Ambrose House, Worthing

Internal Daylight Assessment

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Revision Schedule

Revision No.	Date	Details of Change
Rev 01	19/09/2025	First Issue
Rev 02	01/10/2025	North facing rooms included

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1.0 Introduction

Impact Sustainability Ltd has been instructed to undertake an Internal Daylight Assessment of the proposed conversion of Ambrose House, Worthing.

The project involves the major refurbishment and conversion of an existing commercial premises to create new residential accommodation.

The kitchen and living room of unit 1 and living room and bedroom of unit 2 have single sided glazing only, which faces due South but is obstructed by a tall adjacent building just 2.6m to the South. Furthermore, unit 1 bedrooms 1 and 2 face North and also require assessment.

An Internal Daylight Assessment has therefore been completed to alleviate any concerns regarding these flats / rooms during the planning process.

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 18 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.

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 top-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 and 3.2. IES VE is a dynamic simulation modeling software, which has been selected and applied in accordance with CIBSE AM11. The following rooms are considered to have a potential issue with daylight amenity and so have been modeled within the software package:

- Unit 1 Kitchen
- Unit 1 Living Room
- Unit 1 Bedroom 1
- Unit 1 Bedroom 2
- Unit 2 Living Room
- Unit 2 Bedroom

The geometry of this model has been based upon the following planning issue drawings by ABIR Architects:

- 0759.EXG.001.A Existing Plans
- 0759.EXG.002.A Existing Sections
- 0759.EXG.003.A Existing Elevations
- 0759.FEA.003.A Proposed Plans

