

Internal Daylight and Sunlight Study

Client Details: A One Security & FM Ltd
555 Lincoln Road
Peterborough
PE1 5PB

Site Details: 8 South Prade
Rochdale
OL16 1LR

Contents

1. Introduction & Methodology	3
2. Proposed Development	8
3. Modelling the site	9
4. Internal Daylight and Sunlight Results	11
5. Conclusion.....	14

Appendices

Appendix A:	Proposed Plans
Appendix B:	Daylight Analysis (Spatial Daylight Autonomy – sDA) Numerical Results
Appendix C:	Sunlight Exposure Numerical Results

Report Details:

Prepared by	Checked by	Date	Job Number	Revision
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1. Introduction & Methodology

Base Energy were instructed to investigate the daylight and sunlight levels serving the residential units at first floor level within the proposed scheme at No.8 South Parade, Rochdale, OL16 1LR.

The daylight study is to ensure the comfort, health and safety of building occupants as well as visitors and others within the vicinity is acceptable. It is also to enhance the quality of life in dwellings by recognising those that encourage a healthy and safe internal environment for occupants.

Using industry standard methodology as prescribed by BRE and British Standard guidance: we have made numerical analyses to ensure compliance with the recommended levels of daylight and sunlight within the habitable rooms of the proposed dwelling.

The following standards and guidance have been consulted when compiling this report to ensure compliance with Daylight and Sunlight standards:

- The Building Research Establishment's (BRE) Site Layout Planning for Daylight and Sunlight: A guide to good practice (BRE BR 209) (2nd edition) (the **"BRE Guide"**).
- British Standard BS EN 17037:2018 – Daylight in Buildings (the **"2018 British EN Standard"**).

It should be noted at the outset that the 2008 British Standard has been superseded by the 2018 British Standard. This is the UK implementation of EN 17037:2018, which was approved by the CEN on 29 July 2018. In Ireland, EN 17037:2018 has been implemented by the 2018 Irish Standard. The texts of the 2018 British Standard and the 2018 Irish Standard are the same, with one exception. The exception is that the 2018 British Standard contains an additional "National Annex" which specifically sets out requirements within dwellings, to ensure some similarity to the now superseded 2008 British Standard.

The 2018 British and Irish Versions of the EN Standards

The EN 17037:2018 standard—which is the basis of both the 2018 British EN Standard and the 2018 Irish EN Standard—approaches the assessment of daylight provision on a different basis from that utilised in the 2008 British Standard and the BRE Guide. Instead of **average** daylight factors the standard assess a new metric based on **median** daylight, in order to ensure both extent and a degree of uniformity of daylight.

“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.”

EN 17037:2018 also address other aspects in addition to daylight - including sunlight, glare and quality of view, which are not addressed in the context of this report.

The National Annex

As is noted above, the 2018 British Standard includes a “National Annex”, containing “Further recommendations and data for daylight provision in the UK and Channel Islands”. As there is no equivalent in the 2018 Irish Standard the 2018 British Standard National Annex will be referenced, which states:

“NA.1 Introduction: The UK committee supports the recommendations for daylight in buildings given in BS EN 17037:2018; however, it is the opinion of the UK committee that the recommendations for daylight provision in a space (see Clause A.2) may not be achievable for some buildings, particularly dwellings. The UK committee believes this could be the case for dwellings with basement rooms or those with significant external obstructions (for example, dwellings situated in a dense urban area or with tall trees outside), or for existing buildings being refurbished or converted into dwellings. This National Annex therefore provides the UK committee's guidance on minimum daylight provision in all UK dwellings.”

NA.2 addresses minimum daylight provision in UK dwellings. It contains a table, in which target illuminance, ET (lx), levels are recommended for different room types. These are: bedroom at 100 lx; living room at 150 lx; and kitchen at 200 lx, which may be compared to EN 17037's recommendation of 300 lux (irrespective of room application). The commentary is as follows:

“Even if a predominantly daylight appearance is not achievable for a room in a UK dwelling, the UK committee recommends that the target illuminance values given in Table NA.1 are exceeded over at least 50% of the points on a reference plane 0.85 m above the floor, for at least half of the daylight hours.”

