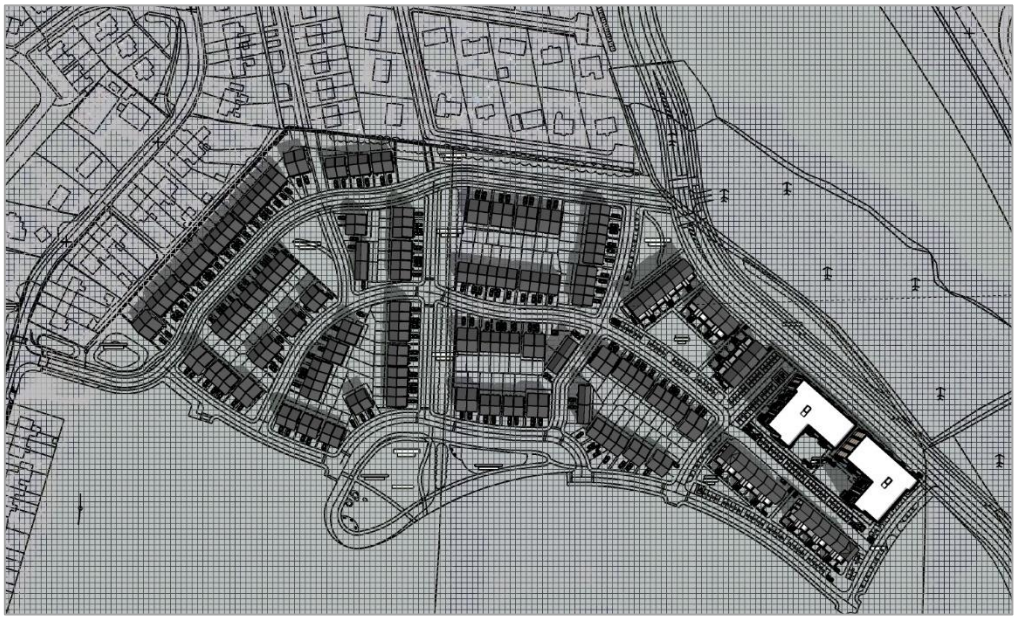
09.00 March 21st



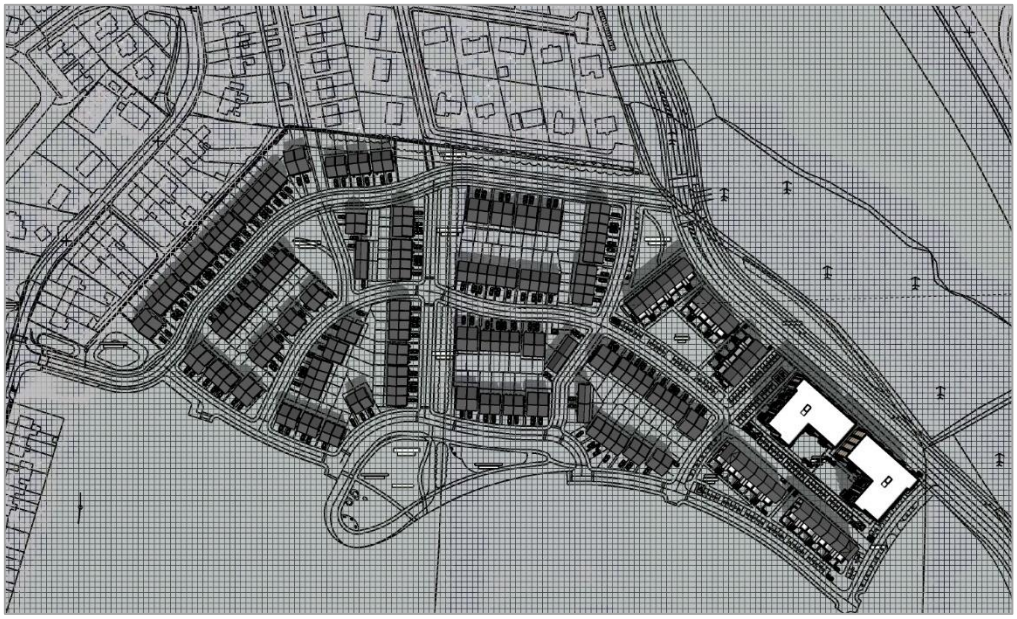
10.00 March 21st



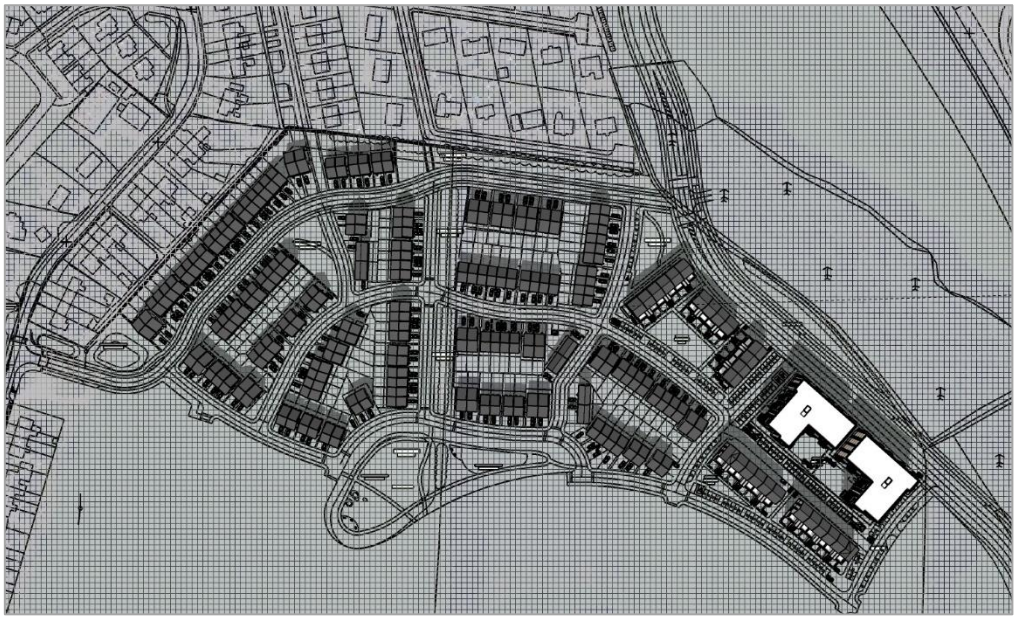
11.00 March 21st



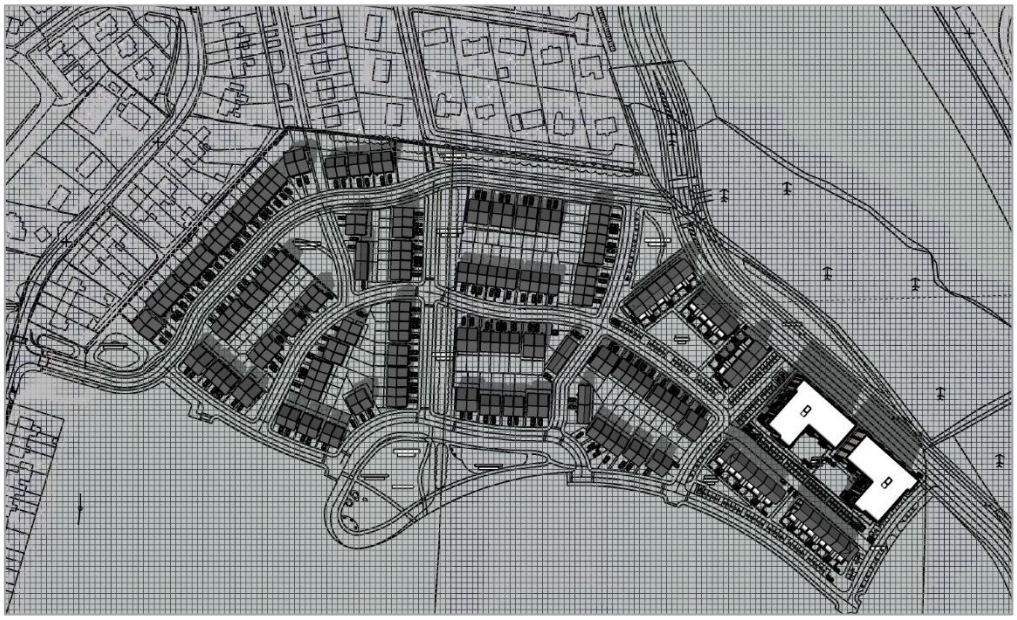
12.00 March 21st



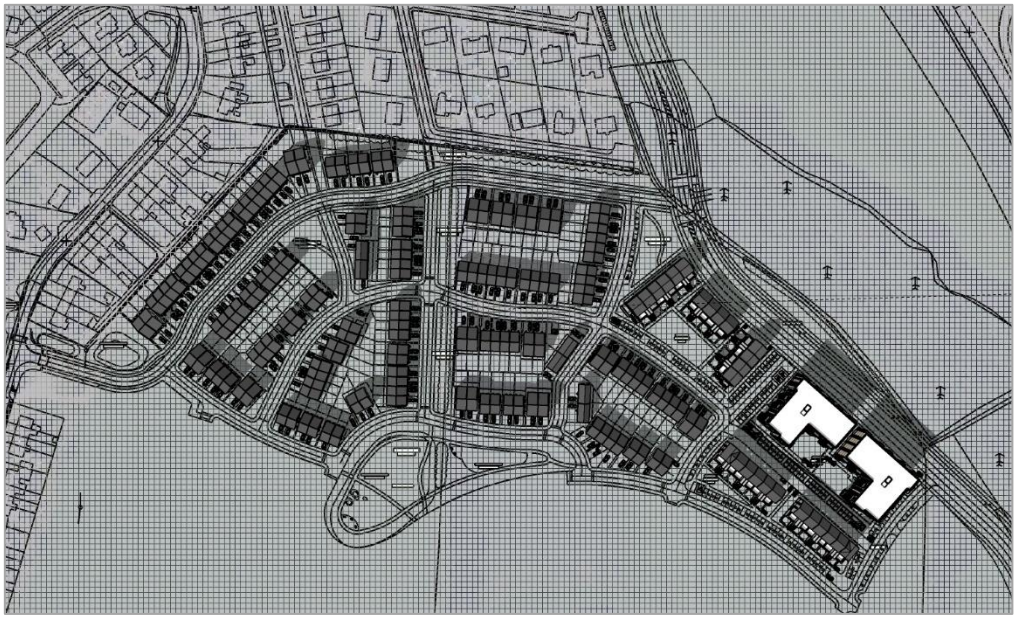
13.00 March 21st



14.00 March 21st



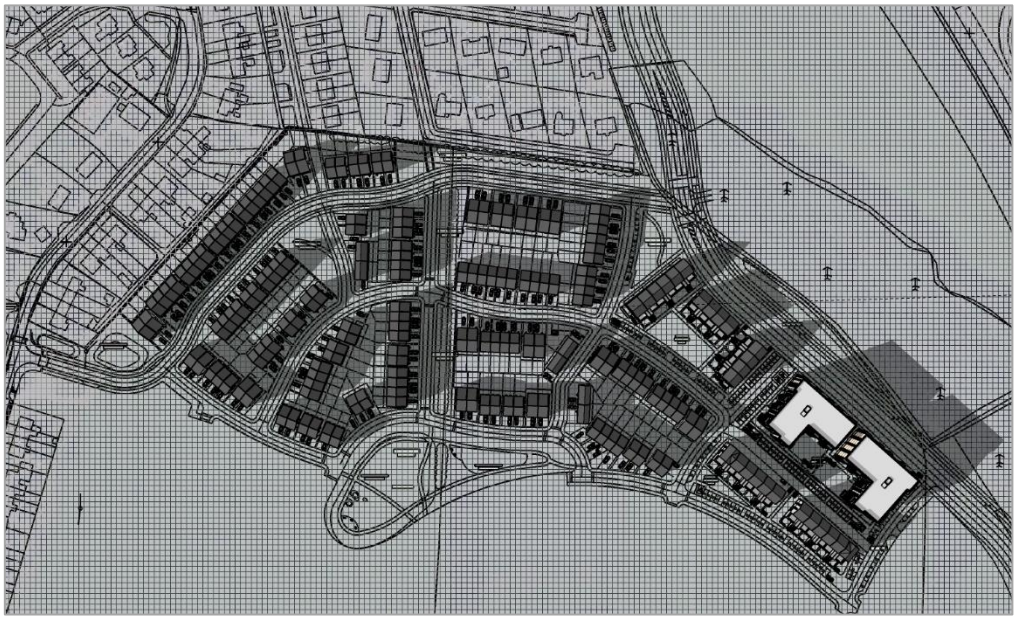
15.00 March 21st



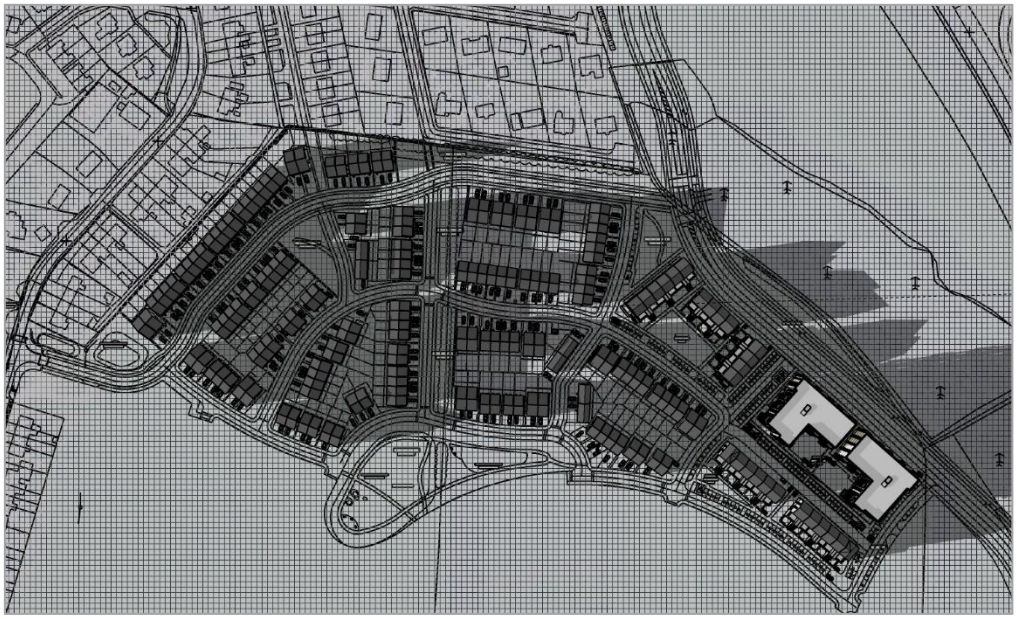
16.00 March 21st



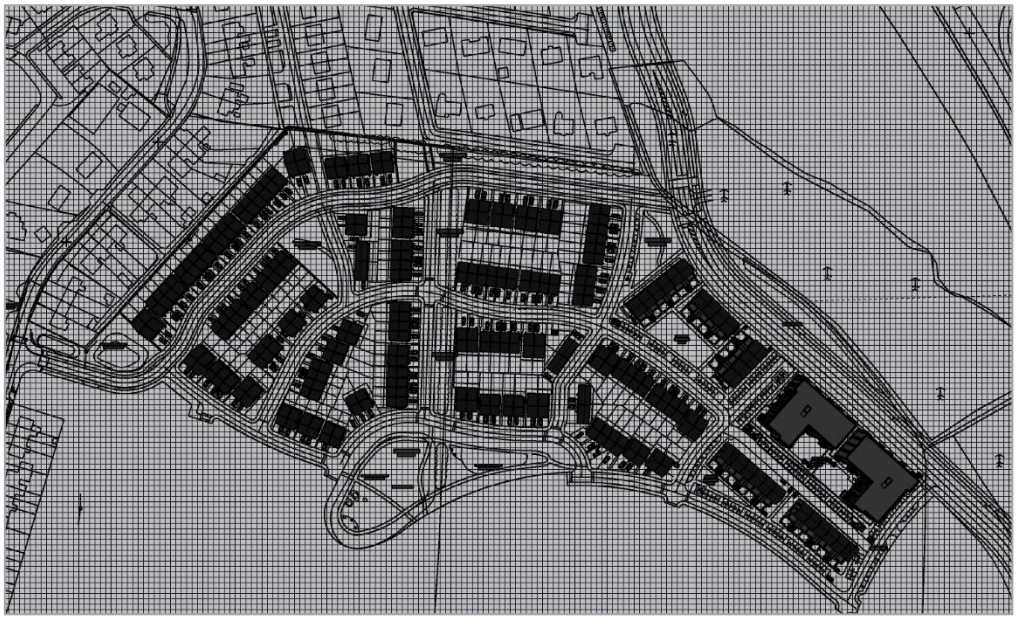
17.00 March 21st



18.00 March 21st



19.00 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 — 5864.00 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	92%	8%	60	469	28,147
8.00	69%	31%	60	1818	109,070
9.00	39%	61%	60	3577	214,622
10.00	15%	85%	60	4984	299,064
11.00	0%	100%	60	5864	351,840
12.00	0%	100%	60	5864	351,840
13.00	0%	100%	60	5864	351,840
14.00	0%	100%	60	5864	351,840
15.00	0%	100%	60	5864	351,840
16.00	16%	84%	60	4926	295,546
17.00	29%	71%	60	4163	249,806
18.00	78%	22%	60	1290	77,405
19.00	100%	0%	60	0	0

Required sun hours @ 50% area 2
Achieved sun hours on @ 50% area 9.00
Achieved total sun time (hrs) 8.62
Achieved daily sun time * area 3032861

B — 789.00 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	100%	0%	60	0	0
8.00	83%	17%	60	134	8,048
9.00	17%	83%	60	655	39,292
10.00	0%	100%	60	789	47,340
