



## DAYLIGHT & SUNLIGHT REPORT

### HEADFORD ROAD HOUSING

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# CONTENTS

|                                                     |    |
|-----------------------------------------------------|----|
| HEADFORD ROAD HOUSING .....                         | 1  |
| 1. Executive Summary.....                           | 1  |
| 2. Introduction.....                                | 2  |
| 3. Daylight Analysis Methodology.....               | 3  |
| 3.1. Average Daylight Factor (ADF).....             | 4  |
| 3.2. Daylight Distribution – No Sky Line .....      | 5  |
| 4. Daylight & Sunlight Context.....                 | 5  |
| 5. Summary of ADF & NSL Results.....                | 5  |
| 5.1. Average Daylight Factor.....                   | 5  |
| 5.2. Daylight Distribution (No Sky Line) .....      | 6  |
| 5.3. Conclusions.....                               | 6  |
| 6. Sunlight to Amenity Space .....                  | 6  |
| 6.1. Conclusions.....                               | 7  |
| 7. Overshadowing .....                              | 7  |
| 7.1. Conclusions.....                               | 7  |
| APPENDIX 1: DAYLIGHT RESULTS .....                  | 8  |
| APPENDIX 2: NO SKY LINES RESULTS .....              | 12 |
| APPENDIX 3: SUNLIGHT TO AMENITY SPACE RESULTS ..... | 15 |
| APPENDIX 4: SHADOW MAPS .....                       | 17 |

## DAYLIGHT & SUNLIGHT REPORT

### HEADFORD ROAD HOUSING

## 1. Executive Summary

Varming Consulting Engineers were engaged to provide daylight and sunlight analysis for the proposed Headford Road Housing Development. The purpose of this report is to predicted internal daylight levels achieved by the proposed Development and evaluate the quality and quantity of sunlight to the main amenity area of the scheme. The model geometry which is the subject of this report was modelled in IES <Virtual Environmental> and was based on drawings received from O'Briain Beary Architects.

This study has been based on the guidance contained in BRE guide 'Site Layout Planning for Daylight and Sunlight' (2nd edition) and BS 8206-2: 2008 – 'Lighting for Buildings – Part 2: Code of Practice for Daylighting' as required by national planning guidance.

Two methodologies were employed in the Daylight evaluation

- Average Daylight Factor (ADF)
- Daylight Distribution – No Sky Line (NSL)

This assessment focuses on 8 apartments located on the ground/second floors of the apartment block and 1 house highlighted in Appendix 1. These dwellings were chosen for analysis as they represent the worst case for daylight levels achievable. Details of the methodology employed in this analysis are shown in Section 3 while a full set of results are contained in Appendix 1 and 2.

Average Daylight Factor (ADF) full compliance with BS 8206 is achieved in 100% of the rooms evaluated (32 rooms out of 32) against the ADF of 1% for bedrooms and 2% for rooms such as Kitchen/Dining/Living.

The "No-Sky Line" (NSL) was evaluated to determine the distribution of diffuse daylight within each space. Further discussion of this is in Section 5.2. BS8206 states that in new developments no more than 20% of the working plane should lie beyond the NSL. The results of the NSL analysis demonstrate that all of the habitable rooms will have good daylight distribution with 32 of the total 32 room, or 100% meeting the BRE numerical criteria. Of the 09 rooms with more than one activity (Kitchen/Dining/Living) and one Living space, all 10 or 100% will meet the target values and receive daylight to at least 80% of their floor area, meaning that daylight will be well distributed across the open plan arrangement, while 100% of bedrooms (22 out of 22) also comply.

The BRE guidance in itself aims to help rather than constrain the designer. Although it gives numerical guidelines, it suggests these should be interpreted flexibly since natural lighting is only one of many factors which influence site layout and fenestration design.

## 2. Introduction

This report evaluates the predicted daylight levels achieved by selected dwellings in the proposed Headford Road housing development in Castlegar, Galway and also evaluates the quality and quantity of sunlight to the main amenity area of the scheme.

This greenfield site is located approximately 3.75km northeast of Galway City in the Townland of Castlegar. The site comprises four distinct zoned areas with Agricultural and Agricultural and Amenity to the West, Residential Zoning in the middle section (4.82 Ha.) and Recreation and Amenity along the road frontage with the Headford Road. Access is available from Headford Road, and services are available.

The 24 residential units under consideration consist of

| Unit Type   | Number of Units |
|-------------|-----------------|
| 1 bed Apt.  | 3               |
| 2 bed Apt.  | 14              |
| 3 bed Apt.  | 4               |
| 4 bed House | 3               |

Table 1: Summary of Dwelling Types



Figure 1: Proposed Development: Area Under Consideration

The BRE expect to publish updated BRE Guidelines in 2022, they consider it reasonable and acceptable to continue using the current BRE Guidelines (i.e., 'Site Layout Planning for Daylight and Sunlight' 2nd edition, published 2011 and referenced in the 'Sustainable Urban Housing: Design Standards for New Apartments' document), until such time as BRE publish an update to reflect BS EN17037.

On This Basis the daylight performance of this development was assessed against the BRE Guidelines and BS 8206-2.

Compliance with the recommendations of the following documents is considered best practice for evaluation of site layouts for planning. The BRE guidance advises on planning developments for good access to daylight and sunlight and is widely used by local authorities during planning permission to help determine the impacts of new developments.

### BS 8206-2: 2008 – 'Lighting for Buildings – Part 2: Code of Practice for Daylighting'

The British Standard 8206 provides recommendations for daylight standards in dwellings. The document states: "Daylighting gives to a building a unique variety and interest. An interior which looks gloomy, or which does not have a satisfactory view to the outside which could reasonably be expected, will be considered unsatisfactory by its users".

