
Cassel and Fletcher Property Management

Daylight Assessment Of Living Room And Bedroom 117 Yorkshire Street, Rochdale OL6 1LA

11 December 2023

Daniel Watt

CIBSE Accreditation Nos:

LCCSIM084077

LCCD084077

LCEA084077

Watt Energy & Consulting Engineers Ltd

40 King Street, Manchester, M2 6BA

t. 0161 43 43 103

w. www.wece.co.uk



Index

1. Introduction
2. Methodology & Terminology
3. Summary
4. Calculations

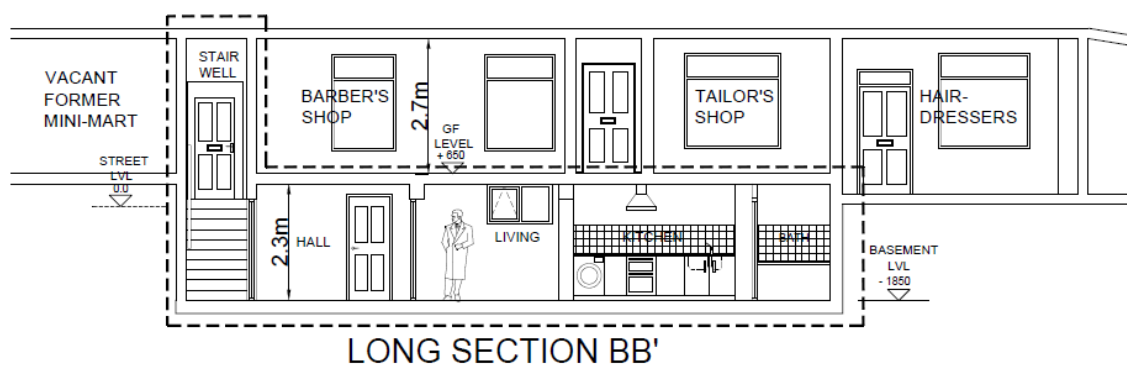
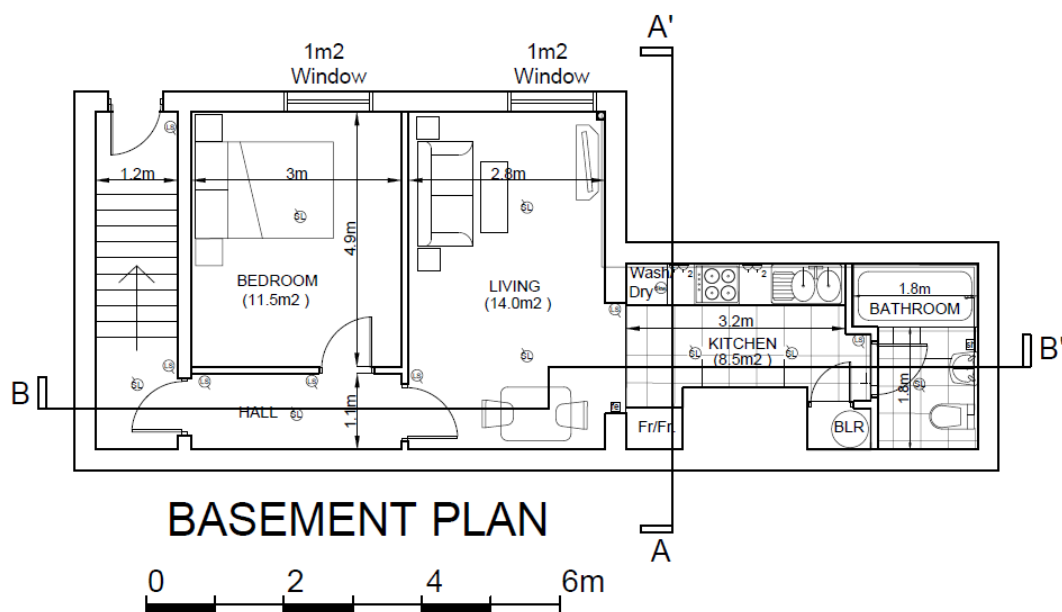


Introduction

The aim of measuring the daylighting of rooms is to improve the quality of life in homes through good natural daylighting and to reduce the need for artificial lighting and energy to light the home.

WE&CE Ltd have been appointed by the applicant to submit and provide a daylight assessment as part of the planning application relating to the redesign of basement of 117 Yorkshire Street, Rochdale, O16 1LA.