Exposure to Sunlight

The National Annex (BS EN 17037:2018) provides guidelines on acceptable levels of sunlight exposure represented in hours.

‘Sunlight provision is essential for any interior space and depending on the function of the space, it is generally desirable, except during hot climatic conditions. Sunlight duration needs to be linked to appropriate selection of shading systems to minimize possible thermal and/or visual discomfort to the occupants (see recommendations in Annex A and Annex E on glare protection).’

Annex A within the reference document BS 3N 17037:2018 presents three values for sunlight exposure in a space for a selected day. Recommended values of sunlight exposure (*h*) are in Table A.6 with the selected date for analysis being 21st March.

Methodology (in accordance with BS EN 17037:2018 – British National Annex)

The methodology and criteria used in this analysis to show compliance is:

- ‘Illuminance Calculation’ - assessed in accordance with BS EN 17037: 2018 National Annex Method 2

and

- ‘Sunlight Exposure’ – assessed using Solar Exposure Calculations accordance with BS EN 17037: 2018 National Annex

Illuminance Calculation - Method 2: This calculation method uses the illuminance targets on the reference plane as per Table NA.1 (refer to page 64 of BS EN 17037). The assessment is carried out for each hour over the course of the year (8,760 hours) using a local weather file which accounts for varying sky conditions and sun positions throughout the year.

As outlined in Section 5.1.4 of the standard, the verification of daylight provision can be determined using either an adequate software or on-site measurements. When using a software, *“a representative model of the space is required together with the key parameters (such as any significant nearby obstructions, the assigned surface reflectance values and glazing transmissivity) that are a reasonable representation of those for the actual, completed building.*

Based on the above criteria, the daylight provision to the proposed development has been assessed using an adequate software (i.e. IES VE), using the Method 2 climate-based approach and targeting the minimum recommended values outlined in Table NA.1 of BS EN 17037:2018.

The Method 2 climate-based approach was selected as it is a far more accurate assessment method compared to Method 1. Climate based daylight modelling (CBDM) is more accurate compared to a calculation based on a single day during the year, i.e. Method 1. The amount of daylight varies throughout the year, primarily due to the sun's position, so it is essential the impact of daylight variance is properly considered. CBDM utilises an annual simulation linking location, shading, climate data (including solar intensity and cloud cover) together with the building properties. This provides a complete overview on how the daylight performance varies throughout the year due to changes in these factors.

Sunlight Exposure measures the amount of sunlight hours a window may receive on 21st March using specialist software (i.e. IES VE). The assessment is conducted on this date for each opening of a space from a reference point located on the inner surface of the aperture at the center of the opening.

This report has been prepared for planning purposes, and not a Right to Light dispute.

2. Proposed Development

There are proposals for the conversion of an existing first floor space into 2 x residential dwellings at No.8 South Parade, Rochdale, OL16 1LR.

Location Plan



3. Modelling the site

An analysis model is created of a sample set of all habitable rooms within Flats 1 and 2 at first floor level, all relevant surrounding buildings and obstructions are factored into the analysis, calculations are then run to determine the illuminance levels and exposure to sunlight within those rooms.

The outputs of those calculations can be exported numerically. Using the BRE guidance which gives absolute figures for the acceptable levels of daylight illuminance and sunlight hours, we can then establish if the proposal will have the required levels stipulated by BRE guidelines.

It is important to note that not all nearby features have been modelled, only those that will affect the daylighting. In accordance with BRE recommendations, trees have been omitted from the calculations.

The reference document for this analysis, BRE BR 209 and BS EN 17037:2018 British National Annex, provides the methodology for undertaking the calculations as well as benchmark figures for the acceptable daylight and sunlight levels required within a habitable space.