BS 8206 Part 2 contains guidance on daylight and sunlight for new dwellings, including recommended minimum values for Average Daylight Factor (ADF). For daylight provision in new dwellings, the British Standard recommends the following minimum values for ADF:

| Room Type    | Min Average Daylight Factor (%) |
|--------------|---------------------------------|
| Bedrooms     | 1.0                             |
| Living Rooms | 1.5                             |
| Kitchen      | 2.0                             |

Table 2: Daylight Requirements

These are minimum values. Where a room has a shared use, the British Standard states that the higher minimum value should apply. The Standard also states that if a space has an ADF of 5%, it will not normally need supplementary electric lighting provided the uniformity is satisfactory, and that an ADF of 2-5% will normally need supplementary electric lighting.

### BRE guide 'Site Layout Planning for Daylight and Sunlight' (2nd edition)

The BRE guide, contains guidance on how to design developments, whilst minimising the impacts on existing buildings from overshadowing and reduced levels of daylight and sunlight. In addition, The BRE report provides advice on how to design buildings to ensure that good practice levels of daylight and sunlight are provided.

As well as advice, the report contains a methodology to assess levels of daylight, sunlight and overshadowing, and specifies criteria to determine the potential impacts of new development on surrounding buildings, and also to determine whether new developments are well lit internally.

The BRE Report states that its own numerical guidelines 'should be interpreted flexibly since natural lighting is only one of many factors in site layout design. In special circumstances, the developer or planning authority may wish to use different target values. For example, in a historic city centre, a higher degree of obstruction may be unavoidable if new developments are to match the height and proportions of existing buildings.

### Urban Development and Building Heights: Guidelines for Planning Authorities

The 'Urban Development and Building Heights Guidelines for Planning Authorities' published by the Department of Housing, Planning and Local Government identify that as reflected in the National Planning Framework:

*"that there is significant scope to accommodate anticipated population growth and development needs, whether for housing, employment or other purposes, by building up and consolidating the development of our existing urban areas' and that 'securing compact and sustainable urban growth means focusing on reusing previously developed 'brownfield' land, building up infill sites (which may not have been built on before) and either reusing or redeveloping existing sites and buildings, in well-served urban locations, particularly those served by good public transport and supporting services, including employment opportunities".*

The Guidelines reference NPO 13 (from the NPF) which states that

*"In urban areas, planning and related standards, including in particular building height and car parking will be based on performance criteria that seek to achieve well-designed high-quality outcomes in order to achieve targeted growth. These standards will be subject to a range of tolerance that enables alternative solutions to be proposed to achieve stated outcomes, provided public safety is not compromised and the environment is suitably protected".*

One of the key performance indicators identified in these statutory guidelines relates to daylight and sunlight standards. Section 3.0 of the Urban Building Height Guidelines provide guidance for Planning Authorities and An Bord Pleanála in considering development proposals for buildings taller than prevailing building heights in pursuit of the Guidelines. In respect of the site/buildings scale the guidelines require consideration of:

- The form, massing and height of proposed developments should be carefully modulated so as to maximise access to natural daylight, ventilation and views and minimise overshadowing and loss of light.

- Appropriate and reasonable regard should be taken of quantitative performance approaches to daylight provision outlined in guides like the Building Research Establishment's 'Site Layout Planning for Daylight and Sunlight (2nd Edition or BS 8206-2:2008 – 'Lighting for Buildings- Part Local Planning Policy and Guidelines

### Sustainable Urban Housing: Design Standards for New Apartments

The Department of Housing, Planning and Local Government published this guideline which sets out apartment design parameters for the Planning Authorities to consider.

The Sustainable Urban Housing: Design Standards for Apartment Guidelines, Guidelines for Planning Authorities states the following (paragraphs 3.36 & 3.37) which relate to daylight and sunlight provision within such buildings:

*"Balconies should adjoin and have a functional relationship with the main living areas of the apartment. In certain circumstances, glass-screened 'winter gardens' may be provided. The minimum required areas for private amenity space are set out in Appendix 1. A minimum depth of 1.5 metres is required for balconies, in one useable length to meet the minimum floor area requirement under these guidelines. While deeper balconies might be desirable in certain cases, this has to be balanced against the need to avoid overshadowing."*

Having regard for the above, it is noted that a balance must be achieved between providing usable balcony depths and achieving sufficient levels of daylight. A level of compromise between these factors is required to ensure a high level of residential amenity

## 3. Daylight Analysis Methodology

The primary goal of daylight analysis is the evaluation of the potential design to provide useful levels of natural illumination. This analysis was carried out using the FlucsPro module of the IES VE-Pro2019 suite of simulation software