This report will demonstrate how the Angle of Visible Sky and View of Sky in the Living Room and Bedroom of the proposed development achieve the requirements of The British Standard Daylight in buildings, BS EN 17037.



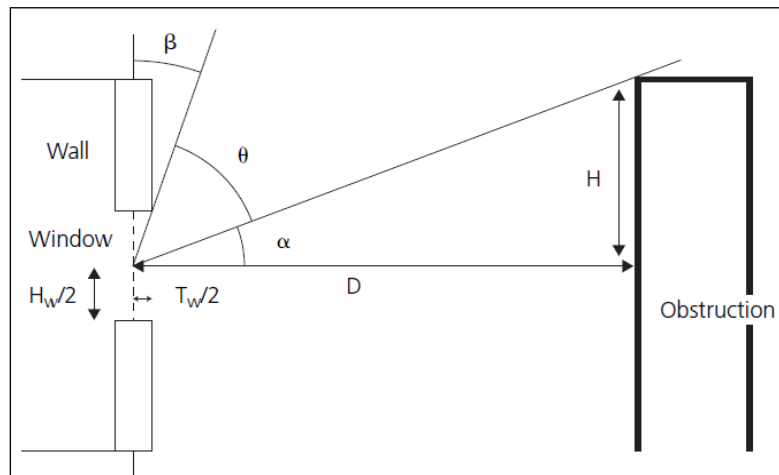
Proposed development



Methodology & Terminology

Angle of Visible Sky

The angle of visible sky is the angle subtended, in the vertical plane normal to the window, by the visible sky from the centre of the window.

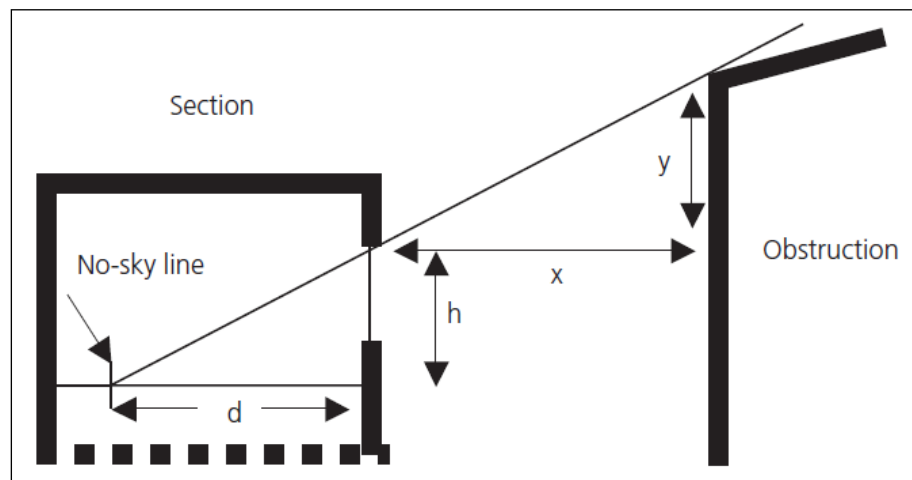


If following the construction of the new development the no skyline is reduced to less than 0.8 times its former value this will be noticeable to occupants.

View of Sky

The no-sky line divides those areas of the working plane which can receive direct light from the sky, from those which cannot. It is important as it indicates how good the distribution of daylight is in a room. Areas beyond the no-sky line will generally look gloomy.

As an approximation, obstructions that are parallel to the window can be considered infinite.



The working plane is a notional surface, typically at about desk or table height, at which daylight factor or the 'no-skyline' is calculated / plotted. For the calculations required here, it is assumed at 0.7m above the finished floor level.

For the purposes of these calculations, guide values for a typical dwelling with light-coloured walls are used as follows:

- R: (Area-weighted average reflectance of room surfaces) = 0.5
- M: (Correction factor for dirt) = 1 (vertical glazing that can be cleaned easily)
- T: (Glass Transmission factor) = 0.72 (double glazing windows)

Where an assessed dwelling contained a complicated/ a number of complicated shaped rooms, such as L-shaped rooms, it is acceptable to divide the room into two section and calculate the ADF for each section based only on the windows present in that section. The ADF of both sections can then be average to give a final result. If following the construction of the new development the no sky line is reduced to less than 0.8 times its former value this will be noticeable to occupants.

Daylighting

For daylight provision in buildings, BS EN 17037 provides two methodologies. One is based on target illuminances from daylight to be achieved over specified fractions of the reference plane (a plane at tabletop height covering the room) for at least half of the daylight hours in a typical year. The other, alternative, method is based on calculating the daylight factors achieved over specified fractions of the reference plane.

