LTRO Wilbury Road, Hove

Internal Daylight Assessment

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Revision Schedule

Revision No.	Date	Details of Change
Rev 00	24/03/2023	First Issue
Rev 01	27/03/2023	Updated to reflect latest fenestration
Rev 02	19/02/2024	Updated to reflect amended scheme

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1.0 Introduction

Impact Sustainability Ltd has been instructed by Skep Projects Limited to undertake an Internal Daylight Assessment of the proposed development on land to the rear of Wilbury Road, Hove.

The proposed development is residential in nature and comprises 3no 2-storey houses. Two semi-detached houses will be located to the Northern end of the site, with a detached house to the Southern end of the site.

The two semi-detached houses will provide 2-bed accommodation, whilst the detached property will provide 3-bed accommodation.

An Internal Daylight Assessment has been requested to meets the requirements of the Local Authority's Planning Policy documents.

This report has been completed by George Kent of Impact Sustainability Ltd, who is a registered Non-Domestic Low Carbon Energy Assessor (LCEA). George has 16 years continuous experience in energy simulation and consultancy.

2.0 Assessment Criteria

To assess the provision of internal daylight within new buildings, guidance criteria are taken from the BRE Guidance document "Site Layout Planning for Daylight and Sunlight, a Guide to Good Practice, 2022". This document provides recommendations for achieving good daylight amenity within properties and refers to the British Standard 'Daylight in Buildings' EN 17037:2018.

Within BS EN 17037:2018 specific guidance is given regarding target and minimum illuminance levels that should be achieved within occupied spaces. These spaces are considered to afford adequate daylight amenity if both the target and minimum illuminance levels are achieved across the relevant percentage of the working plane for at least 50% of annual daylight hours. The working plane is considered to be 0.85m above floor level, unless a specific reason is provided as to why a different working plane height should be used. Three different levels daylight illuminance are provided within BS EN 17037:2018 for minimum, medium and high level scenarios. The recommended targets differ depending on whether an occupied room is side-lit, or top-lit. These targets are shown within figures 2.1 and 2.2 below.

All occupied rooms within unit 1 and the bedroom 2 / study within units 2 and 3 are side lit only, meaning criteria from figure 2.1 will be applicable to these.

The open plan living area and bedroom 1 within units 2 and 3 are all rooms that are both side-lit and top-lit. Therefore, criteria from figure 2.1 are applicable to these rooms.

Level of recommendation for vertical and inclined daylight opening	Target illuminance E_T lx	Fraction of space for target level $F_{plane,\%}$	Minimum target illuminance E_{TM} lx	Fraction of space for minimum target level $F_{plane,\%}$	Fraction of daylight hours $F_{time,\%}$
Minimum	300	50 %	100	95 %	50 %
Medium	500	50 %	300	95 %	50 %
High	750	50 %	500	95 %	50 %
NOTE Table A.3 gives target daylight factor (D_T) and minimum target daylight factor (D_{TM}) corresponding to target illuminance level and minimum target illuminance, respectively, for the CEN capital cities.					

Figure 2.1 BS EN 17037:2018 target and minimum target illuminance levels for side-lit spaces

Level of recommendation for horizontal daylight opening	Target illuminance E_T lx	Fraction of space for target level $F_{plane,\%}$	Fraction of daylight hours $F_{time,\%}$
Minimum	300	95 %	50 %
Medium	500	95 %	50 %
High	750	95 %	50 %

Figure 2.2 BS EN 17037:2018 target illuminance levels for side-lit spaces

Further to these targets, BS EN 17037:2018 includes National Annex NA "Further recommendations and data for daylight provision in the UK and Channel Islands", NA.2 of which provides guidance on minimum daylight provision within UK dwellings. The guidance is intended for use within 'hard to light' habitable spaces, such as basement rooms or rooms with significant external obstructions such as dense tree cover. The National Annex NA.2 recommends that the target illuminances levels for specific room types are exceeded over at least 50% of the working plane area, for at least half of the annual daylight hours. The targets are shown in figure 2.3 below.