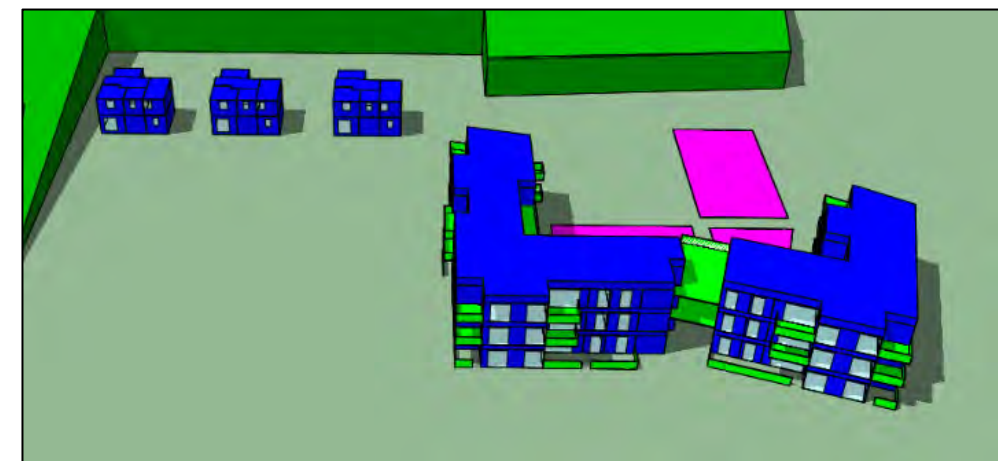


Figure 2: 3D View of the IES Virtual Environment Model

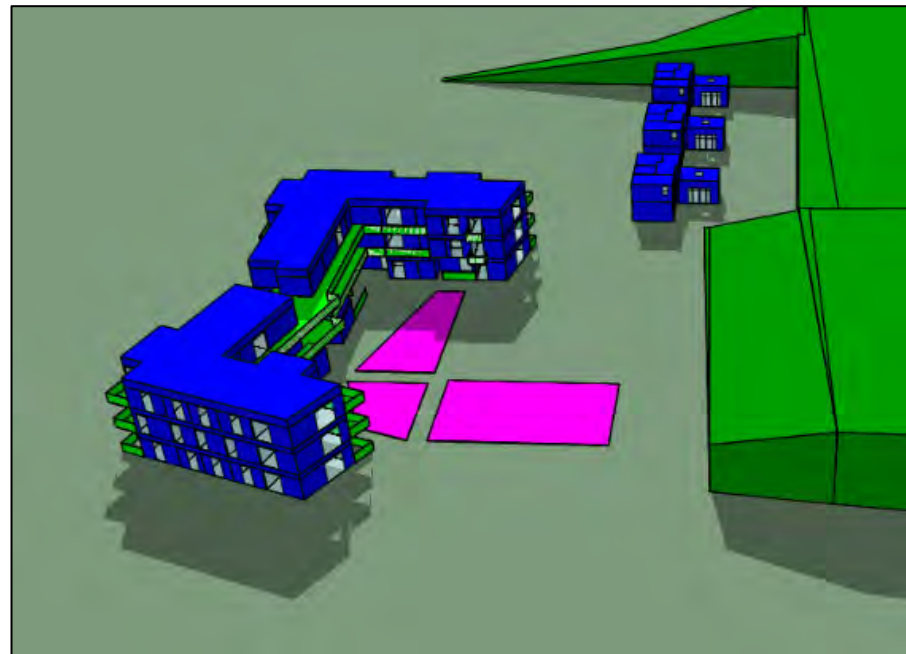


Figure 3: 3D View of the IES Virtual Environment Model

### 3.1. Average Daylight Factor (ADF)

The average daylight factor is a numerical measure for the subjective daylight quality in a space. It describes the ratio of outside illuminance over inside illuminance, expressed in per cent. The higher the ADF, the more natural light is available in the room. It is determined as the mean daylight factor over a horizontal working plane. The results for ADF are contained in Appendix 1, note the images are illustrative and the tabulated results take precedence.

BS 8206-2: 2008 – ‘Lighting for Buildings – Part 2: Code of Practice for Daylighting’, British Standards Institute, 2008 advises that a predominantly day lit appearance can be expected in rooms where an average daylight factor above 2% is achieved.

ADF is expressed as follows;

$$ADF = 100 * e / E$$

Where:

e inside illuminance at a fixed point  
E outside horizontal illuminance under an overcast (CIE sky) or uniform sky.

The daylight factor at any point is the ratio of the interior illuminance at that point to the global horizontal illuminance under CIE standard overcast sky conditions. The interior illuminance is usually evaluated at working plane height.

### Sky Model

Standard CIE overcast sky, as described by the International Commission on illumination, was used to analyse the design to ensure compliance with statutory minimum daylight provision and predict the daylight factor reduction caused by introducing new external obstructions to the local environment, such as a proposed nearby building.

Because overcast skies will generally be the duller, the daylight factor method should be considered a “worst case” evaluation, primarily suited to calculating minimum values. As the sky luminance does not vary with azimuth, the orientation of the scene about the z-axis has no effect on the Daylight Factor which means that the calculation is independent of window orientation.

### Internal Environment

Daylight factors are usually evaluated for uncluttered spaces. Since we are not interested in visualisation, the scene description usually accounts for only the important structural features of the space, and furniture etc. is excluded. The calculation takes into account the direct and reflected, internal and external, component of daylight to determine the daylight factors within the calculated space. The surface reflectances used in this analysis are shown in Table 3.

| Surface | Reflectance |
|---------|-------------|
| Floor   | 20          |
| Wall    | 50          |
| Ceiling | 70          |

Table 3: Surface Properties

Calculations have not taken account of reflectance of external surfaces.

Clean, clear double glazing with low emissivity coating was assumed with a diffuse visible transmittance of 0.7, internal and external reflectance of 0.07.

The working plane, or plane at which the visual task takes place, represents the average height of work surfaces from the floor. This was set at a height of 0.85m above the floor as per BRE guidance for dwellings.

To avoid inclusion of potentially misleading illuminance data close to walls and windows a margin of 0.5m was used as recommended by CIBSE (Chartered Institution of Building Services Engineers).

| Task Area                     |       |
|-------------------------------|-------|
| Working plane height (m)      | 0.850 |
| Area of interest - margin (m) | 0.500 |

Table 4: Task Area

### 3.2. Daylight Distribution – No Sky Line

The “No-Sky Line” (NSL) is the line that divides the points on the working plane (0.85m in Dwellings) which can and cannot see the sky and provides a measure of the distribution of diffuse daylight within a room.

If from a point in a room on the working plane it is possible to see some sky then that point will lie inside the NSL contour. Conversely, if no sky is visible from that point then it would lie outside the contour.

The BRE guide suggests that areas beyond the NSL may look dark and gloomy compared with the rest of the room and BS 8206 states that in new developments no more than 20% of the working plane lies beyond the NSL. The guide suggests that in houses, living rooms, dining rooms and kitchens should be tested: bedrooms are deemed less important, although should nevertheless be analysed.

## 4. Daylight & Sunlight Context

Daylight is defined as the visible part of global solar radiation and consists of a combination of sunlight and skylight. In effect this is direct light from the sun that reaches the earth’s surface as after selective attenuation by the atmosphere.

All of the following documents reference BS 8206-2: 2008 – ‘Lighting for Buildings – Part 2: Code of Practice for Daylighting’ and BRE guidelines ‘Site Layout Planning for Daylight and Sunlight’ (2nd edition):

- Building Regulations Part L 2019 Conservation of fuel and energy – dwellings.
- Sustainable Urban Housing: Design Standards for New Apartments (2020).
- Urban Development and Building Heights: Guidelines for Planning Authorities (2018).