11.00	0%	100%	60	789	47,340
12.00	11%	89%	60	702	42,133
13.00	18%	82%	60	647	38,819
14.00	18%	82%	60	647	38,819
15.00	26%	74%	60	584	35,032
16.00	38%	62%	60	489	29,351
17.00	53%	47%	60	371	22,250
18.00	100%	0%	60	0	0
19.00	100%	0%	60	0	0

Required sun hours @ 50% area 2
Achieved sun hours on @ 50% area 8.00
Achieved total sun time (hrs) 7.36
Achieved daily sun time * area 348422

G — 600.00 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	100%	0%	60	0	0
8.00	94%	6%	60	36	2,160
9.00	52%	48%	60	288	17,280
10.00	19%	81%	60	486	29,160
11.00	7%	93%	60	558	33,480
12.00	0%	100%	60	600	36,000
13.00	0%	100%	60	600	36,000
14.00	0%	100%	60	600	36,000
15.00	0%	100%	60	600	36,000
16.00	0%	100%	60	600	36,000
17.00	0%	100%	60	600	36,000
18.00	100%	0%	60	0	0
19.00	100%	0%	60	0	0

Required sun hours @ 50% area 2
Achieved sun hours on @ 50% area 8.00
Achieved total sun time (hrs) 8.28
Achieved daily sun time * area 298080

H — 747.00 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	100%	0%	60	0	0
8.00	100%	0%	60	0	0
9.00	100%	0%	60	0	0
10.00	74%	26%	60	194	11,653
11.00	38%	62%	60	463	27,788
12.00	30%	70%	60	523	31,374
13.00	22%	78%	60	583	34,960
14.00	16%	84%	60	627	37,649
15.00	9%	91%	60	680	40,786
16.00	27%	73%	60	545	32,719
17.00	90%	10%	60	75	4,482
18.00	100%	0%	60	0	0
19.00	100%	0%	60	0	0