Room type	Target illuminance E_T (lx)
Bedroom	100
Living room	150
Kitchen	200

Figure 2.3 National Annex NA.2 target illuminance levels for dwellings

3.0 3D Analysis Model

3.1 Geometry

A 3D model of the development has been constructed within IES Virtual Environment software using the ModelIT tool, see figures 3.1 & 3.2. IES VE is a dynamic simulation modeling software, which has been selected and applied in accordance with CIBSE AM11. The geometry of this model has been based upon the following stage 3 issue drawings by ABIR Architects:

- 0697.PL.400 – Proposed Site Plan, Location & Block Plans
- 0697.PL.401 – Proposed Plans
- 0697.PL.402 – Proposed Front and Rear Elevations
- 0697.PL.403 – Proposed Side Elevations

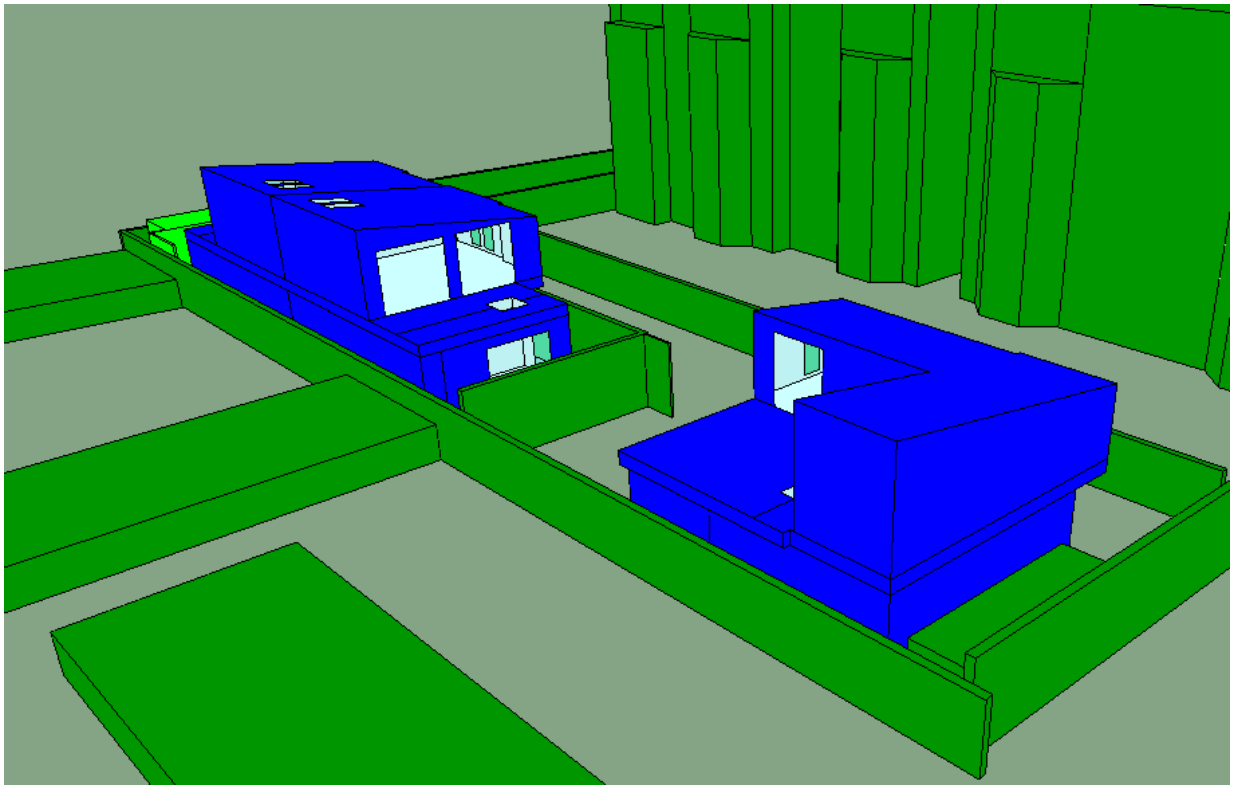

Figure 3.1 Axonometric View of development from South-West

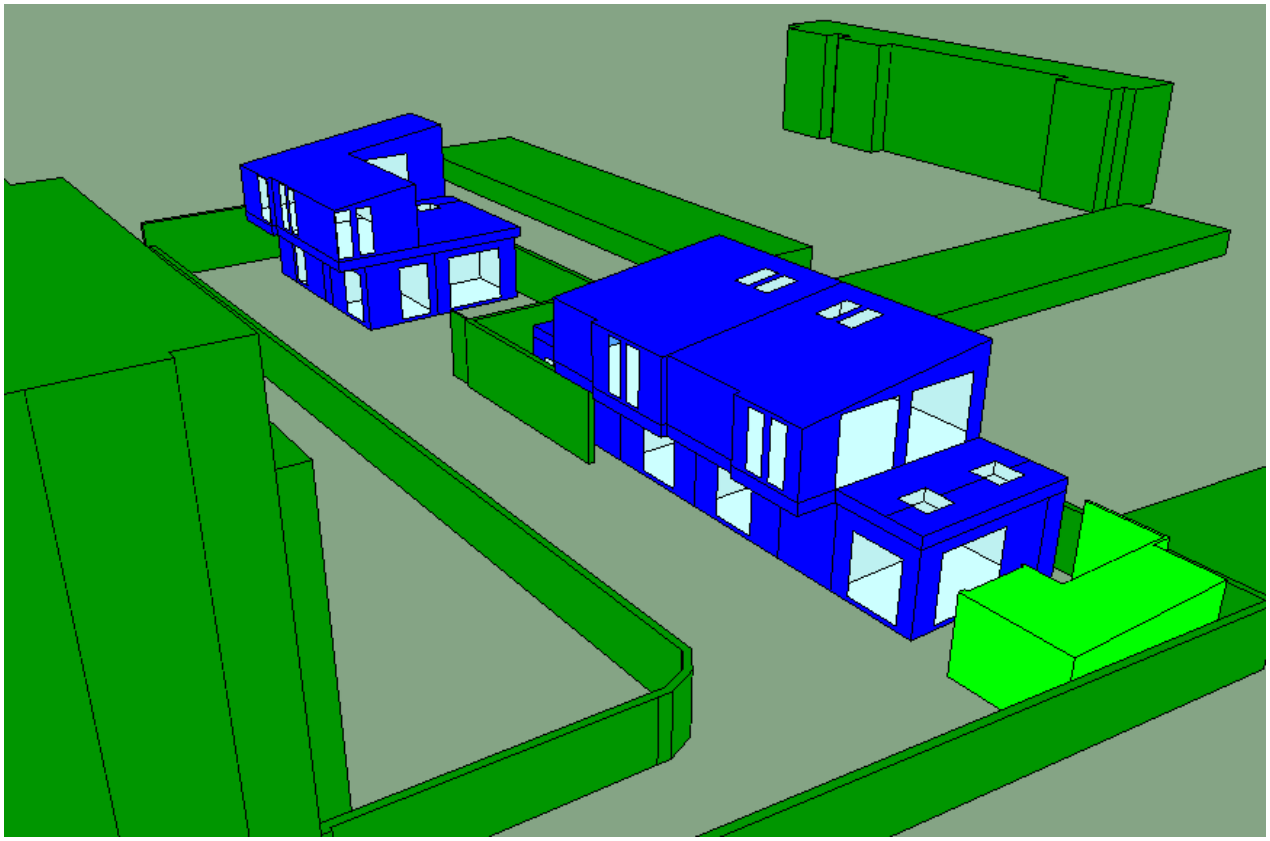

Figure 3.2 Axonometric View of development from North-West

3.2 Building Fabric

The building fabric details used within the daylight analysis are shown in table 3.1 below. These are taken from BRE's Site Layout Planning for Daylight and Sunlight, a Guide to Good Practice, 2022, Appendix C.