Guidance on daylight and sunlight provision is contained in BS 8206-2: 2008 – ‘Lighting for Buildings – Part 2: Code of Practice for Daylighting’, with supplementary guidance in the BRE guide ‘Site Layout Planning for Daylight and Sunlight’ (2nd edition).

BS 8206-2 referenced in Sustainable Urban Housing: Design Standards for New Apartments was removed in 2018 and replaced with EN17037. However, no reference to EN17037 is mentioned in the ‘Design Standards for New Apartments’ released in December 2020.

As already noted in this report the BRE expect to publish updated BRE Guidelines in 2022, they consider it reasonable and acceptable to continue using the current BRE Guidelines (i.e. ‘Site Layout Planning for Daylight and Sunlight’ 2nd edition, published 2011 and referenced in the ‘Sustainable Urban Housing: Design Standards for New Apartments’ document), until such time as BRE publish an update to reflect BS EN17037.

## 5. Summary of ADF & NSL Results

Full compliance with BS 8206 is achieved in all the rooms evaluated (32 rooms out of 32), results show that adequate levels of daylight can be achieved in the proposed scheme.

### 5.1. Average Daylight Factor

BS 8206 minimum Average Daylight Factor (ADF) values of 1% for bedrooms, 1.5% for living spaces and 2% for kitchens. Where a room has a shared use, the British Standard states that the higher minimum value should apply.

In total 32 spaces were evaluated comprising bedrooms, combined spaces such as Kitchen/Living/Dining areas and a dedicated living space. Of these spaces 32, 100% meet or exceed BRE recommended minimum daylighting levels.

The analysis strictly adhered to the Average Daylight Factor (ADF) target values of BS 8206 in this evaluation which states that “Where one room serves more than one purpose, the minimum ADF should be that for the room type with the highest value.” However, the ADF determines the amount of daylight in a room as a whole and does not indicate the levels of daylight in the different areas of a large combined area such as the living/dining/kitchen area in a typical apartment. In addition, balconies and high quality landscaped external amenity spaces are provided.

| Building           | Room Type             | No. of Rooms | Achieves BS 8206 ADF |
|--------------------|-----------------------|--------------|----------------------|
| Apt. block         | Bedroom               | 18           | 18                   |
|                    | Kitchen/Living/Dining | 8            | 8                    |
| House              | Bedroom               | 4            | 4                    |
|                    | Kitchen/Dining        | 1            | 1                    |
|                    | Living                | 1            | 1                    |
| <b>Total Rooms</b> |                       | <b>32</b>    | <b>32</b>            |
| <b>Percentage</b>  |                       | <b>-</b>     | <b>100%</b>          |

Table 5: Summary of ADF Results

### Apartment Block

- All 18 (100%) bedrooms simulated achieve or exceed the BS 8206 average daylight factor of 1% for bedrooms;
- All 8 (100%) kitchen/living/dining spaces simulated achieve or exceed the BS 8206 average daylight factor of 2% for spaces serving more than one purpose.

### House

- All 4 (100%) bedrooms simulated achieve or exceed the BS 8206 average daylight factor of 1%.
- The kitchen/dining space simulated achieves or exceeds the BS 8206 average daylight factor of 2% for spaces serving more than one purpose.
- The living space simulated achieves or exceeds the BS 8206 average daylight factor of 1.5% which is recommended for living spaces.

## 5.2. Daylight Distribution (No Sky Line)

The “No-Sky Line” (NSL) is the line that divides the points on the working plane (0.85m in Dwellings) which can and cannot see the sky. The BRE guide suggests that areas beyond the NSL may look dark and gloomy compared with the rest of the room and BS8206 states that in new developments no more than 20% of the working plane lies beyond the NSL. The guide suggests that in houses, living rooms, dining rooms and kitchens should be tested: bedrooms are deemed less important, although should nevertheless be analysed. The table below summaries compliance with BRE guidelines across all room types in each block.

| Building                    | Room Type             | No. of Rooms Evaluated | Compliant with BRE |    | Total Percentage |
|-----------------------------|-----------------------|------------------------|--------------------|----|------------------|
|                             |                       |                        | Yes                | No |                  |
| Apt. block                  | Bedroom               | 18                     | 18                 | -  | 100%             |
|                             | Kitchen/Living/Dining | 8                      | 8                  | -  | 100%             |
| House                       | Bedroom               | 4                      | 4                  | -  | 100%             |
|                             | Kitchen/Dining        | 1                      | 1                  | -  | 100%             |
|                             | Living                | 1                      | 1                  | -  | 100%             |
| Total Kitchen/Living/Dining |                       | 10                     | 10                 | -  | 100%             |
| Total Bedroom               |                       | 22                     | 22                 | -  | 100%             |
| Total Rooms                 |                       | 32                     | 32                 | -  | 100%             |

Table 6: Summary of NSL Results

The results of the NSL analysis demonstrate that all of the habitable rooms will have good daylight distribution with 32 of the total 32 rooms, or 100% meeting the BRE numerical criteria.

## 5.3. Conclusions

Full ADF compliance with BS 8206 is achieved in 100% of the rooms evaluated, the ADF of 1% for bedrooms, 2% for rooms such as Kitchen/Dining/Living and 1.5% for Living spaces. Of the 09 spaces with combined activities (kitchen/living/dining) and the dedicated living space considered, all meet or exceed BRE recommended minimum daylighting levels.

The results of the NSL analysis demonstrate that all of the habitable rooms will have good daylight distribution with 32 of the total 32 room, or 100% meeting the BRE numerical criteria

The building massing proposed in this development results in good quality light and maximises daylight within the units. The internal layouts have been designed to locate the Kitchen/living spaces in the best location to maximise daylight within the space. Balcony locations also allow good levels of sunlight into the units.