Required sun hours @ 50% area 2
Achieved sun hours on @ 50% area 6.00
Achieved total sun time (hrs) 4.94
Achieved daily sun time * area 221411

C — 1681.00 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	94%	6%	60	101	6,052
8.00	31%	69%	60	1160	69,593
9.00	0%	100%	60	1681	100,860
10.00	0%	100%	60	1681	100,860
11.00	0%	100%	60	1681	100,860
12.00	0%	100%	60	1681	100,860
13.00	0%	100%	60	1681	100,860
14.00	7%	93%	60	1563	93,800
15.00	12%	88%	60	1479	88,757
16.00	16%	84%	60	1412	84,722
17.00	19%	81%	60	1362	81,697
18.00	37%	63%	60	1059	63,542
19.00	100%	0%	60	0	0

Required sun hours @ 50% area 2
Achieved sun hours on @ 50% area 11.00
Achieved total sun time (hrs) 9.84
Achieved daily sun time * area 992462

D — 767.00 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	95%	5%	60	38	2,301
8.00	56%	44%	60	337	20,249
9.00	50%	50%	60	384	23,010
10.00	41%	59%	60	453	27,152
11.00	18%	82%	60	629	37,736
12.00	8%	92%	60	706	42,338
13.00	0%	100%	60	767	46,020
14.00	0%	100%	60	767	46,020
15.00	0%	100%	60	767	46,020
16.00	0%	100%	60	767	46,020
17.00	88%	12%	60	92	5,522
18.00	90%	10%	60	77	4,602
19.00	100%	0%	60	0	0

Required sun hours @ 50% area 2
Achieved sun hours on @ 50% area 7.00
Achieved total sun time (hrs) 7.54
Achieved daily sun time * area 346991

I — 173.00 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	100%	0%	60	0	0
8.00	100%	0%	60	0	0
9.00	0%	100%	60	173	10,380
10.00	0%	100%	60	173	10,380
11.00	0%	100%	60	173	10,380
12.00	0%	100%	60	173	10,380
13.00	0%	100%	60	173	10,380
14.00	0%	100%	60	173	10,380
15.00	0%	100%	60	173	10,380
16.00	39%	61%	60	106	6,332
17.00	100%	0%	60	0	0
18.00	100%	0%	60	0	0
19.00	100%	0%	60	0	0

Required sun hours @ 50% area 2
Achieved sun hours on @ 50% area 8.00
Achieved total sun time (hrs) 7.61
Achieved daily sun time * area 78992

E — 695.00 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	95%	5%	60	35	2,085
8.00	56%	44%	60	306	18,348
9.00	50%	50%	60	348	20,850
10.00	41%	59%	60	410	24,603
11.00	23%	77%	60	535	32,109
12.00	8%	92%	60	639	38,364
13.00	0%	100%	60	695	41,700
14.00	0%	100%	60	695	41,700
15.00	0%	100%	60	695	41,700
16.00	0%	100%	60	695	41,700
17.00	85%	15%	60	104	6,255
18.00	95%	5%	60	35	2,085
19.00	100%	0%	60	0	0

Required sun hours @ 50% area 2
Achieved sun hours on @ 50% area 7.00
Achieved total sun time (hrs) 7.47
Achieved daily sun time * area 311499

F — 737.00 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	79%	21%	60	155	9,286
8.00	51%	49%	60	361	21,668
9.00	56%	44%	60	324	19,457
10.00	49%	51%	60	376	22,552
11.00	45%	55%	60	405	24,321
12.00	39%	61%	60	450	26,974
13.00	19%	81%	60	597	35,818
14.00	0%	100%	60	737	44,220
15.00	0%	100%	60	737	44,220
16.00	0%	100%	60	737	44,220
17.00	9%	91%	60	671	40,240
18.00	100%	0%	60	0	0
19.00	100%	0%	60	0	0

Required sun hours @ 50% area 2
Achieved sun hours on @ 50% area 8.00
Achieved total sun time (hrs) 7.53
Achieved daily sun time * area 332977

Appendix C

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

Receptor 1.0	EXISTING										NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	
Target distance 45m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	88	3	92	1					180	37%	59	1	51	10	70	7			180	35%	0.96

Receptor 1.1	EXISTING										NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	
Target distance 45m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	76	3	104	1					180	37%	57	1	52	10	71	7			180	35%	0.96

Receptor 2.0	EXISTING										NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	
Target distance 45m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	70	3	110	1					180	37%	45	1	86	10	49	7			180	35%	0.95

Receptor 2.1	EXISTING										NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	
Target distance 45m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	67	3	113	1					180	37%	43	1	88	10	49	7			180	35%	0.95

Receptor 3.0	EXISTING										NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	
Target distance 46m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	78	3	102	1					180	37%	60	3	84	10	36	7			180	35%	0.95

Receptor 3.1	EXISTING										NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	
Target distance 46m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	79	3	101	1					180	37%	62	3	86	10	32	7			180	35%	0.95

Receptor 4.0	EXISTING										NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	
Target distance 48m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	60	3	120	1					180	37%	47	3	66	9	67	7			180	35%	0.95

Receptor 4.1	EXISTING										NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	
Target distance 48m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	57	3	123	1					180	37%	46	3	68	9	66	7			180	35%	0.95

Receptor 5.0	EXISTING										NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	
Target distance 37m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	65	3	115	1					180	37%	42	3	106	7	32	13			180	34%	0.93

Receptor 5.1	EXISTING										NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	
Target distance 37m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	65	3	115	1					180	37%	42	3	108	7	30	13			180	34%	0.93

Receptor 6.0	EXISTING										NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	
Target distance 15m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	90	19	90	1					180	33%	90	19	90	7					180	32%	0.96

Receptor 6.1	EXISTING										NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	
Target distance 15m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	98	3	82	1					180	36%	73	27	71	8	36	3			180	31%	0.87

Receptor 6.2	EXISTING										NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	
Target distance 15m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	107	14	73	1					180	34%	107	14	73	19					180	31%	0.90

Receptor 7.0	EXISTING										NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	
Target distance 18m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	103	15	77	1					180	34%	103	15	27	4	50	23			180	31%	0.93

Receptor 7.1	EXISTING										NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	
Target distance 18m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	80	3	100	1					180	37%	126	25	54	3					180	30%	0.82

Receptor 7.2	EXISTING									NEW									
VSC test distance 24 m	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	2							180	37%	58	26	122	2					180	34%	0.91

Receptor 8.0	EXISTING									NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	
Target distance 42m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	102	10	78	2					180	35%	102	10	78	11					180	33%	0.95

Receptor 8.1	EXISTING									NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	
Target distance 42m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	83	17	97	2					180	34%	83	17	97	9					180	32%	0.95

Receptor 9.0	EXISTING									NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	
Target distance 41m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	55	9	125	2					180	36%	55	9	79	12	46	7			180	34%	0.94

Receptor 9.1	EXISTING									NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	
Target distance 41m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	50	9	120	2					170	36%	50	9	79	12	51	7			180	34%	0.94

Receptor 10.0	EXISTING									NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	
Target distance 35m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	47	8	133	2					180	36%	45	8	91	14	44	7			180	33%	0.92

Receptor 11.0	EXISTING									NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	
Target distance 35m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	45	8	135	2					180	36%	43	8	91	14	46	7			180	33%	0.92

Receptor 12.0	EXISTING									NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	
Target distance 35m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	48	8	135	2					183	36%	38	8	88	15	54	7			180	33%	0.92

Receptor 12.1	EXISTING									NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	
Target distance 35m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	46	8	134	2					180	36%	36	8	89	15	55	7			180	33%	0.92

Receptor 13.0	EXISTING									NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	
Target distance 33m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	43	7	137	2					180	36%	31	7	74	7	75	15			180	33%	0.92

Receptor 13.1	EXISTING									NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	
Target distance 33m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	40	7	140	2					180	36%	29	7	75	7	76	15			180	33%	0.92

Receptor 14.0	EXISTING									NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	
Target distance 33m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	42	6	138	2					180	36%	52	4	64	15	64	7			180	34%	0.93

Receptor 15.0	EXISTING									NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	
Target distance 33m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	28	6	152	2					180	36%	57	4	62	15	61	7			180	34%	0.93

Receptor 15.1	EXISTING									NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	
Target distance 33m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	26	6	154	2					180	36%	58	4	63	15	59	7			180	34%	0.93

Receptor 16.0	EXISTING									NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor ↓	∑ VSC	
Target distance 33m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	41	6	139	2					180	36%	55	4	63	15	62	7			180	34%	0.93

Receptor 17.0	EXISTING										NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	
Target distance 37m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	39	6	141	2					180	36%	23	6	56	15	56	7	45	6	180	34%	0.92

Receptor 18.0	EXISTING										NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	
Target distance 37m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	38	6	142	2					180	36%	22	6	53	15	50	7	55	6	180	34%	0.93

Receptor 18.1	EXISTING										NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	
Target distance 35m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	37	6	143	2					180	36%	21	6	53	15	49	7	57	6	180	34%	0.93

Receptor 19.0	EXISTING										NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	
Target distance 35m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	37	6	61	6	82	1			180	36%	61	6	50	15	49	7	20	6	180	34%	0.94

Receptor 20.0	EXISTING										NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	
Target distance 35m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	36	6	74	6	70	1			180	36%	74	6	51	16	37	7	18	6	180	34%	0.94

Receptor 20.1	EXISTING										NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	
Target distance 35m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	35	6	75	6	70	1			180	36%	75	6	50	16	37	7	18	6	180	34%	0.94

Receptor 21.0	EXISTING										NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	
Target distance 37m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	46	5	81	6	53	1			180	36%	28	5	81	6	45	16	26	7	180	34%	0.96

Receptor 21.1	EXISTING										NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	
Target distance 37m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	45	5	81	6	54	1			180	36%	27	5	81	6	45	16	27	7	180	34%	0.96