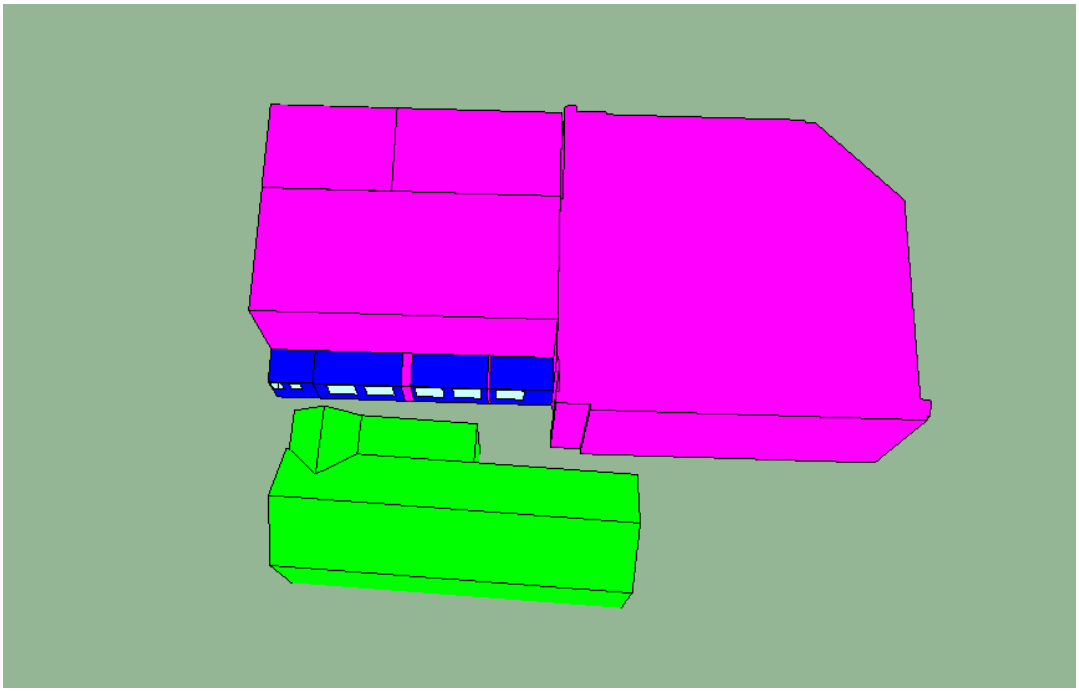

Figure 3.1 Axonometric View of site overhead

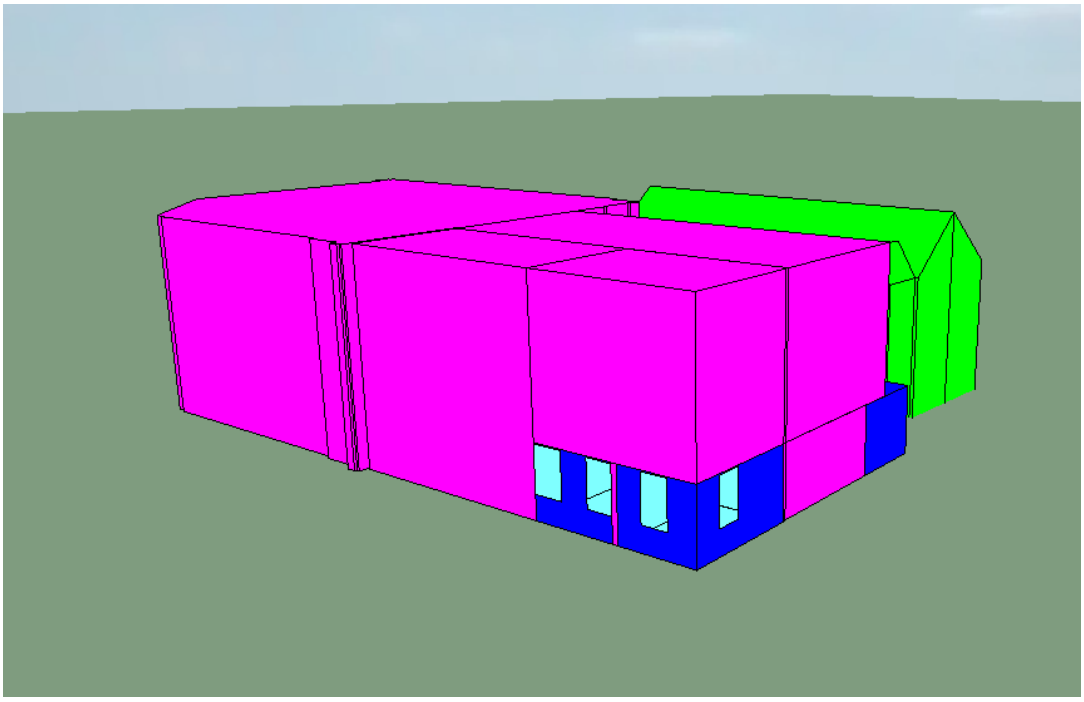

Figure 3.2 Axonometric View of model from North-West

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/ glazed doors	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 SouthamptonTRY 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 the 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 results demonstrate that at least 50% of the floor area within unit 1 kitchen, unit 1 bedroom 1, unit 1 bedroom 2 and unit 2 bedroom achieve the target and the minimum illuminance for at least 50% of annual daylight hours in accordance with BS EN 17037 criteria. However, unit 1 living rooms falls short of the 50% floor area target for the 300 lux criterion and unit 2 living rooms falls short of the 95% floor area target for the 90 lux criterion.

All South facing spaces have also been assessed against the National Annex NA.2 criteria for 'hard to light spaces', since they have a significant obstruction directly to the South of the windows in the form of a tall existing building. All four assessed rooms meet the NA.2 criteria.

Room	BS EN 17037 illuminance area achieved (%)		National Annex NA.2 area for 'hard to light' spaces achieved (%)		Overall Pass achieved?
	E_t=300 lux for 50% hrs (Target - 50%)	E_t=100 lux for 50% hrs (Minimum - 95%)	Target E_t for 50% area (lux)	Area compliant (%)	
Unit 1 Kitchen	100.0%	100.0%	200	100.0%	Yes
Unit 1 Living Room	53.7%	81.4%	150	68.8%	Yes
Unit 1 Bedroom 1	100.0%	100.0%			Yes
Unit 1 Bedroom 2	100.0%	100.0%			Yes
Unit 2 Living Room	42.6%	100.0%	150	75.7%	Yes
Unit 2 Bedroom	80.3%	100.0%	100	100.0%	Yes

Table 4.1 – Results of Spatial Daylight Autonomy Assessment

5.0 Conclusion

The results of the internal daylight assessment demonstrate that four of the assessed rooms achieve compliance against the target and minimum target illuminance levels set out within the BS EN 17037 guidance criteria. The unit 1 living room does not meet the target illuminance level criterion And the unit 2 living room does not meet the minimum target illuminance criterion with the current design.

However, as previously mentioned the proposed windows to these rooms are significantly obstructed by a tall adjacent property, which lies just 2.6m to the South of the elevation. Therefore, as the windows have a significant obstruction these rooms can be considered to be 'hard to light' spaces as per National Annex NA.2 (see section 2 and figure 2.3). Therefore, these criteria should be used as a backstop to assess the level of internal daylight amenity in these hard to light spaces. All 4no of the South facing rooms meet the NA.2 criteria for hard to light spaces as can be seen in table 4.1.

Therefore, the CBDM results confirm that adequate daylight amenity will be provided within each of the assessed rooms.