## 6. Sunlight to Amenity Space

The availability of sunlight in public spaces, including those between buildings, plays an important role in the overall appearance and ambience of a development along with making outdoor activities more pleasant. Amenity areas which should be checked for access to sunlight are defined in the BRE guide as follows;

- Gardens, usually the main or back garden of a house and allotments
- Parks and playing fields
- Children’s playgrounds
- Outdoor swimming pools and paddling pools
- Sitting-out areas, such as those between non-domestic buildings and public squares
- Focal points for views, such as a group monument or fountains.

We carried out an evaluation of the large amenity space (see Figure 4 highlighted yellow) within the proposed development. The BRE guidance is that at least 50% of the area should receive at least 2 hours of sunlight on March 21st.



Figure 4: Area evaluated

Sunlight exposure was evaluated by generating a 1m<sup>2</sup> grid across the amenity area. Solar exposure results were calculated for each point of the grid, utilizing hourly solar shading data specific to the location, to determine the availability of sunlight in hours and percentage of available hours for the specified period. The results in Appendix 3 show that the amenity space evaluated exceed BRE guidelines that at least 50% of an amenity area should receive a minimum 2 hours sunlight on March 21st.

## 6.1. Conclusions

This study adhered to quantitative performance approaches to sunlight provision set out in BRE 209, 'Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice', Second Edition 2011 and has shown that each space meets the BRE recommended criteria.

The current design has carefully considered maximizing solar access to the amenity spaces within the development and minimising any potential impact from the dwellings.

## 7. Overshadowing

The shadow maps presented here were used to visualize any overshadowing of buildings or amenity spaces.

Overshadowing was visualized and analysed using SunCast which is used to investigate external obstruction and self-shading of a building by generating shading and solar insolation images from any sun position defined by date, time, orientation, site latitude and longitude.

The following coordinates were used for the evaluation;

Latitude: 53°16'55.7"N

Longitude: 09°05'21.7"W

BRE 209 uses the equinox, March 21st for evaluation of sunlight, skylight and daylight. The summer solstice is the best-case scenario with minimal shadows due to the height of the sun, and winter solstice is the worst case, when it is common for large areas of the ground to be in shadow due to the sun's low angle and shorter days. Therefore, for consistency and in line with BRE guidance we have also used March 21st in overshadowing analysis to represent the average condition across the year. For completeness we have also included diagrams for June 21st, September 21st and December 21st.

## 7.1. Conclusions

The maps demonstrate that following development there will be limited adverse impact on the surrounding area or amenity areas and only transient overshadowing over amenity areas within the development.



Figure 5: Dwellings of Interest

## APPENDIX 1: DAYLIGHT RESULTS

Apartment Block – Ground Floor



| Ground Floor     | ADF (%) | Pass/Fail | Comments              |
|------------------|---------|-----------|-----------------------|
| Apt.-01- 2Bed/4P |         |           |                       |
| K/L/D            | 5.2     | Pass      | Complies with BS 8206 |
| Double Bedroom   | 3.3     | Pass      | Complies with BS 8206 |
| Twin Bedroom     | 2.5     | Pass      | Complies with BS 8206 |
| Apt.-04- 2Bed/3P |         |           |                       |
| K/L/D            | 2.0     | Pass      | Complies with BS 8206 |
| Double Bedroom   | 2.8     | Pass      | Complies with BS 8206 |
| Single Bedroom   | 4.6     | Pass      | Complies with BS 8206 |
| Apt.-05- 2Bed/3P |         |           |                       |
| K/L/D            | 2.0     | Pass      | Complies with BS 8206 |
| Double Bedroom   | 3.1     | Pass      | Complies with BS 8206 |
| Single Bedroom   | 4.7     | Pass      | Complies with BS 8206 |
| Apt.-07- 2Bed/4P |         |           |                       |
| K/L/D            | 5.1     | Pass      | Complies with BS 8206 |
| Double Bedroom   | 3.6     | Pass      | Complies with BS 8206 |
| Twin Bedroom     | 2.6     | Pass      | Complies with BS 8206 |