Receptor 22.0	EXISTING										NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	
Target distance 37m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	45	5	86	6	49	1			180	36%	27	5	86	6	36	16	31	7	180	34%	0.96

Receptor 22.1	EXISTING										NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	
Target distance 37m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	44	5	87	6	49	1			180	36%	26	5	87	6	37	16	30	7	180	34%	0.96

Receptor 23.0	EXISTING										NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	
Target distance 37m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	44	5	90	6	46	1			180	36%	26	5	90	6	48	16	16	7	180	34%	0.96

Receptor 23.1	EXISTING										NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	
Target distance 37m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	43	5	91	6	46	1			180	36%	25	5	91	6	48	16	16	7	180	34%	0.96

Receptor 24.0	EXISTING										NEW									
VSC test distance 24 m	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	
Target distance 37m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	43	5	93	6	44	1			180	36%	24	5	93	6	48	16	15	7	180	34%	0.96

Receptor 25.0	EXISTING										NEW									
VSC test distance 33 m	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	
Target distance 82m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	85	2	95	1					180	37%	34	8	146	2					180	36%	0.99

Receptor 25.1	EXISTING										NEW									
VSC test distance 33 m	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	Section 1		Section 2		Section 3		Section 4		Σ Hor l	Σ VSC	
Target distance 83m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
	180	1							180	37%	30	8	150	1					180	36%	0.99

Appendix D

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

1 — **150** m2

EXISTING STATUS					March 21st
Time	Shadow	Sunlight	Sun time	Sun area	time * area
24 Hr	% / %		min	m2	min*m2
6.00	100%	0%	60	0	0
7.00	76%	24%	60	36	2,160
8.00	35%	65%	60	98	5,850
9.00	21%	79%	60	119	7,110
10.00	10%	90%	60	135	8,100
11.00	9%	91%	60	137	8,190
12.00	8%	92%	60	138	8,280
13.00	7%	93%	60	140	8,370
14.00	7%	93%	60	140	8,370
15.00	7%	93%	60	140	8,370
16.00	13%	87%	60	131	7,830
17.00	35%	65%	60	98	5,850
18.00	68%	32%	60	48	2,880
19.00	100%	0%	60	0	0

Required sun hours @ 50% area (hr)	2
Achieved sun hours on (hrs) @ 50% area	10.00
Achieved total sun time (hrs)	9.04
Achieved daily sun time * area	81360

NEW STATUS					March 21st	change
Time	Shadow	Sunlight	Sun time	Sun area	time * area	time * area
24 Hr	% / %		min	m2	min*m2	min*m2
6.00	100%	0%	60	0	0	0
7.00	76%	24%	60	36	2,160	0
8.00	35%	65%	60	98	5,850	0
9.00	21%	79%	60	119	7,110	0
10.00	10%	90%	60	135	8,100	0
11.00	9%	91%	60	137	8,190	0
12.00	8%	92%	60	138	8,280	0
13.00	7%	93%	60	140	8,370	0
14.00	7%	93%	60	140	8,370	0
15.00	7%	93%	60	140	8,370	0
16.00	13%	87%	60	131	7,830	0
17.00	35%	65%	60	98	5,850	0
18.00	68%	32%	60	48	2,880	0
19.00	100%	0%	60	0	0	0

Required sun hours @ 50% area (hr)	2	
Achieved sun hours on (hrs) @ 50% area	10.00	
Achieved total sun time (hrs)	9.04	1.00
Achieved daily sun time * area	81360	1.00

2 — **135** m2

EXISTING STATUS					March 21st
Time	Shadow	Sunlight	Sun time	Sun area	time * area
24 Hr	% / %		min	m2	min*m2
6.00	100%	0%	60	0	0
7.00	76%	24%	60	32	1,944
8.00	35%	65%	60	88	5,265
9.00	21%	79%	60	107	6,399
10.00	10%	90%	60	122	7,290
11.00	9%	91%	60	123	7,371
12.00	8%	92%	60	124	7,452
13.00	7%	93%	60	126	7,533
14.00	7%	93%	60	126	7,533
15.00	7%	93%	60	126	7,533
16.00	13%	87%	60	117	7,047
17.00	35%	65%	60	88	5,265
18.00	68%	32%	60	43	2,592
19.00	100%	0%	60	0	0

Required sun hours @ 50% area (hr)	2
Achieved sun hours on (hrs) @ 50% area	10.00
Achieved total sun time (hrs)	9.04
Achieved daily sun time * area	73224

NEW STATUS					March 21st	change
Time	Shadow	Sunlight	Sun time	Sun area	time * area	time * area
24 Hr	% / %		min	m2	min*m2	min*m2
6.00	100%	0%	60	0	0	0
7.00	76%	24%	60	32	1,944	0
8.00	35%	65%	60	88	5,265	0
9.00	21%	79%	60	107	6,399	0
10.00	10%	90%	60	122	7,290	0
11.00	9%	91%	60	123	7,371	0
12.00	8%	92%	60	124	7,452	0
13.00	7%	93%	60	126	7,533	0
14.00	7%	93%	60	126	7,533	0
15.00	7%	93%	60	126	7,533	0
16.00	13%	87%	60	117	7,047	0
17.00	35%	65%	60	88	5,265	0
18.00	68%	32%	60	43	2,592	0
19.00	100%	0%	60	0	0	0

Required sun hours @ 50% area (hr)	2	
Achieved sun hours on (hrs) @ 50% area	10.00	
Achieved total sun time (hrs)	9.04	1.00
Achieved daily sun time * area	73224	1.00

3 — **150** m2

EXISTING STATUS					March 21st
Time	Shadow	Sunlight	Sun time	Sun area	time * area
24 Hr	% / %		min	m2	min*m2
6.00	100%	0%	60	0	0
7.00	76%	24%	60	36	2,160
8.00	35%	65%	60	98	5,850
9.00	21%	79%	60	119	7,110
10.00	10%	90%	60	135	8,100
11.00	9%	91%	60	137	8,190
12.00	8%	92%	60	138	8,280
13.00	7%	93%	60	140	8,370
14.00	7%	93%	60	140	8,370
15.00	7%	93%	60	140	8,370
16.00	13%	87%	60	131	7,830
17.00	35%	65%	60	98	5,850
18.00	68%	32%	60	48	2,880
19.00	100%	0%	60	0	0

Required sun hours @ 50% area (hr)	2
Achieved sun hours on (hrs) @ 50% area	10.00
Achieved total sun time (hrs)	9.04
Achieved daily sun time * area	81360

NEW STATUS					March 21st	change
Time	Shadow	Sunlight	Sun time	Sun area	time * area	time * area
24 Hr	% / %		min	m2	min*m2	min*m2
6.00	100%	0%	60	0	0	0
7.00	76%	24%	60	36	2,160	0
8.00	35%	65%	60	98	5,850	0
9.00	21%	79%	60	119	7,110	0
10.00	10%	90%	60	135	8,100	0
11.00	9%	91%	60	137	8,190	0
12.00	8%	92%	60	138	8,280	0
13.00	7%	93%	60	140	8,370	0
14.00	7%	93%	60	140	8,370	0
15.00	7%	93%	60	140	8,370	0
16.00	13%	87%	60	131	7,830	0
17.00	35%	65%	60	98	5,850	0
18.00	68%	32%	60	48	2,880	0
19.00	100%	0%	60	0	0	0

Required sun hours @ 50% area (hr)	2	
Achieved sun hours on (hrs) @ 50% area	10.00	
Achieved total sun time (hrs)	9.04	1.00
Achieved daily sun time * area	81360	1.00

4 — **260** m2

EXISTING STATUS					March 21st
Time	Shadow	Sunlight	Sun time	Sun area	time * area
24 Hr	% / %		min	m2	min*m2
6.00	100%	0%	60	0	0
7.00	76%	24%	60	62	3,744
8.00	35%	65%	60	169	10,140
9.00	21%	79%	60	205	12,324
10.00	10%	90%	60	234	14,040
11.00	9%	91%	60	237	14,196
12.00	8%	92%	60	239	14,352
13.00	7%	93%	60	242	14,508
14.00	7%	93%	60	242	14,508
15.00	7%	93%	60	242	14,508
16.00	13%	87%	60	226	13,572
17.00	35%	65%	60	169	10,140
18.00	68%	32%	60	83	4,992
19.00	100%	0%	60	0	0

Required sun hours @ 50% area (hr)	2
Achieved sun hours on (hrs) @ 50% area	10.00
Achieved total sun time (hrs)	9.04
Achieved daily sun time * area	141024

NEW STATUS					March 21st	change
Time	Shadow	Sunlight	Sun time	Sun area	time * area	time * area
24 Hr	% / %		min	m2	min*m2	min*m2
6.00	100%	0%	60	0	0	0
7.00	76%	24%	60	62	3,744	0
8.00	35%	65%	60	169	10,140	0
9.00	21%	79%	60	205	12,324	0
10.00	10%	90%	60	234	14,040	0
11.00	9%	91%	60	237	14,196	0
12.00	8%	92%	60	239	14,352	0
13.00	7%	93%	60	242	14,508	0
14.00	7%	93%	60	242	14,508	0
15.00	7%	93%	60	242	14,508	0
16.00	13%	87%	60	226	13,572	0
17.00	35%	65%	60	169	10,140	0
18.00	68%	32%	60	83	4,992	0
19.00	100%	0%	60	0	0	0

Required sun hours @ 50% area (hr)	2	
Achieved sun hours on (hrs) @ 50% area	10.00	
Achieved total sun time (hrs)	9.04	1.00
Achieved daily sun time * area	141024	1.00