This study has been calculated in accordance with BRE methodology, using the following parameters for each calculation:

- Room assessment grid excluding a perimeter band of 0.3m from the walls
- Working plane at 0.85m from above floor level
- Minimum room grid point of 0.3m
- An CIE overcast sky
- Glass transmission is 0.6 (double glazing with low-emissivity coating)
- Angle of visible sky between 72° and 74°
- Vertical glazing
- Area weighted reflectance of room surfaces at 0.5 for internal walls, 0.7 for ceilings, 0.2 for floors and 0.2 for exterior walls, obstructions and exterior ground

It is also worth noting that these figures assume that internal lighting is available to supplement the available daylight. It is considered that if a room has an illuminance result of 50% or more then it will be sufficiently well lit, even in the absence of electric lighting. It is deemed by the guidance that if the BRE criteria are met, then the occupiers of the dwelling will have sufficient daylight, although it should be noted that these figures are guidelines only.

4. Internal Daylight and Sunlight Results

Internal illuminance and sunlight exposure levels for the habitable rooms within Flats 1 and 2 at first floor level have been calculated in accordance with BRE methodology, using a CIE overcast sky at an illuminance value of 8500 lux. The calculations assume a white ceiling, cream walls and mid-grey carpet or wooden floor.

The BS EN 17037 National Annex provides minimum target illuminances for the following room types in UK dwellings:

Illuminance Targets – Method 2:

Room Type	Target Illuminance (lux)
Bedroom	100
Living Room	150
Kitchen	200

The above targets should be achieved across at least 50% of the assessment area for at least 50% of the daylight hours.

- Daylight Hours = 4380
- 50% of Daylight Hours = 2190

It is deemed by the guidance that if the above criteria are met, then the occupiers of the dwellings will have sufficient daylight.

Sunlight Exposure

The BS EN 17037 National Annex provides the recommended levels of exposure to sunlight on 21st March:

Level of recommendation for exposure to sunlight	Sunlight exposure (<i>hours</i>)
Minimum	1,5 h
Medium	3,0 h
High	4,0 h

When applying the recommendation to a whole dwelling, the proposal is that at least one habitable room in the dwelling should meet the above criteria.

The criteria applies to rooms of all orientations (even though north facing rooms are unlikely to meet this criteria).

The amount of sunlight can be added together for rooms with windows on difference facades.

Daylight Illuminance Results Summary (Numerical Results can be found in Appendix B)

The results show a mix of compliance and non - compliance within the proposed development. The bedrooms serving Flats 1 and 2 experience 100 lux for over 50% of the room assessment area for at least 50% of the available daylight hours and the kitchen / living room serving Flat 2 experiences 200 lux for over 50% of the room assessment area for at least 50% of the available daylight hours and therefore satisfy the required criteria in accordance with BRE Guidelines and the new standards as stipulated within BS EN 17037:2018 British Annex.

However, it can be seen from the results that the kitchen / living room serving Flat 1 fails to meet the minimum in accordance with BRE Guidelines.

Sunlight Exposure Results Summary (Numerical Results can be found in Appendix C)

The results show full compliance with all units experiencing in excess of 1,5 hours of sunlight exposure on 21st March and therefore satisfy BRE Guidelines.

As previously stated, only one habitable room within each dwelling is required to meet the Sunlight Exposure criteria in order to meet BRE Guidelines and satisfy the criteria set out in BS EN 17037:2018 British Annex.

5. Conclusion

Using industry standard methodology, we have made numerical analyses to calculate the recommended levels of daylight for the rooms detailed above. The main criteria used in this analysis to show compliance is the Illuminance Calculation and Sunlight Exposure Calculation in accordance with BRE Guidance, BS EN 17037:2018 British Annex.