Daylight factor method

This method involves the computation of the daylight factor at each calculation point on an assessment grid.

The daylight factor is the illuminance at a point on the reference plane in a space, divided by the illuminance on an unobstructed horizontal surface outdoors. The CIE standard overcast sky is used, and the ratio is usually expressed as a percentage.

Specific recommendations for daylight provision in UK dwellings

A UK National Annex gives specific minimum recommendations for habitable rooms in dwellings in the United Kingdom. These are intended for 'hard to light' dwellings, for example in basements or with significant external obstructions or with tall trees outside, or for existing buildings being refurbished or converted into dwellings. The National Annex therefore provides the UK guidance on minimum daylight provision in all UK dwellings.

The UK National Annex gives illuminance recommendations of **100 lux in bedrooms, 150 lux in living rooms** and 200 lux in kitchens. These are the median illuminances, to be exceeded over at least 50% of the assessment points in the room for at least half of the daylight hours. The recommended levels over 95% of a reference plane need not apply to dwellings in the UK.



Summary

A summary of the results is as follows:

Angle of Visible Sky

Room	Angle of Visible Sky	Acceptable
Bedroom	36.8°	Y
Living Room	36.8°	Y

View of Sky

Room	View of Sky %	Acceptable
Bedroom	35.9%	Y
Living Room	27%	Y

Daylight Factor method

Room	Daylight Factor and Illuminance %/lux	Acceptable
Bedroom	176 lux Average , 1.4%	Y
Living Room	176 lux Average , 1.4%	Y



Conclusion

In conclusion, we believe the proposed development to be acceptable with internal daylighting requirements as advised under The British Standard Daylight in buildings, BS EN 17037.



Calculations

1) Bedroom

Room	Bedroom		
Windows	Height	0.8	m
	Width	1.29	m
	Height 2	0	m
	Width 2	0	m
	Height 3	0	m
	Width 3	0	m
Room Dimensions	Depth	3.69	m
	Width	3	m
	Wall3	3.69	m
	Wall4	3	m
	Ceiling height	2.3	m
	Floor	11.07	sqm
	Ceiling	11.07	sqm
Glass transmission factor		0.720	0.72 - double glazing
			0.6 - double glazing with low emissivity coating
			0.6 - triple glazing
Average daylight factor			
Total glazed area of windows	1.032	sqm	
Total area of all room surfaces	52.914	sqm	
Area weighted average reflectance of room surfaces	0.500	Default figure	
Correction factor for dirt	1.000	1.0 - vertical glazing that can be cleaned easily	
		0.8 - sloping glazing	
		0.7 - horizontal glazing	
Angle of visible sky	36.8	See Calculation Below	
Average daylight factor 0.69			
View of sky from desk height - if d is greater than depth of room then no part lies beyond 'no sky line'			
Distance from window to obstruction - x (m)	10.600	m	
Height of the window head above the working plane - h (m)	0.800	BREEAM uses 0.7m, Code & EcoHomes 0.85m	
Height of obstruction above window head - y (m)	6.400	m	
No Sky Line Distance - d (m)	1.325	m	
Depth of room	3.690	m	
View of Sky Criteria	35.9%		
Angle of visible sky			
Height of obstruction above mid height of window - H (m)	6.8	m	
Distance from window to obstruction - D (m)	10.600	m	
Thickness of the wall (m)	0.3	m	
Height of the window HW (m)	0.8	m	
Alpha	32.681		
Beta	20.556		
Angle of visible sky	36.8		

Section

No-sky line

Obstruction

$$d = \frac{xh}{y}$$

Where:

h = height of the window head above the working plane
y = height of the obstruction above the window head
x = distance from the window to the obstruction