Table 7: Daylight Factor Results – Apartment Block, Ground Floor

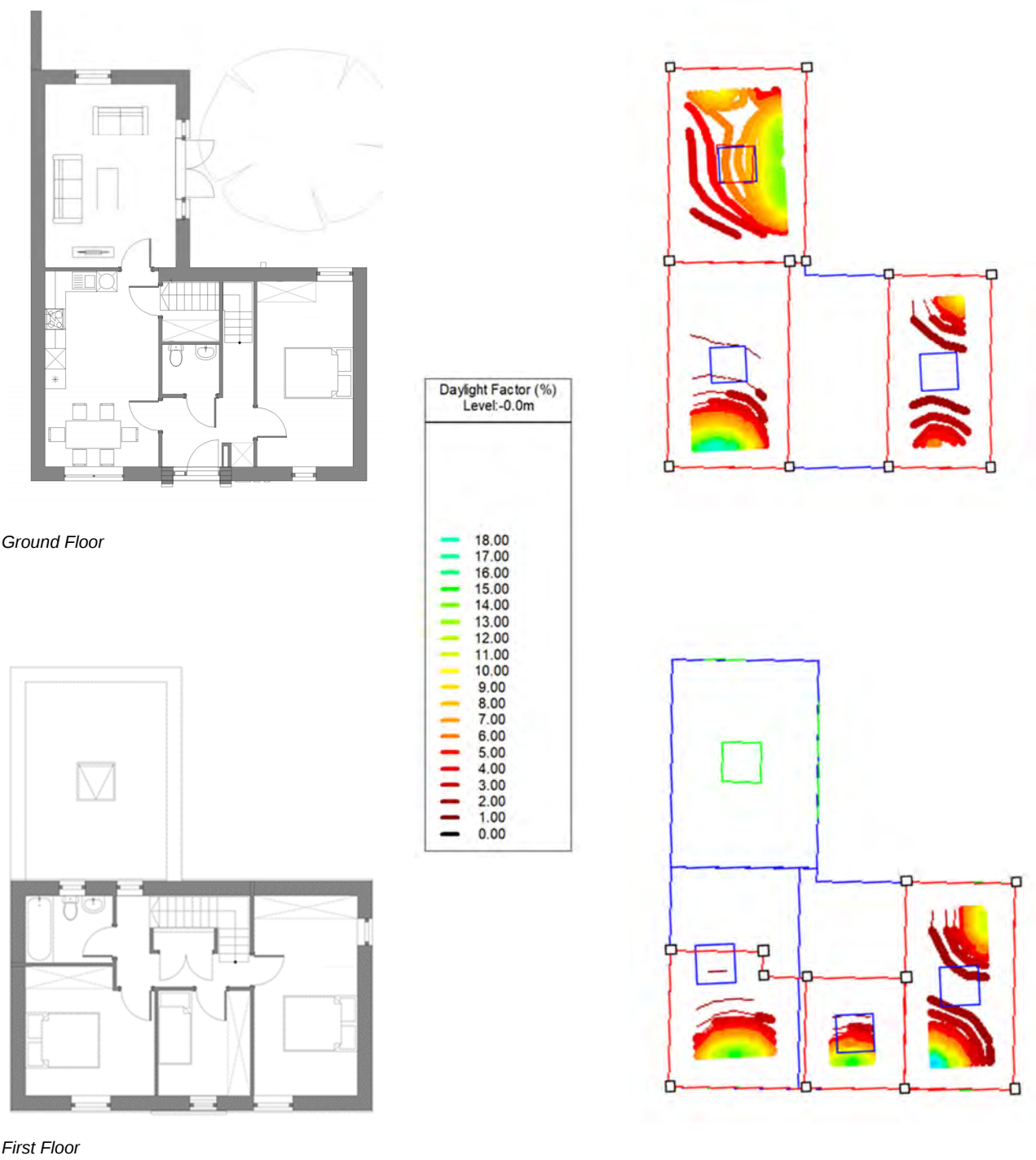
Apartment Block – Second Floor



| Second Floor     | ADF (%) | Pass/Fail | Comments              |
|------------------|---------|-----------|-----------------------|
| Apt-15- 3Bed/5P  |         |           |                       |
| K/L/D            | 5.1     | Pass      | Complies with BS 8206 |
| Double Bedroom   | 3.1     | Pass      | Complies with BS 8206 |
| Twin Bedroom     | 2.1     | Pass      | Complies with BS 8206 |
| Single Bedroom   | 5.7     | Pass      | Complies with BS 8206 |
| Apt.-18- 2Bed/3P |         |           |                       |
| K/L/D            | 2.0     | Pass      | Complies with BS 8206 |
| Double Bedroom   | 2.6     | Pass      | Complies with BS 8206 |
| Single Bedroom   | 4.6     | Pass      | Complies with BS 8206 |
| Apt.-19- 2Bed/3P |         |           |                       |
| K/L/D            | 2.0     | Pass      | Complies with BS 8206 |
| Double Bedroom   | 2.8     | Pass      | Complies with BS 8206 |
| Single Bedroom   | 4.7     | Pass      | Complies with BS 8206 |
| Apt.-21- 3Bed/5P |         |           |                       |
| K/L/D            | 5.0     | Pass      | Complies with BS 8206 |
| Double Bedroom   | 3.2     | Pass      | Complies with BS 8206 |
| Twin Bedroom     | 2.5     | Pass      | Complies with BS 8206 |
| Single Bedroom   | 4.2     | Pass      | Complies with BS 8206 |

Table 8: Daylight Factor Results – Apartment Block, Second Floor

House



| Ground Floor         | ADF (%) | Pass/Fail | Comments              |
|----------------------|---------|-----------|-----------------------|
| House-4Bed/5-7Person |         |           |                       |
| Kitchen/Dining       | 3.4     | Pass      | Complies with BS 8206 |
| Living               | 6.5     | Pass      | Complies with BS 8206 |
| Bedroom 01           | 2.8     | Pass      | Complies with BS 8206 |
| First Floor          |         |           |                       |
| Bedroom 02           | 2.8     | Pass      | Complies with BS 8206 |
| Bedroom 03           | 3.2     | Pass      | Complies with BS 8206 |
| Bedroom 04           | 2.6     | Pass      | Complies with BS 8206 |

Table 9: Daylight Factor Results – 4Bed/7Person House

## APPENDIX 2: NO SKY LINES RESULTS

## Apartment Block – Ground Floor

| Ground Floor            | Floor Area (m2) | No Sky Line (m2) | % of Room Area | BRE Compliant |
|-------------------------|-----------------|------------------|----------------|---------------|
| <b>Apt.-01- 2Bed/4P</b> |                 |                  |                |               |
| K/L/D                   | 36.1            | 36.1             | 100%           | Yes           |
| Double Bedroom          | 13.8            | 13.8             | 100%           | Yes           |
| Twin Bedroom            | 15.4            | 15.4             | 100%           | Yes           |
| <b>Apt.-04- 2Bed/3P</b> |                 |                  |                |               |
| K/L/D                   | 31.3            | 31.3             | 100%           | Yes           |
| Double Bedroom          | 16.0            | 16.0             | 100%           | Yes           |
| Single Bedroom          | 7.8             | 7.8              | 100%           | Yes           |
| <b>Apt.-05- 2Bed/3P</b> |                 |                  |                |               |
| K/L/D                   | 32.2            | 32.2             | 100%           | Yes           |
| Double Bedroom          | 14.8            | 14.8             | 100%           | Yes           |
| Single Bedroom          | 7.8             | 7.8              | 100%           | Yes           |
| <b>Apt.-07- 2Bed/4P</b> |                 |                  |                |               |
| K/L/D                   | 34.8            | 34.8             | 100%           | Yes           |
| Double Bedroom          | 12.7            | 12.7             | 100%           | Yes           |
| Twin Bedroom            | 16.3            | 16.3             | 100%           | Yes           |