5 — **160** m2

EXISTING STATUS					March 21st
Time	Shadow	Sunlight	Sun time	Sun area	time * area
24 Hr	% / %		min	m2	min*m2
6.00	100%	0%	60	0	0
7.00	76%	24%	60	38	2,304
8.00	35%	65%	60	104	6,240
9.00	21%	79%	60	126	7,584
10.00	10%	90%	60	144	8,640
11.00	9%	91%	60	146	8,736
12.00	8%	92%	60	147	8,832
13.00	7%	93%	60	149	8,928
14.00	7%	93%	60	149	8,928
15.00	7%	93%	60	149	8,928
16.00	13%	87%	60	139	8,352
17.00	35%	65%	60	104	6,240
18.00	68%	32%	60	51	3,072
19.00	100%	0%	60	0	0

Required sun hours @ 50% area (hr)	2
Achieved sun hours on (hrs) @ 50% area	10.00
Achieved total sun time (hrs)	9.04
Achieved daily sun time * area	86784

NEW STATUS					March 21st	change
Time	Shadow	Sunlight	Sun time	Sun area	time * area	time * area
24 Hr	% / %		min	m2	min*m2	min*m2
6.00	100%	0%	60	0	0	0
7.00	76%	24%	60	38	2,304	0
8.00	35%	65%	60	104	6,240	0
9.00	21%	79%	60	126	7,584	0
10.00	10%	90%	60	144	8,640	0
11.00	9%	91%	60	146	8,736	0
12.00	8%	92%	60	147	8,832	0
13.00	7%	93%	60	149	8,928	0
14.00	7%	93%	60	149	8,928	0
15.00	7%	93%	60	149	8,928	0
16.00	13%	87%	60	139	8,352	0
17.00	35%	65%	60	104	6,240	0
18.00	68%	32%	60	51	3,072	0
19.00	100%	0%	60	0	0	0

Required sun hours @ 50% area (hr)	2	
Achieved sun hours on (hrs) @ 50% area	10.00	
Achieved total sun time (hrs)	9.04	1.00
Achieved daily sun time * area	86784	1.00

6 — **670** m2

EXISTING STATUS					March 21st
Time	Shadow	Sunlight	Sun time	Sun area	time * area
24 Hr	% / %		min	m2	min*m2
6.00	100%	0%	60	0	0
7.00	80%	20%	60	134	8,040
8.00	55%	45%	60	302	18,090
9.00	45%	55%	60	369	22,110
10.00	35%	65%	60	436	26,130
11.00	30%	70%	60	469	28,140
12.00	24%	76%	60	509	30,552
13.00	10%	90%	60	603	36,180
14.00	10%	90%	60	603	36,180
15.00	20%	80%	60	536	32,160
16.00	29%	71%	60	476	28,542
17.00	40%	60%	60	402	24,120
18.00	68%	32%	60	214	12,864
19.00	100%	0%	60	0	0

Required sun hours @ 50% area (hr)	2
Achieved sun hours on (hrs) @ 50% area	9.00
Achieved total sun time (hrs)	7.54
Achieved daily sun time * area	303108

NEW STATUS					March 21st	change
Time	Shadow	Sunlight	Sun time	Sun area	time * area	time * area
24 Hr	% / %		min	m2	min*m2	min*m2
6.00	100%	0%	60	0	0	0
7.00	80%	20%	60	134	8,040	0
8.00	55%	45%	60	302	18,090	0
9.00	45%	55%	60	369	22,110	0
10.00	35%	65%	60	436	26,130	0
11.00	30%	70%	60	469	28,140	0
12.00	24%	76%	60	509	30,552	0
13.00	10%	90%	60	603	36,180	0
14.00	10%	90%	60	603	36,180	0
15.00	20%	80%	60	536	32,160	0
16.00	29%	71%	60	476	28,542	0
17.00	40%	60%	60	402	24,120	0
18.00	68%	32%	60	214	12,864	0
19.00	100%	0%	60	0	0	0

Required sun hours @ 50% area (hr)	2	
Achieved sun hours on (hrs) @ 50% area	9.00	
Achieved total sun time (hrs)	7.54	1.00
Achieved daily sun time * area	303108	1.00

7 — **200** m2

EXISTING STATUS					March 21st
Time	Shadow	Sunlight	Sun time	Sun area	time * area
24 Hr	% / %		min	m2	min*m2
6.00	100%	0%	60	0	0
7.00	80%	20%	60	40	2,400
8.00	55%	45%	60	90	5,400
9.00	45%	55%	60	110	6,600
10.00	35%	65%	60	130	7,800
11.00	30%	70%	60	140	8,400
12.00	24%	76%	60	152	9,120
13.00	10%	90%	60	180	10,800
14.00	10%	90%	60	180	10,800
15.00	20%	80%	60	160	9,600
16.00	29%	71%	60	142	8,520
17.00	40%	60%	60	120	7,200
18.00	68%	32%	60	64	3,840
19.00	100%	0%	60	0	0

Required sun hours @ 50% area (hr)	2
Achieved sun hours on (hrs) @ 50% area	9.00
Achieved total sun time (hrs)	7.54
Achieved daily sun time * area	90480

NEW STATUS					March 21st	change
Time	Shadow	Sunlight	Sun time	Sun area	time * area	time * area
24 Hr	% / %		min	m2	min*m2	min*m2
6.00	100%	0%	60	0	0	0
7.00	80%	20%	60	40	2,400	0
8.00	55%	45%	60	90	5,400	0
9.00	45%	55%	60	110	6,600	0
10.00	35%	65%	60	130	7,800	0
11.00	30%	70%	60	140	8,400	0
12.00	24%	76%	60	152	9,120	0
13.00	10%	90%	60	180	10,800	0
14.00	10%	90%	60	180	10,800	0
15.00	20%	80%	60	160	9,600	0
16.00	29%	71%	60	142	8,520	0
17.00	40%	60%	60	120	7,200	0
18.00	68%	32%	60	64	3,840	0
19.00	100%	0%	60	0	0	0

Required sun hours @ 50% area (hr)	2	
Achieved sun hours on (hrs) @ 50% area	9.00	
Achieved total sun time (hrs)	7.54	1.00
Achieved daily sun time * area	90480	1.00

8 — **370** m2

EXISTING STATUS					March 21st
Time	Shadow	Sunlight	Sun time	Sun area	time * area
24 Hr	% / %		min	m2	min*m2
6.00	100%	0%	60	0	0
7.00	100%	0%	60	0	0
8.00	46%	54%	60	200	11,988
9.00	12%	88%	60	326	19,536
10.00	12%	88%	60	326	19,536
11.00	12%	88%	60	326	19,536
12.00	12%	88%	60	326	19,536
13.00	12%	88%	60	326	19,536
14.00	12%	88%	60	326	19,536
15.00	18%	82%	60	303	18,204
16.00	18%	82%	60	303	18,204
17.00	23%	77%	60	285	17,094
18.00	60%	40%	60	148	8,880
19.00	100%	0%	60	0	0

Required sun hours @ 50% area (hr)	2
Achieved sun hours on (hrs) @ 50% area	10.00
Achieved total sun time (hrs)	8.63
Achieved daily sun time * area	191586

NEW STATUS					March 21st	change
Time	Shadow	Sunlight	Sun time	Sun area	time * area	time * area
24 Hr	% / %		min	m2	min*m2	min*m2
6.00	100%	0%	60	0	0	0
7.00	100%	0%	60	0	0	0
8.00	46%	54%	60	200	11,988	0
9.00	12%	88%	60	326	19,536	0
10.00	12%	88%	60	326	19,536	0
11.00	12%	88%	60	326	19,536	0
12.00	12%	88%	60	326	19,536	0
13.00	12%	88%	60	326	19,536	0
14.00	12%	88%	60	326	19,536	0
15.00	18%	82%	60	303	18,204	0
16.00	18%	82%	60	303	18,204	0
17.00	23%	77%	60	285	17,094	0
18.00	60%	40%	60	148	8,880	0
19.00	100%	0%	60	0	0	0

Required sun hours @ 50% area (hr)	2	
Achieved sun hours on (hrs) @ 50% area	10.00	
Achieved total sun time (hrs)	8.63	1.00
Achieved daily sun time * area	191586	1.00

9 — **550** m2

EXISTING STATUS — March 21st

Time	Shadow	Sunlight	Sun time	Sun area	time * area
24 Hr	% / %		min	m2	min*m2
6.00	100%	0%	60	0	0
7.00	45%	55%	60	303	18,150
8.00	19%	81%	60	446	26,730
9.00	9%	91%	60	501	30,030
10.00	9%	91%	60	501	30,030
11.00	10%	90%	60	495	29,700
12.00	10%	90%	60	495	29,700
13.00	10%	90%	60	495	29,700
14.00	10%	90%	60	495	29,700
15.00	10%	90%	60	495	29,700
16.00	10%	90%	60	495	29,700
17.00	36%	64%	60	352	21,120
18.00	67%	33%	60	182	10,890
19.00	100%	0%	60	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 11.00
Achieved total sun time (hrs) 9.55
Achieved daily sun time * area 315150

NEW STATUS — March 21st

Time	Shadow	Sunlight	Sun time	Sun area	time * area	change
24 Hr	% / %		min	m2	min*m2	min*m2
6.00	100%	0%	60	0	0	0
7.00	65%	35%	60	193	11,550	-6,600
8.00	30%	70%	60	385	23,100	-3,630
9.00	10%	90%	60	495	29,700	-330
10.00	9%	91%	60	501	30,030	0
11.00	10%	90%	60	495	29,700	0
12.00	10%	90%	60	495	29,700	0
13.00	10%	90%	60	495	29,700	0
14.00	10%	90%	60	495	29,700	0
15.00	10%	90%	60	495	29,700	0
16.00	10%	90%	60	495	29,700	0
17.00	36%	64%	60	352	21,120	0
18.00	67%	33%	60	182	10,890	0
19.00	100%	0%	60	0	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 10.00
Achieved total sun time (hrs) 9.23 0.97
Achieved daily sun time * area 304590 0.97