In conclusion, the assessment of lux levels and sunlight exposure in habitable rooms within the proposed development demonstrates a commendable overall adherence to the prescribed standards outlined in BRE Guidelines and BS EN 17037:2018 British Annex. All bedrooms consistently achieve the recommended 100 lux, meeting or exceeding the criteria for over 50% of the room assessment area and at least 50% of the available daylight hours and the kitchen/living room serving Flat 2 also exceeding compliance and experiencing an illumination level of 200 lux for over 50% of the rooms assessment area.

Despite this positive trend, a noteworthy exception is observed in the kitchen/living room serving Flat 1 at 1st-floor level, falling short of meeting the required criteria. Further investigation or adjustments may be warranted to enhance the lux levels in this particular area and bring it in line with the stipulated guidelines. Overall, the results indicate a robust level of compliance with lux level criteria in the proposed development.

It must be noted that a good level of daylight access is available to the Kitchen of Flat 1, however, the problem lies in the fact that the BRE guide for internal daylight and sunlight calculation is more suited for assessing new developments before construction. It's not quite fair to apply the same standards to existing buildings, especially when there are limitations in layout and design. Therefore, flexibility should be considered when interpreting internal daylight and sunlight result in this existing structure.

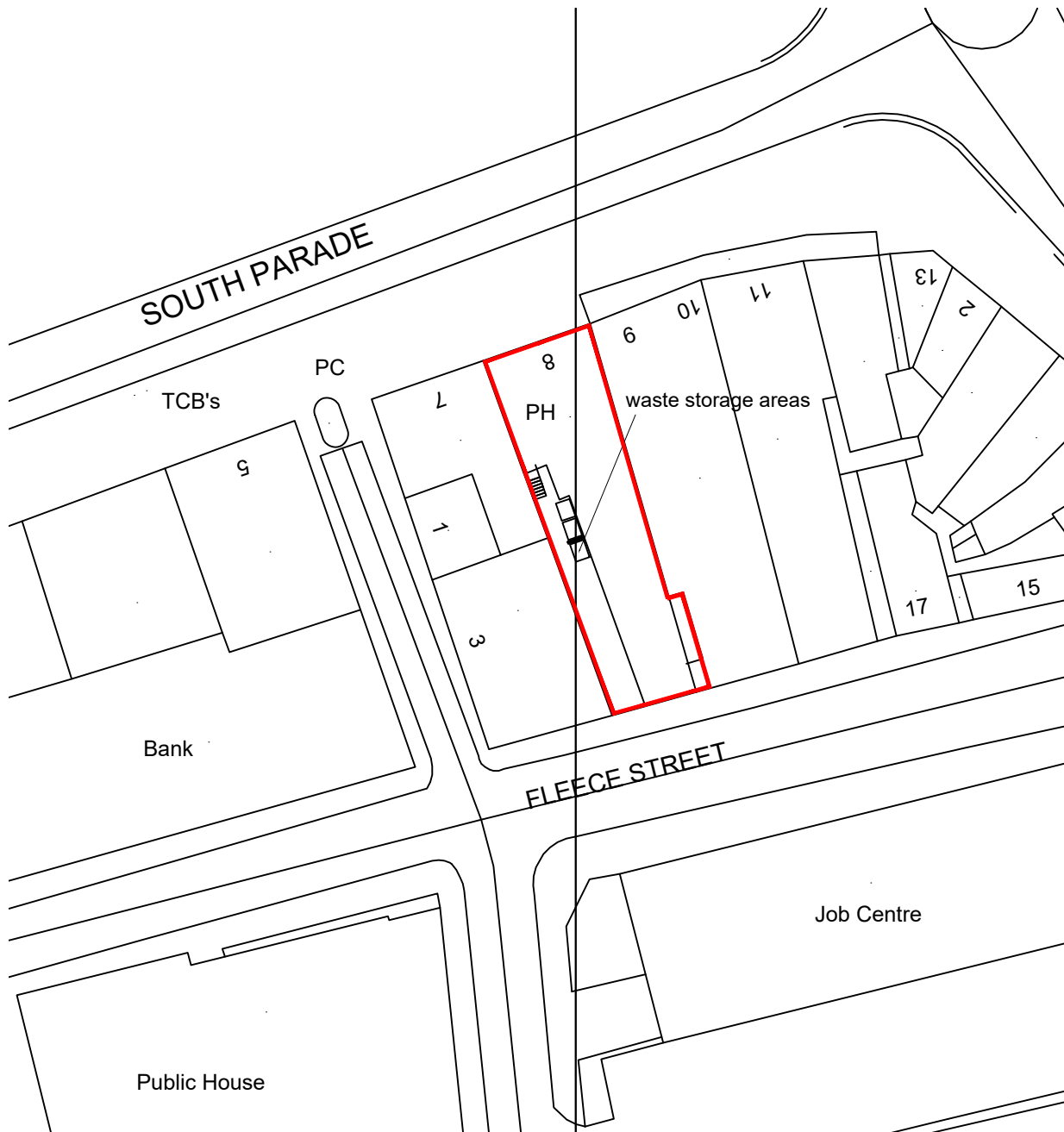
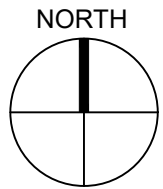
With respect to sunlight, the assessment results reveal full compliance with sunlight exposure criteria within the proposed development.