Table 10: NSL Results – Apartment Block: Ground Floor

## Apartment Block – Second Floor

| Second Floor            | Floor Area (m2) | No Sky Line (m2) | % of Room Area | BRE Compliant |
|-------------------------|-----------------|------------------|----------------|---------------|
| <b>Apt.-15- 3Bed/5P</b> |                 |                  |                |               |
| K/L/D                   | 36.4            | 36.4             | 100%           | Yes           |
| Double Bedroom          | 13.8            | 13.8             | 100%           | Yes           |
| Twin Bedroom            | 15.4            | 15.4             | 100%           | Yes           |
| Single Bedroom          | 7.8             | 7.8              | 100%           | Yes           |
| <b>Apt.-18- 2Bed/3P</b> |                 |                  |                |               |
| K/L/D                   | 31.3            | 31.3             | 100%           | Yes           |
| Double Bedroom          | 16.0            | 16.0             | 100%           | Yes           |
| Single Bedroom          | 7.8             | 7.8              | 100%           | Yes           |
| <b>Apt.-19- 2Bed/3P</b> |                 |                  |                |               |
| K/L/D                   | 32.2            | 32.2             | 100%           | Yes           |
| Double Bedroom          | 14.8            | 14.8             | 100%           | Yes           |
| Single Bedroom          | 7.8             | 7.8              | 100%           | Yes           |
| <b>Apt.-21- 3Bed/5P</b> |                 |                  |                |               |
| K/L/D                   | 34.8            | 34.8             | 100%           | Yes           |
| Double Bedroom          | 13.7            | 13.7             | 100%           | Yes           |
| Twin Bedroom            | 16.3            | 16.3             | 100%           | Yes           |
| Single Bedroom          | 8.0             | 8.0              | 100%           | Yes           |

Table 11: NSL Results – Apartment Block: Second Floor

House –

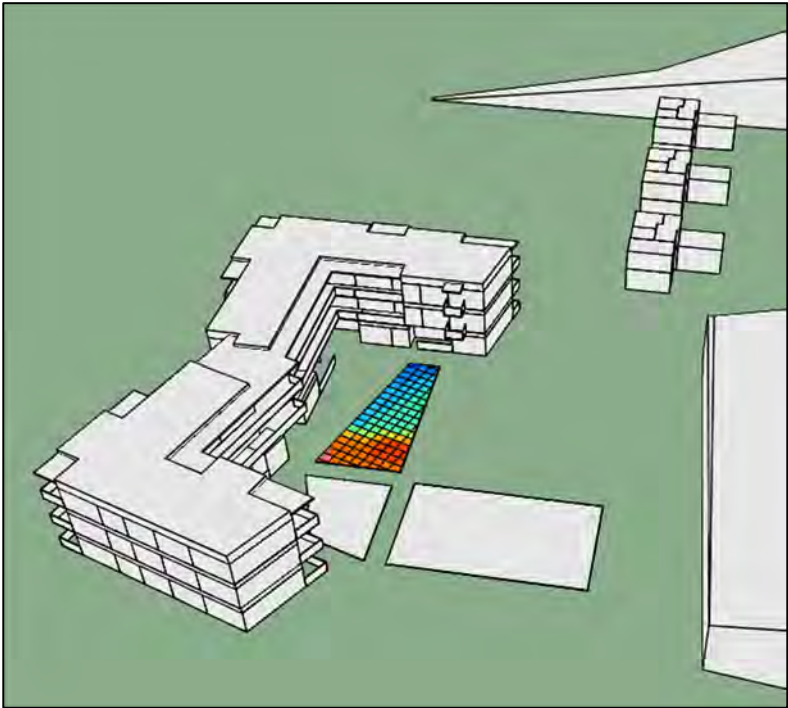
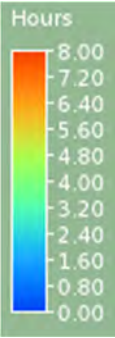
| Ground Floor    | Floor Area (m2) | No Sky Line (m2) | % of Room Area | BRE Compliant |
|-----------------|-----------------|------------------|----------------|---------------|
| House-4Bed/5-7P |                 |                  |                |               |
| Kitchen/Dining  | 19.4            | 19.4             | 100%           | Yes           |
| Living          | 20.8            | 20.8             | 100%           | Yes           |
| Bedroom 01      | 15.4            | 15.4             | 100%           | Yes           |

Table 12: NSL Results – House: Ground Floor

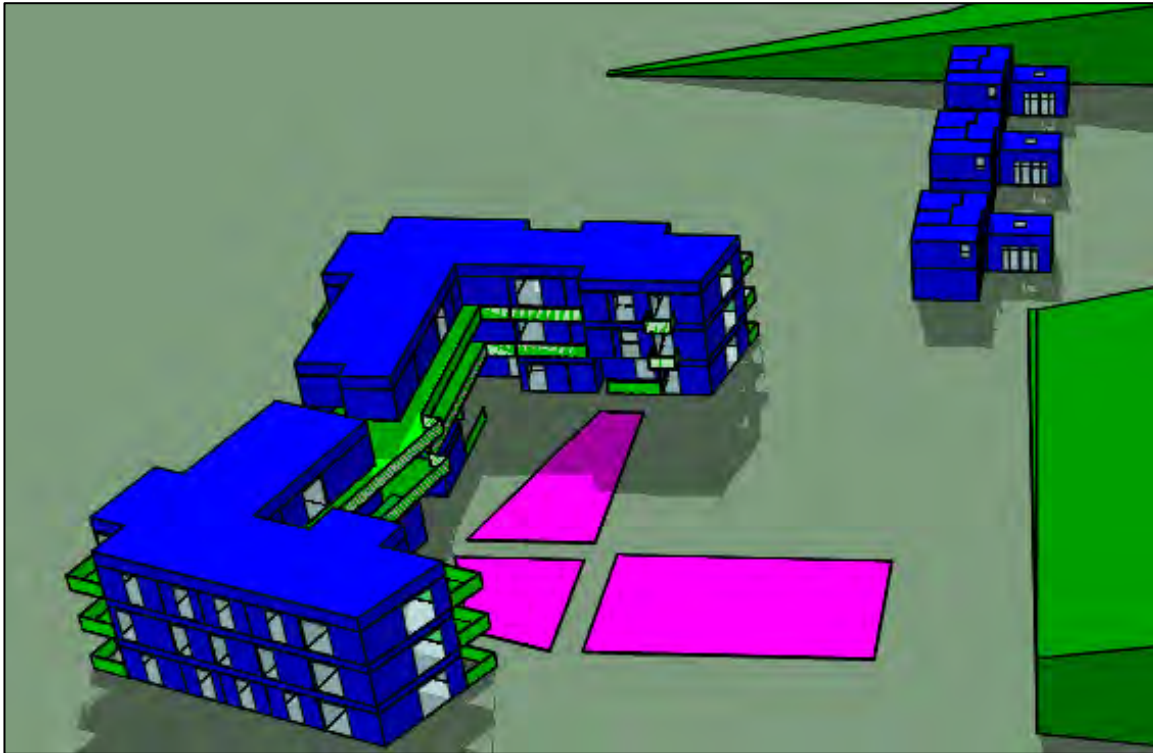
| First Floor     | Floor Area (m2) | No Sky Line (m2) | % of Room Area | BRE Compliant |
|-----------------|-----------------|------------------|----------------|---------------|
| House-4Bed/5-7P |                 |                  |                |               |
| Bedroom 02      | 11.9            | 11.9             | 100%           | Yes           |
| Bedroom 03      | 7.5             | 7.5              | 100%           | Yes           |
| Bedroom 04      | 15.4            | 15.4             | 100%           | Yes           |