Building Element	Comments	Reflectance Factor
Internal floors	Dark floor finish	0.2
Internal walls	Painted with white emulsion	0.8
Internal ceilings	Painted with white emulsion	0.8
Windows/ roof lights/ curtain wall	Visible light transmittance of 70%	N/A

Table 3.1 Building Fabric Constructions

3.3 Climate Data

IES VE software uses CIBSE weather files to assess the thermal comfort levels during simulations. There are generally two types of weather file, a TRY (Test Reference Year) file and a DSY (Design Summer Year) file. Weather files are available for 12 different locations throughout the UK. The weather file that has the closest representation to the site climate should be applied to the model.

The TRY is composed of 12 separate months of data each chosen to be the most average month from the collected data.

The TRY is used for energy analysis, compliance with the UK Building Regulations (Part L) and to assess winter thermal comfort. The TRY weather file used within the daylight analysis is the Gatwick DSY1 weather file.

Solar gains are calculated automatically by the modelling software based on the location and orientation of the building, external shading, the solar transmission factor of the glazing and the solar angles.

3.4 Climate Based Daylight Modelling

The approach taken to obtain the assessment results follows Climate Based Daylight Modelling (CBDM). CBDM assesses daylight, sunlight and overshadowing effects using Sun and sky conditions taken from weather data sets, rather than the CIE uniform sky used to assess Average Daylight factor under the now obsolete BS 8206-2 standard.

To undertake the CBDM , the IES Virtual Environment software suite has been used. IES VE offers full Dynamic Simulation Modelling (DSM), as well as CBDM through use of the Radiance software module. The Radiance software uses Spatial Daylight Autonomy calculation and the weather file as defined in section 3.3 as the weather dataset for the location to determine the daylight illuminance on the working plane of the room across each point on a grid, for each hour of the year. These point grid results can then be interrogated to confirm whether the daylight criteria have been met within each room.

For this assessment the working plane has been assumed to be at 0.85m, and the CBDM grid used is 0.25m x 0.25m.

4.0 Results

The results of the daylight assessment are shown in table 4.1 below. These demonstrate that that all of the occupied rooms meet the minimum guidance criteria of BS EN 17037 and that all rooms meet the minimum requirements of National Annex NA.2.

Room	Side-lit / Top-lit	BS EN 17037 illuminance				National Annex NA.2	
		E_t=300 lux for 50% hrs (Target)		E_t=100 lux for 50% hrs (Minimum Target)		Target E_t for 50% area (lux)	Area compliant
		Area required	Area Achieved	Area required	Area Achieved		
Unit 1 - Bedroom 1	Side-lit	50%	100%	95%	100%	100	100%
Unit 1 - Bedroom 2	Side-lit	50%	100%	95%	100%	100	100%
Unit 1 - K/L/D	Side-lit	50%	100%	95%	100%	200	100%
Unit 1 - Study	Side-lit	50%	100%	95%	100%	150	100%
Unit 2 - Bedroom 1	Top-lit	95%	100%	-	-	100	100%
Unit 2 - Bedroom 2 / Study	Side-lit	50%	100%	95%	100%	150	100%
Unit 2 - K/L/D	Top-lit	95%	100%	-	-	200	100%
Unit 3 - Bedroom 1	Top-lit	95%	100%	-	-	100	100%
Unit 3 - Bedroom 2 / Study	Side-lit	50%	100%	95%	100%	150	100%
Unit 3 - K/L/D	Top-lit	95%	100%	-	-	200	100%

Table 4.1 – Results of Spatial Daylight Autonomy Assessment

5.0 Conclusion

The results of the internal daylight assessment demonstrate that all of the occupied rooms achieve target and minimum target illuminance levels set out within the BS EN 17037 guidance criteria, with all rooms also meeting the respective targets for the room type from National Annex NA.2 criteria.

Therefore, the climate based daylight modelling analysis confirms that adequate daylight amenity will be provided within all houses.