As previously emphasized, the criteria for sunlight exposure are met if at least one habitable room within each dwelling achieves the specified standards. This allows for flexibility in design while ensuring compliance with both BRE Guidelines and the criteria outlined in BS EN 17037:2018 British Annex.

Appendices

Appendix A: Proposed Plans

8 SOUTH PARADE ROCHDALE OL16 1LR



SITE PLAN - PROPOSED

scale 1-500

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date: October 2023

scale: as noted@A4

dwg. nr: K234-07

CDM:
Clients and contractors must fulfil their duties under the CDM regulations 2015. The client is required to notify the HSE of any projects lasting more than 30 days or involving more than 500 person days.



AJ COCKER ASSOCIATES
CHARTERED BUILDING SURVEYORS



scale: as noted @ A1
date: October 2023
drawn: IS

Dwg. Nr. K234-04/A

Appendix B: Daylight Analysis (Spatial Daylight Autonomy – sDA) Numerical Results

Project Name: No.8 South Parade, Rochdale, OL16 1LR
Project No: S11725 - Rev0
Report Title: SDA - BS EN 17037 - Proposed Scheme
Date of Analysis: 21.12.2023

						Criteria				
Floor Ref	Unit	Room	Property Type	Room Area (m2)	% of Area Meeting Req Lux	Req Lux	Req % of Effective Area	Req % of Daylight Hours	Daylight Hours	Meets Criteria
First Floor	Flat 1	Kitchen/Living Room	Residential	31.5	36.00%	200	50%	50%	4380	No
		Bedroom	Residential	11.05	100.00%	100	50%	50%	4380	Yes
	Flat 2	Kitchen/Living Room	Residential	47	95.00%	200	50%	50%	4380	Yes
		Bedroom	Residential	19.8	79.00%	100	50%	50%	4380	Yes

Appendix C: Sunlight Exposure Numerical Results

Project Name:No.8 South Parade, Rochdale, OL16 1LR

Project No:S11725 - Rev0

Report Title:Sunlight Exposure - BS EN 17037 - Proposed Scheme

Date of Analysis:21.12.2023

Dwelling Ref	Room	Property Type	Proposed Sunlight Exposure Hours	Rating	Dwelling Compliance (At least 1 room per dwelling has over 1.5 hours Sunlight Exposure)
Flat 1	Kitchen / Living Room	Residential	2.00	Minimum	Yes
	Bedroom	Residential	0.00	Low	
Flat 2	Kitchen / Living Room	Residential	9.30	High	Yes
	Bedroom	Residential	7.20	High	