Table 13: NSL Results – House: First Floor

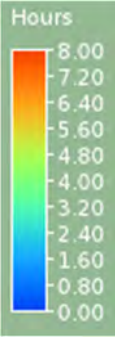
## APPENDIX 3: SUNLIGHT TO AMENITY SPACE RESULTS



Overview



IES Virtual Environment Model View – March 21<sup>st</sup>, 12:00



Area receiving at least 2 hours sunlight on March 21st

| Amenity Area        | Area<br>(m2) | Area > 2hrs sunlight<br>(m2) | (%) | BRE Threshold | Compliant |
|---------------------|--------------|------------------------------|-----|---------------|-----------|
| Development Grounds | 106          | 70                           | 66% | 50%           | Yes       |

Table 14: Sunlight Results for Proposed Development

## APPENDIX 4: SHADOW MAPS

Shadow Diagrams for 21<sup>st</sup> March

08:00



09:00



10:00



11:00



12:00



13:00



14:00



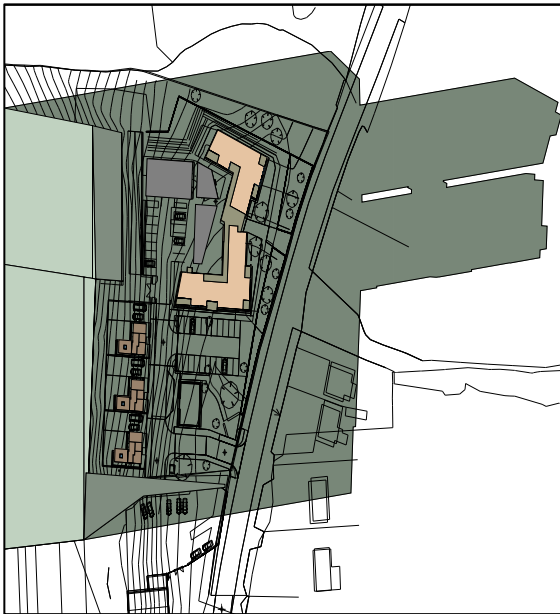
15:00



16:00



17:00

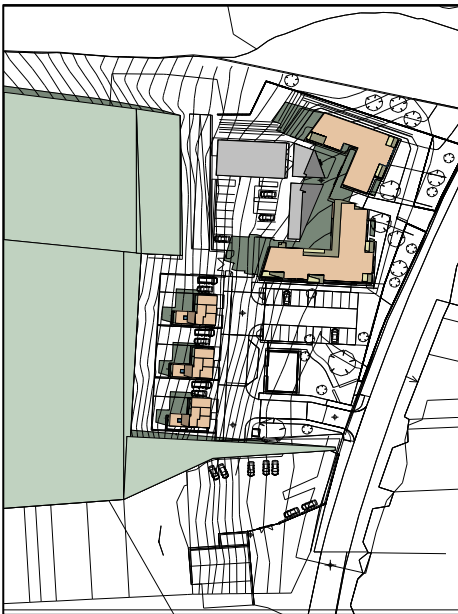


18:00

Shadow Diagrams for 21<sup>st</sup> June



08:00



09:00



10:00



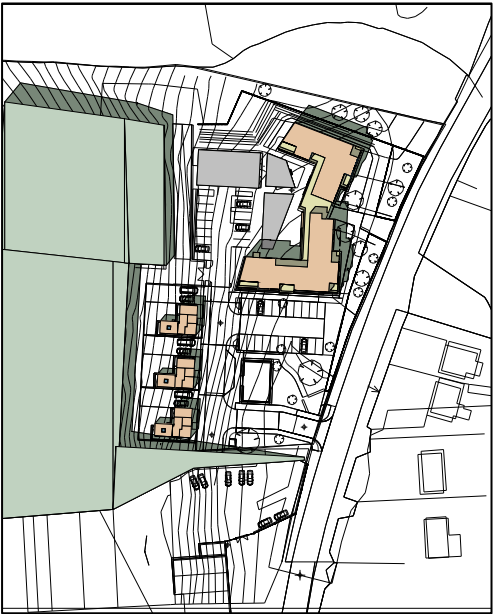
11:00



12:00



13:00



14:00



15:00



16:00



17:00



18:00

## Shadow Diagrams for 21<sup>st</sup> September



08:00



09:00



10:00



11:00



12:00



13:00



14:00



15:00



16:00



17:00



18:00

Shadow Diagrams for 21<sup>st</sup> December



08:00



09:00



10:00



11:00



12:00



13:00



14:00



15:00



16:00



17:00



18:00