10 — **245** m2

EXISTING STATUS — March 21st

Time	Shadow	Sunlight	Sun time	Sun area	time * area
24 Hr	% / %		min	m2	min*m2
6.00	100%	0%	60	0	0
7.00	45%	55%	60	135	8,085
8.00	19%	81%	60	198	11,907
9.00	9%	91%	60	223	13,377
10.00	9%	91%	60	223	13,377
11.00	10%	90%	60	221	13,230
12.00	10%	90%	60	221	13,230
13.00	10%	90%	60	221	13,230
14.00	10%	90%	60	221	13,230
15.00	10%	90%	60	221	13,230
16.00	10%	90%	60	221	13,230
17.00	36%	64%	60	157	9,408
18.00	67%	33%	60	81	4,851
19.00	100%	0%	60	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 11.00
Achieved total sun time (hrs) 9.55
Achieved daily sun time * area 140385

NEW STATUS — March 21st

Time	Shadow	Sunlight	Sun time	Sun area	time * area	change
24 Hr	% / %		min	m2	min*m2	min*m2
6.00	100%	0%	60	0	0	0
7.00	100%	0%	60	0	0	-8,085
8.00	79%	21%	60	51	3,087	-8,820
9.00	21%	79%	60	194	11,613	-1,764
10.00	9%	91%	60	223	13,377	0
11.00	10%	90%	60	221	13,230	0
12.00	10%	90%	60	221	13,230	0
13.00	10%	90%	60	221	13,230	0
14.00	10%	90%	60	221	13,230	0
15.00	10%	90%	60	221	13,230	0
16.00	10%	90%	60	221	13,230	0
17.00	36%	64%	60	157	9,408	0
18.00	67%	33%	60	81	4,851	0
19.00	100%	0%	60	0	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 9.00
Achieved total sun time (hrs) 8.28 0.87
Achieved daily sun time * area 121716 0.87

11 — **175** m2

EXISTING STATUS — March 21st

Time	Shadow	Sunlight	Sun time	Sun area	time * area
24 Hr	% / %		min	m2	min*m2
6.00	100%	0%	60	0	0
7.00	45%	55%	60	96	5,775
8.00	19%	81%	60	142	8,505
9.00	9%	91%	60	159	9,555
10.00	9%	91%	60	159	9,555
11.00	10%	90%	60	158	9,450
12.00	10%	90%	60	158	9,450
13.00	10%	90%	60	158	9,450
14.00	10%	90%	60	158	9,450
15.00	10%	90%	60	158	9,450
16.00	10%	90%	60	158	9,450
17.00	36%	64%	60	112	6,720
18.00	67%	33%	60	58	3,465
19.00	100%	0%	60	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 11.00
Achieved total sun time (hrs) 9.55
Achieved daily sun time * area 100275

NEW STATUS — March 21st

Time	Shadow	Sunlight	Sun time	Sun area	time * area	change
24 Hr	% / %		min	m2	min*m2	min*m2
6.00	100%	0%	60	0	0	0
7.00	100%	0%	60	0	0	-5,775
8.00	90%	10%	60	18	1,050	-7,455
9.00	21%	79%	60	138	8,295	-1,260
10.00	9%	91%	60	159	9,555	0
11.00	10%	90%	60	158	9,450	0
12.00	10%	90%	60	158	9,450	0
13.00	10%	90%	60	158	9,450	0
14.00	10%	90%	60	158	9,450	0
15.00	10%	90%	60	158	9,450	0
16.00	10%	90%	60	158	9,450	0
17.00	36%	64%	60	112	6,720	0
18.00	67%	33%	60	58	3,465	0
19.00	100%	0%	60	0	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 9.00
Achieved total sun time (hrs) 8.17 0.86
Achieved daily sun time * area 85785 0.86

12 — **290** m2

EXISTING STATUS — March 21st

Time	Shadow	Sunlight	Sun time	Sun area	time * area
24 Hr	% / %		min	m2	min*m2
6.00	100%	0%	60	0	0
7.00	44%	56%	60	162	9,744
8.00	19%	81%	60	235	14,094
9.00	9%	91%	60	264	15,834
10.00	9%	91%	60	264	15,834
11.00	10%	90%	60	261	15,660
12.00	10%	90%	60	261	15,660
13.00	10%	90%	60	261	15,660
14.00	10%	90%	60	261	15,660
15.00	10%	90%	60	261	15,660
16.00	10%	90%	60	261	15,660
17.00	36%	64%	60	186	11,136
18.00	67%	33%	60	96	5,742
19.00	100%	0%	60	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 11.00
Achieved total sun time (hrs) 9.56
Achieved daily sun time * area 166344

NEW STATUS — March 21st

Time	Shadow	Sunlight	Sun time	Sun area	time * area	change
24 Hr	% / %		min	m2	min*m2	min*m2
6.00	100%	0%	60	0	0	0
7.00	100%	0%	60	0	0	-9,744
8.00	90%	10%	60	29	1,740	-12,354
9.00	21%	79%	60	229	13,746	-2,088
10.00	9%	91%	60	264	15,834	0
11.00	10%	90%	60	261	15,660	0
12.00	10%	90%	60	261	15,660	0
13.00	10%	90%	60	261	15,660	0
14.00	10%	90%	60	261	15,660	0
15.00	10%	90%	60	261	15,660	0
16.00	10%	90%	60	261	15,660	0
17.00	36%	64%	60	186	11,136	0
18.00	67%	33%	60	96	5,742	0
19.00	100%	0%	60	0	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 9.00
Achieved total sun time (hrs) 8.17 0.86
Achieved daily sun time * area 142158 0.86

13 — **215** m2

EXISTING STATUS — March 21st

Time	Shadow	Sunlight	Sun time	Sun area	time * area
24 Hr	% / %		min	m2	min*m2
6.00	100%	0%	60	0	0
7.00	44%	56%	60	120	7,224
8.00	19%	81%	60	174	10,449
9.00	9%	91%	60	196	11,739
10.00	9%	91%	60	196	11,739
11.00	10%	90%	60	194	11,610
12.00	10%	90%	60	194	11,610
13.00	10%	90%	60	194	11,610
14.00	10%	90%	60	194	11,610
15.00	10%	90%	60	194	11,610
16.00	10%	90%	60	194	11,610
17.00	36%	64%	60	138	8,256
18.00	67%	33%	60	71	4,257
19.00	100%	0%	60	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 11.00
Achieved total sun time (hrs) 9.56
Achieved daily sun time * area 123324

NEW STATUS — March 21st

Time	Shadow	Sunlight	Sun time	Sun area	time * area	change
24 Hr	% / %		min	m2	min*m2	min*m2
6.00	100%	0%	60	0	0	0
7.00	100%	0%	60	0	0	-7,224
8.00	90%	10%	60	22	1,290	-9,159
9.00	21%	79%	60	170	10,191	-1,548
10.00	9%	91%	60	196	11,739	0
11.00	10%	90%	60	194	11,610	0
12.00	10%	90%	60	194	11,610	0
13.00	10%	90%	60	194	11,610	0
14.00	10%	90%	60	194	11,610	0
15.00	10%	90%	60	194	11,610	0
16.00	10%	90%	60	194	11,610	0
17.00	36%	64%	60	138	8,256	0
18.00	67%	33%	60	71	4,257	0
19.00	100%	0%	60	0	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 9.00
Achieved total sun time (hrs) 8.17 0.86
Achieved daily sun time * area 105393 0.86

14 — **120** m2

EXISTING STATUS — March 21st

Time	Shadow	Sunlight	Sun time	Sun area	time * area
24 Hr	% / %		min	m2	min*m2
6.00	100%	0%	60	0	0
7.00	44%	56%	60	67	4,032
8.00	19%	81%	60	97	5,832
9.00	9%	91%	60	109	6,552
10.00	9%	91%	60	109	6,552
11.00	10%	90%	60	108	6,480
12.00	10%	90%	60	108	6,480
13.00	10%	90%	60	108	6,480
14.00	10%	90%	60	108	6,480
15.00	10%	90%	60	108	6,480
16.00	10%	90%	60	108	6,480
17.00	36%	64%	60	77	4,608
18.00	67%	33%	60	40	2,376
19.00	100%	0%	60	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 11.00
Achieved total sun time (hrs) 9.56
Achieved daily sun time * area 68832

NEW STATUS — March 21st

Time	Shadow	Sunlight	Sun time	Sun area	time * area	change
24 Hr	% / %		min	m2	min*m2	min*m2
6.00	100%	0%	60	0	0	0
7.00	100%	0%	60	0	0	-4,032
8.00	90%	10%	60	12	720	-5,112
9.00	21%	79%	60	95	5,688	-864
10.00	9%	91%	60	109	6,552	0
11.00	10%	90%	60	108	6,480	0
12.00	10%	90%	60	108	6,480	0
13.00	10%	90%	60	108	6,480	0
14.00	10%	90%	60	108	6,480	0
15.00	10%	90%	60	108	6,480	0
16.00	10%	90%	60	108	6,480	0
17.00	36%	64%	60	77	4,608	0
18.00	67%	33%	60	40	2,376	0
19.00	100%	0%	60	0	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 9.00
Achieved total sun time (hrs) 8.17 0.86
Achieved daily sun time * area 58824 0.86

15 — **175** m2

EXISTING STATUS — March 21st

Time	Shadow	Sunlight	Sun time	Sun area	time * area
24 Hr	% / %		min	m2	min*m2
6.00	100%	0%	60	0	0
7.00	44%	56%	60	98	5,880
8.00	19%	81%	60	142	8,505
9.00	9%	91%	60	159	9,555
10.00	9%	91%	60	159	9,555
11.00	10%	90%	60	158	9,450
12.00	10%	90%	60	158	9,450
13.00	10%	90%	60	158	9,450
14.00	10%	90%	60	158	9,450
15.00	10%	90%	60	158	9,450
16.00	10%	90%	60	158	9,450
17.00	36%	64%	60	112	6,720
18.00	67%	33%	60	58	3,465
19.00	100%	0%	60	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 11.00
Achieved total sun time (hrs) 9.56
Achieved daily sun time * area 100380