Wall

Window

Obstruction

$H_W/2$

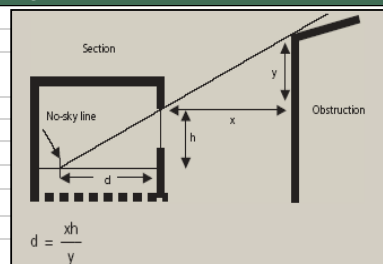
$T_W/2$

D

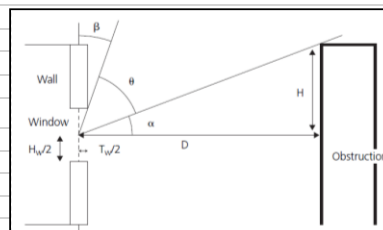
H

α

β

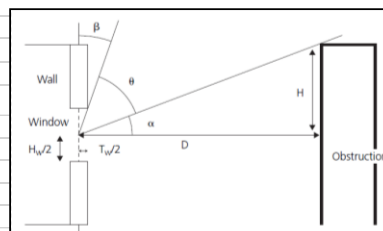
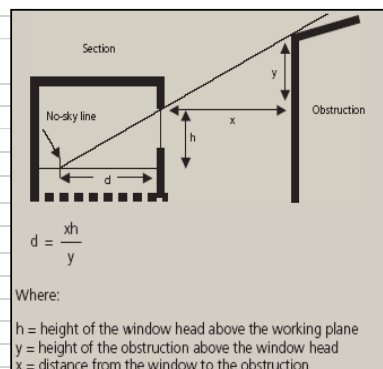


Where:
h = height of the window head above the working plane
y = height of the obstruction above the window head
x = distance from the window to the obstruction



2) Living Room

Room	Living Room		
Windows	Height	0.8	m
	Width	1.29	m
	Height 2	0	m
	Width 2	0	m
	Height 3	0	m
	Width 3	0	m
Room Dimensions	Depth	4.9	m
	Width	2.8	m
	Wall3	4.9	m
	Wall4	2.8	m
	Ceiling height	2.3	m
	Floor	13.72	sqm
	Ceiling	13.72	sqm
Glass transmission factor		0.720	0.72 - double glazing
			0.6 - double glazing with low emissivity coating
			0.6 - triple glazing
Average daylight factor			
Total glazed area of windows	1.032	sqm	
Total area of all room surfaces	62.860	sqm	
Area weighted average reflectance of room surfaces	0.500	Default figure	
Correction factor for dirt	1.000	1.0 - vertical glazing that can be cleaned easily	
		0.8 - sloping glazing	
		0.7 - horizontal glazing	
Angle of visible sky	36.8	See Calculation Below	
Average daylight factor			
	0.58		
View of sky from desk height - if d is greater than depth of room then no part lies beyond 'no sky line'			
Distance from window to obstruction - x (m)	10.600	m	
Height of the window head above the working plane - h (m)	0.800	BREEAM uses 0.7m, Code & EcoHomes 0.85m	
Height of obstruction above window head - y (m)	6.400	m	
No Sky Line Distance - d (m)	1.325	m	
Depth of room	4.900	m	
View of Sky Criteria			
	27.0%		
Angle of visible sky			
Height of obstruction above mid height of window - H (m)	6.8	m	
Distance from window to obstruction - D (m)	10.600	m	
Thickness of the wall (m)	0.3	m	
Height of the window HW (m)	0.8	m	
Alpha	32.681		
Beta	20.556		
Angle of visible sky			
	36.8		



Analysis calculation summary:

Room ID	Room name	Calculation succeeded
LV000001	Bedroom	OK
LV000002	Living Room	OK

Construction/Material ID	External area (m²)	External reflectance (%)	Internal area (m²)	Internal reflectance (%)
STD_FLO1	45.00	0	22.50	20
STD_PART	0.00	0	19.50	10
STD_ROOF	45.00	10	22.50	70
STD_WAL1	136.80	10	48.90	50

Room LV000001 (Bedroom)

Analysis calculation for room -

Summary results for working planes and floor

Surface	Quantity	Values			Uniformity (Min./Ave.)	Diversity (Min./Max.)
		Min.	Ave.	Max.		
Working plane 1 Reflectance=0% Transmittance=100% Grid size=0.50 m Area=5.500m² Margin=0.50 m	Daylight factor	0.5 %	1.4 %	3.5 %	0.32	0.13
	Daylight illuminance	55.81 lux	175.95 lux	430.64 lux	0.32	0.13
	Sky view	1.00	1.00	1.00	1.00	1.00

Room LV000002 (Living Room)

Analysis calculation for room -

Summary results for working planes and floor

Surface	Quantity	Values			Uniformity (Min./Ave.)	Diversity (Min./Max.)
		Min.	Ave.	Max.		
Working plane 1 Reflectance=0% Transmittance=100% Grid size=0.50 m Area=5.500m² Margin=0.50 m	Daylight factor	0.5 %	1.4 %	3.5 %	0.32	0.13
	Daylight illuminance	55.81 lux	175.95 lux	430.64 lux	0.32	0.13
	Sky view	1.00	1.00	1.00	1.00	1.00