NEW STATUS — March 21st

Time	Shadow	Sunlight	Sun time	Sun area	time * area	change
24 Hr	% / %		min	m2	min*m2	min*m2
6.00	100%	0%	60	0	0	0
7.00	100%	0%	60	0	0	-5,880
8.00	90%	10%	60	18	1,050	-7,455
9.00	21%	79%	60	138	8,295	-1,260
10.00	9%	91%	60	159	9,555	0
11.00	10%	90%	60	158	9,450	0
12.00	10%	90%	60	158	9,450	0
13.00	10%	90%	60	158	9,450	0
14.00	10%	90%	60	158	9,450	0
15.00	10%	90%	60	158	9,450	0
16.00	10%	90%	60	158	9,450	0
17.00	36%	64%	60	112	6,720	0
18.00	67%	33%	60	58	3,465	0
19.00	100%	0%	60	0	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 9.00
Achieved total sun time (hrs) 8.17 0.86
Achieved daily sun time * area 85785 0.86

16 — **200** m2

EXISTING STATUS — March 21st

Time	Shadow	Sunlight	Sun time	Sun area	time * area
24 Hr	% / %		min	m2	min*m2
6.00	100%	0%	60	0	0
7.00	44%	56%	60	112	6,720
8.00	19%	81%	60	162	9,720
9.00	9%	91%	60	182	10,920
10.00	9%	91%	60	182	10,920
11.00	10%	90%	60	180	10,800
12.00	10%	90%	60	180	10,800
13.00	10%	90%	60	180	10,800
14.00	10%	90%	60	180	10,800
15.00	10%	90%	60	180	10,800
16.00	10%	90%	60	180	10,800
17.00	36%	64%	60	128	7,680
18.00	67%	33%	60	66	3,960
19.00	100%	0%	60	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 11.00
Achieved total sun time (hrs) 9.56
Achieved daily sun time * area 114720

NEW STATUS — March 21st

Time	Shadow	Sunlight	Sun time	Sun area	time * area	change
24 Hr	% / %		min	m2	min*m2	min*m2
6.00	100%	0%	60	0	0	0
7.00	100%	0%	60	0	0	-6,720
8.00	90%	10%	60	20	1,200	-8,520
9.00	21%	79%	60	158	9,480	-1,440
10.00	9%	91%	60	182	10,920	0
11.00	10%	90%	60	180	10,800	0
12.00	10%	90%	60	180	10,800	0
13.00	10%	90%	60	180	10,800	0
14.00	10%	90%	60	180	10,800	0
15.00	10%	90%	60	180	10,800	0
16.00	10%	90%	60	180	10,800	0
17.00	36%	64%	60	128	7,680	0
18.00	67%	33%	60	66	3,960	0
19.00	100%	0%	60	0	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 9.00
Achieved total sun time (hrs) 8.17 0.86
Achieved daily sun time * area 98040 0.86

17 — 245 m2

EXISTING STATUS

Time	Shadow	Sunlight	Sun time	Sun area	March 21st time * area
24 Hr	% / %		min	m2	min*m2
6.00	100%	0%	60	0	0
7.00	44%	56%	60	137	8,232
8.00	19%	81%	60	198	11,907
9.00	9%	91%	60	223	13,377
10.00	9%	91%	60	223	13,377
11.00	10%	90%	60	221	13,230
12.00	10%	90%	60	221	13,230
13.00	10%	90%	60	221	13,230
14.00	10%	90%	60	221	13,230
15.00	10%	90%	60	221	13,230
16.00	10%	90%	60	221	13,230
17.00	36%	64%	60	157	9,408
18.00	67%	33%	60	81	4,851
19.00	100%	0%	60	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 11.00
Achieved total sun time (hrs) 9.56
Achieved daily sun time * area 140532

NEW STATUS

Time	Shadow	Sunlight	Sun time	Sun area	March 21st time * area	change time * area
24 Hr	% / %		min	m2	min*m2	min*m2
6.00	100%	0%	60	0	0	0
7.00	100%	0%	60	0	0	-8,232
8.00	90%	10%	60	25	1,470	-10,437
9.00	21%	79%	60	194	11,613	-1,764
10.00	9%	91%	60	223	13,377	0
11.00	10%	90%	60	221	13,230	0
12.00	10%	90%	60	221	13,230	0
13.00	10%	90%	60	221	13,230	0
14.00	10%	90%	60	221	13,230	0
15.00	10%	90%	60	221	13,230	0
16.00	10%	90%	60	221	13,230	0
17.00	36%	64%	60	157	9,408	0
18.00	67%	33%	60	81	4,851	0
19.00	100%	0%	60	0	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 9.00
Achieved total sun time (hrs) 8.17 0.86
Achieved daily sun time * area 120099 0.86

18 — 165 m2

EXISTING STATUS

Time	Shadow	Sunlight	Sun time	Sun area	March 21st time * area
24 Hr	% / %		min	m2	min*m2
6.00	100%	0%	60	0	0
7.00	44%	56%	60	92	5,544
8.00	19%	81%	60	134	8,019
9.00	9%	91%	60	150	9,009
10.00	9%	91%	60	150	9,009
11.00	10%	90%	60	149	8,910
12.00	10%	90%	60	149	8,910
13.00	10%	90%	60	149	8,910
14.00	10%	90%	60	149	8,910
15.00	10%	90%	60	149	8,910
16.00	10%	90%	60	149	8,910
17.00	36%	64%	60	106	6,336
18.00	67%	33%	60	54	3,267
19.00	100%	0%	60	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 11.00
Achieved total sun time (hrs) 9.56
Achieved daily sun time * area 94644

NEW STATUS

Time	Shadow	Sunlight	Sun time	Sun area	March 21st time * area	change time * area
24 Hr	% / %		min	m2	min*m2	min*m2
6.00	100%	0%	60	0	0	0
7.00	100%	0%	60	0	0	-5,544
8.00	90%	10%	60	17	990	-7,029
9.00	21%	79%	60	130	7,821	-1,188
10.00	9%	91%	60	150	9,009	0
11.00	10%	90%	60	149	8,910	0
12.00	10%	90%	60	149	8,910	0
13.00	10%	90%	60	149	8,910	0
14.00	10%	90%	60	149	8,910	0
15.00	10%	90%	60	149	8,910	0
16.00	10%	90%	60	149	8,910	0
17.00	36%	64%	60	106	6,336	0
18.00	67%	33%	60	54	3,267	0
19.00	100%	0%	60	0	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 9.00
Achieved total sun time (hrs) 8.17 0.86
Achieved daily sun time * area 80883 0.86

19 — 155 m2

EXISTING STATUS

Time	Shadow	Sunlight	Sun time	Sun area	March 21st time * area
24 Hr	% / %		min	m2	min*m2
6.00	100%	0%	60	0	0
7.00	44%	56%	60	87	5,208
8.00	19%	81%	60	126	7,533
9.00	9%	91%	60	141	8,463
10.00	9%	91%	60	141	8,463
11.00	10%	90%	60	140	8,370
12.00	10%	90%	60	140	8,370
13.00	10%	90%	60	140	8,370
14.00	10%	90%	60	140	8,370
15.00	10%	90%	60	140	8,370
16.00	10%	90%	60	140	8,370
17.00	36%	64%	60	99	5,952
18.00	67%	33%	60	51	3,069
19.00	100%	0%	60	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 11.00
Achieved total sun time (hrs) 9.56
Achieved daily sun time * area 88908

NEW STATUS

Time	Shadow	Sunlight	Sun time	Sun area	March 21st time * area	change time * area
24 Hr	% / %		min	m2	min*m2	min*m2
6.00	100%	0%	60	0	0	0
7.00	100%	0%	60	0	0	-5,208
8.00	90%	10%	60	16	930	-6,603
9.00	21%	79%	60	122	7,347	-1,116
10.00	9%	91%	60	141	8,463	0
11.00	10%	90%	60	140	8,370	0
12.00	10%	90%	60	140	8,370	0
13.00	10%	90%	60	140	8,370	0
14.00	10%	90%	60	140	8,370	0
15.00	10%	90%	60	140	8,370	0
16.00	10%	90%	60	140	8,370	0
17.00	36%	64%	60	99	5,952	0
18.00	67%	33%	60	51	3,069	0
19.00	100%	0%	60	0	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 9.00
Achieved total sun time (hrs) 8.17 0.86
Achieved daily sun time * area 75981 0.86

20 — 200 m2

EXISTING STATUS

Time	Shadow	Sunlight	Sun time	Sun area	March 21st time * area
24 Hr	% / %		min	m2	min*m2
6.00	100%	0%	60	0	0
7.00	44%	56%	60	112	6,720
8.00	19%	81%	60	162	9,720
9.00	9%	91%	60	182	10,920
10.00	9%	91%	60	182	10,920
11.00	10%	90%	60	180	10,800
12.00	10%	90%	60	180	10,800
13.00	10%	90%	60	180	10,800
14.00	10%	90%	60	180	10,800
15.00	10%	90%	60	180	10,800
16.00	10%	90%	60	180	10,800
17.00	36%	64%	60	128	7,680
18.00	67%	33%	60	66	3,960
19.00	100%	0%	60	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 11.00
Achieved total sun time (hrs) 9.56
Achieved daily sun time * area 114720

NEW STATUS

Time	Shadow	Sunlight	Sun time	Sun area	March 21st time * area	change time * area
24 Hr	% / %		min	m2	min*m2	min*m2
6.00	100%	0%	60	0	0	0
7.00	100%	0%	60	0	0	-6,720
8.00	90%	10%	60	20	1,200	-8,520
9.00	21%	79%	60	158	9,480	-1,440
10.00	9%	91%	60	182	10,920	0
11.00	10%	90%	60	180	10,800	0
12.00	10%	90%	60	180	10,800	0
13.00	10%	90%	60	180	10,800	0
14.00	10%	90%	60	180	10,800	0
15.00	10%	90%	60	180	10,800	0
16.00	10%	90%	60	180	10,800	0
17.00	36%	64%	60	128	7,680	0
18.00	67%	33%	60	66	3,960	0
19.00	100%	0%	60	0	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 9.00
Achieved total sun time (hrs) 8.17 0.86
Achieved daily sun time * area 98040 0.86

21 — 190 m2

EXISTING STATUS

Time	Shadow	Sunlight	Sun time	Sun area	March 21st time * area
24 Hr	% / %		min	m2	min*m2
6.00	100%	0%	60	0	0
7.00	44%	56%	60	106	6,384
8.00	19%	81%	60	154	9,234
9.00	9%	91%	60	173	10,374
10.00	9%	91%	60	173	10,374
11.00	10%	90%	60	171	10,260
12.00	10%	90%	60	171	10,260
13.00	10%	90%	60	171	10,260
14.00	10%	90%	60	171	10,260
15.00	13%	87%	60	165	9,918
16.00	17%	83%	60	158	9,462
17.00	46%	54%	60	103	6,156
18.00	67%	33%	60	63	3,762
19.00	100%	0%	60	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 11.00
Achieved total sun time (hrs) 9.36
Achieved daily sun time * area 106704

NEW STATUS

Time	Shadow	Sunlight	Sun time	Sun area	March 21st time * area	change time * area
24 Hr	% / %		min	m2	min*m2	min*m2
6.00	100%	0%	60	0	0	0
7.00	100%	0%	60	0	0	-6,384
8.00	87%	13%	60	25	1,482	-7,752
9.00	9%	91%	60	173	10,374	0
10.00	9%	91%	60	173	10,374	0
11.00	10%	90%	60	171	10,260	0
12.00	10%	90%	60	171	10,260	0
13.00	10%	90%	60	171	10,260	0
14.00	10%	90%	60	171	10,260	0
15.00	13%	87%	60	165	9,918	0
16.00	17%	83%	60	158	9,462	0
17.00	46%	54%	60	103	6,156	0
18.00	67%	33%	60	63	3,762	0
19.00	100%	0%	60	0	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 9.00
Achieved total sun time (hrs) 8.12 0.87
Achieved daily sun time * area 92568 0.87

22 — 165 m2

EXISTING STATUS

Time	Shadow	Sunlight	Sun time	Sun area	March 21st time * area
24 Hr	% / %		min	m2	min*m2
6.00	100%	0%	60	0	0
7.00	44%	56%	60	92	5,544
8.00	19%	81%	60	134	8,019
9.00	9%	91%	60	150	9,009
10.00	9%	91%	60	150	9,009
11.00	10%	90%	60	149	8,910
12.00	10%	90%	60	149	8,910
13.00	10%	90%	60	149	8,910
14.00	10%	90%	60	149	8,910
15.00	13%	87%	60	144	8,613
16.00	17%	83%	60	137	8,217
17.00	46%	54%	60	89	5,346
18.00	67%	33%	60	54	3,267
19.00	100%	0%	60	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 11.00
Achieved total sun time (hrs) 9.36
Achieved daily sun time * area 92664

NEW STATUS

Time	Shadow	Sunlight	Sun time	Sun area	March 21st time * area	change time * area
24 Hr	% / %		min	m2	min*m2	min*m2
6.00	100%	0%	60	0	0	0
7.00	100%	0%	60	0	0	-5,544
8.00	87%	13%	60	21	1,287	-6,732
9.00	9%	91%	60	150	9,009	0
10.00	9%	91%	60	150	9,009	0
11.00	10%	90%	60	149	8,910	0
12.00	10%	90%	60	149	8,910	0
13.00	10%	90%	60	149	8,910	0
14.00	10%	90%	60	149	8,910	0
15.00	13%	87%	60	144	8,613	0
16.00	17%	83%	60	137	8,217	0
17.00	46%	54%	60	89	5,346	0
18.00	67%	33%	60	54	3,267	0
19.00	100%	0%	60	0	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 9.00
Achieved total sun time (hrs) 8.12 0.87
Achieved daily sun time * area 80388 0.87

23 — 150 m2

EXISTING STATUS

Time	Shadow	Sunlight	Sun time	Sun area	March 21st time * area
24 Hr	% / %		min	m2	min*m2
6.00	100%	0%	60	0	0
7.00	44%	56%	60	84	5,040
8.00	19%	81%	60	122	7,290
9.00	9%	91%	60	137	8,190
10.00	9%	91%	60	137	8,190
11.00	10%	90%	60	135	8,100
12.00	10%	90%	60	135	8,100
13.00	10%	90%	60	135	8,100
14.00	10%	90%	60	135	8,100
15.00	13%	87%	60	131	7,830
16.00	17%	83%	60	125	7,470
17.00	46%	54%	60	81	4,860
18.00	67%	33%	60	50	2,970
19.00	100%	0%	60	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 11.00
Achieved total sun time (hrs) 9.36
Achieved daily sun time * area 84240

NEW STATUS

Time	Shadow	Sunlight	Sun time	Sun area	March 21st time * area	change time * area
24 Hr	% / %		min	m2	min*m2	min*m2
6.00	100%	0%	60	0	0	0
7.00	100%	0%	60	0	0	-5,040
8.00	71%	29%	60	44	2,610	-4,680
9.00	9%	91%	60	137	8,190	0
10.00	9%	91%	60	137	8,190	0
11.00	10%	90%	60	135	8,100	0
12.00	10%	90%	60	135	8,100	0
13.00	10%	90%	60	135	8,100	0
14.00	10%	90%	60	135	8,100	0
15.00	13%	87%	60	131	7,830	0
16.00	17%	83%	60	125	7,470	0
17.00	46%	54%	60	81	4,860	0
18.00	67%	33%	60	50	2,970	0
19.00	100%	0%	60	0	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 9.00
Achieved total sun time (hrs) 8.28 0.89
Achieved daily sun time * area 74520 0.89

24 — 148 m2

EXISTING STATUS

Time	Shadow	Sunlight	Sun time	Sun area	March 21st time * area
24 Hr	% / %		min	m2	min*m2
6.00	100%	0%	60	0	0
7.00	44%	56%	60	83	4,973
8.00	19%	81%	60	120	7,193
9.00	9%	91%	60	135	8,081
10.00	9%	91%	60	135	8,081
11.00	10%	90%	60	133	7,992
12.00	10%	90%	60	133	7,992
13.00	10%	90%	60	133	7,992
14.00	10%	90%	60	133	7,992
15.00	13%	87%	60	129	7,726
16.00	17%	83%	60	123	7,370
17.00	46%	54%	60	80	4,795
18.00	67%	33%	60	49	2,930
19.00	100%	0%	60	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 11.00
Achieved total sun time (hrs) 9.36
Achieved daily sun time * area 83116.8

NEW STATUS

Time	Shadow	Sunlight	Sun time	Sun area	March 21st time * area	change time * area
24 Hr	% / %		min	m2	min*m2	min*m2
6.00	100%	0%	60	0	0	0
7.00	100%	0%	60	0	0	-4,973
8.00	19%	81%	60	120	7,193	0
9.00	9%	91%	60	135	8,081	0
10.00	9%	91%	60	135	8,081	0
11.00	10%	90%	60	133	7,992	0
12.00	10%	90%	60	133	7,992	0
13.00	10%	90%	60	133	7,992	0
14.00	10%	90%	60	133	7,992	0
15.00	13%	87%	60	129	7,726	0
16.00	17%	83%	60	123	7,370	0
17.00	46%	54%	60	80	4,795	0
18.00	67%	33%	60	49	2,930	0
19.00	100%	0%	60	0	0	0

Required sun hours @ 50% area (hr) 2
Achieved sun hours on (hrs) @ 50% area 10.00
Achieved total sun time (hrs) 8.8 0.94
Achieved daily sun time * area 78144 0.94

25					1,700 m2
EXISTING STATUS					March 21st
Time	Shadow	Sunlight	Sun time	Sun area	time * area
24 Hr	% / %		min	m2	min*m2
6.00	100%	0%	60	0	0
7.00	46%	54%	60	918	55,080
8.00	35%	65%	60	1105	66,300
9.00	21%	79%	60	1343	80,580
10.00	10%	90%	60	1530	91,800
11.00	9%	91%	60	1547	92,820
12.00	8%	92%	60	1564	93,840
13.00	7%	93%	60	1581	94,860
14.00	7%	93%	60	1581	94,860
15.00	7%	93%	60	1581	94,860
16.00	13%	87%	60	1479	88,740
17.00	35%	65%	60	1105	66,300
18.00	68%	32%	60	544	32,640
19.00	100%	0%	60	0	0
Required sun hours @ 50% area (hr)					2
Achieved sun hours on (hrs) @ 50% area					11.00
Achieved total sun time (hrs)					9.34
Achieved daily sun time * area					952680

NEW STATUS					March 21st	change
Time	Shadow	Sunlight	Sun time	Sun area	time * area	time * area
24 Hr	% / %		min	m2	min*m2	min*m2
6.00	100%	0%	60	0	0	0
7.00	52%	48%	60	816	48,960	-6,120
8.00	35%	65%	60	1105	66,300	0
9.00	21%	79%	60	1343	80,580	0
10.00	10%	90%	60	1530	91,800	0
11.00	9%	91%	60	1547	92,820	0
12.00	8%	92%	60	1564	93,840	0
13.00	7%	93%	60	1581	94,860	0
14.00	7%	93%	60	1581	94,860	0
15.00	7%	93%	60	1581	94,860	0
16.00	13%	87%	60	1479	88,740	0
17.00	35%	65%	60	1105	66,300	0
18.00	68%	32%	60	544	32,640	0
19.00	100%	0%	60	0	0	0
Required sun hours @ 50% area (hr)					2	
Achieved sun hours on (hrs) @ 50% area					10.00	
Achieved total sun time (hrs)					9.28	0.99
Achieved daily sun time * area					946560	0.99

End of Report