

Daylight & Sunlight Analysis

Ref: Z69691A

75No. New Apartment Dwellings

at

**Land off Royle Road,
Rochdale**

for

BMC Rochdale Limited



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1.0 Introduction

This report has been prepared to support the submission of a planning application for the development of 75No. new dwellings at Royle Road. We have undertaken an assessment to demonstrate the quantity and quality of daylight and sunlight received by the new residential spaces. 6 No. sample apartments have been assessed on the ground and first floors to provide results for the 'worst case' examples.

In accordance with good practise and planning policy we have therefore reviewed the following against the BRE's daylight and sunlight standards:

- Vertical sky component
- Daylight Illuminance
- Annual probable sunlight hours

Basis of Assessment

It is usual to assess daylight and sunlight in relation to the guidelines set out in the 'Site layout planning for daylight and sunlight, A guide to good practice – BR209 2022'.

The BRE guidelines provide two principal measures of quality of daylight achieved within new residential properties, namely Vertical Sky Component (VSC) and daylight illuminance; and one measure of sunlight, probable sunlight hours (PSH). We have used IES Virtual Environment software to carry out the analysis, specifically the RadianceIES programme. These measures of daylight and sunlight are discussed in the following report below.

Vertical Sky Component (VSC) - VSC is a measure of the skylight reaching a point from an overcast sky. For new dwellings, the BRE guidelines state that the VSC at the centre of a window should not be less than 27%, in order to provide reasonable daylight amenity. If a room has two or more windows of equal size, the mean of their VSCs may be taken.

Daylight Illuminance Method - This method involves using climatic data for the location of the site to calculate the illuminance from daylight at each point on an assessment grid on the reference plane at an at least hourly interval for a typical year.

BRE 209 refers to BS EN 17037 which includes the National Annex section NA.2 Minimum daylight provision in UK dwellings. The UK committee recommends that the target illuminance values given in Table NA.1 are exceeded for 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. The values required are demonstrated below:

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

Where one room in a UK dwelling serves more than a single purpose, the UK committee recommends that the target illuminance is that for the room type with the highest value – for example, in a space that combines a living room and a kitchen the target illuminance is recommended to be 200 lx.

Probable Sunlight Hours (PSH) - In relation to sunlight, the BRE recommends that a dwelling, or non-domestic building that has a particular requirement for sunlight, will appear reasonably sunlit provided:

- at least one main window wall faces within 90° of due south and
- a habitable room, preferably a main living room, can receive a total of at least 1.5 hours of sunlight on 21st March.

This is assessed at the inside centre of the window(s); sunlight received by different windows can be added provided they occur at different times and sunlight hours are not double counted.

Trees and shrubs have not been included within the analysis, partly because their exact shape is very hard to predict, and partly because the dappled shade of a tree is more pleasant than the deep shadow of a building or wall. Only where there is a dense belt or group of evergreen planting will this be included within and shading modelling.

We have only assessed occupied rooms, i.e. Living Rooms, Kitchens and Bedrooms, as these are the rooms where daylight and sunlight are most important.

2.0 Executive Summary

We have reviewed the proposals for the new development of 75 new dwellings against the BRE's criteria. 6 No. sample apartments have been assessed on the ground and first floors to provide results for the 'worst case' examples. Section 5.0 of our report shows the proposed massing after development.

We have modelled the proposed designs for the new dwellings, as provided by BTP architects. The proposed dwellings have mostly complied with the target standards as set out in the BRE guidance. However, the Living / Dining / Kitchen areas are demonstrating difficulty in achieving the standards for Daylight Illuminance and Probable Sunlight Hours. Notwithstanding this, there are generally good levels of daylight and sunlight received by most windows and the majority of the internal occupied space.

The analysis shows that for the proposed development:

1. **All windows in the new dwellings fully accord with the BRE VSC criteria for a new development** – all windows within the occupied Living / Dining / Kitchen spaces and bedrooms exceed the minimum VSC of 27%. All of these windows achieve a VSC of 27 or more and the average VSC for all windows is more than 39.
2. **All bedrooms and some living / dining / kitchen areas comfortably achieve the BRE and BS EN 17037 Daylight Illuminance criteria** – all bedrooms achieve more than 100 Lux for the Bedrooms for more than 90% of the daylight hours. The Living / Dining / Kitchen areas in half of the areas assessed do not meet the 50% minimum standard for more than 50% of the daylight hours.
3. **South facing living room windows fully accord with the BRE PSH criteria for the new development** – the proposed PSH values are very good to the south façade, the simulation software has demonstrated that south facing areas will receive a minimum of 10 hours of direct sunlight on 21st March (minimum 1.50 hours). However, the north façade spaces do not meet the required levels.

Conclusion

We therefore conclude that, in respect of the proposed development, the daylight and sunlight amenity to the new dwellings is in accordance with the current BRE BR209 guidance for the bedroom areas. However, the living room areas fall short of the minimum requirement for Daylight Illuminance in most of the areas assessed, and Probable Sunlight Hours for 50% of the Apartments as they are North facing.

This failure to meet the Daylight Illuminance criterion is due to the depth of the apartments and the distance from the windows to the back of the space. This is not uncommon for apartment developments of this type, but they would benefit from being shorter and wider in form. An increase in window area would assist the calculations, however it is the depth which is the main problem so this improvement will not necessarily confirm compliance.

The failure to meet the Probable Sunlight Hours is due to the orientation of the Apartment Block. As 50% of the Apartments face North, the main living room does not receive a total of at least 1.5 hours of sunlight on 21st March. All North facing Living /Dining / Kitchen spaces receive less than 0.5 hours of direct sunlight on this day.

6 No. sample apartments have been assessed on the ground and first floors to provide results for the 'worst case' examples. When assessing the other floors the daylight illuminance values improve, but not until the third floor does a meaningful difference occur, enough to improve the pass rate.

3.0 Existing Site

3.1 Existing Site Location

The existing Location plan of the development plot is shown below. The site is close to existing commercial units and a new housing development.



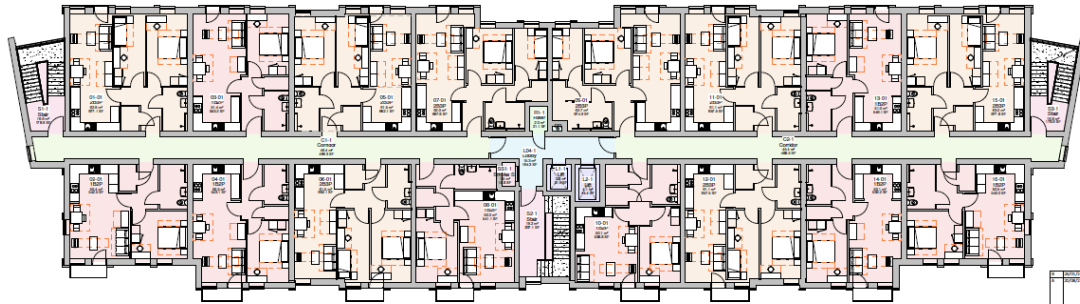
3.2 Existing Image



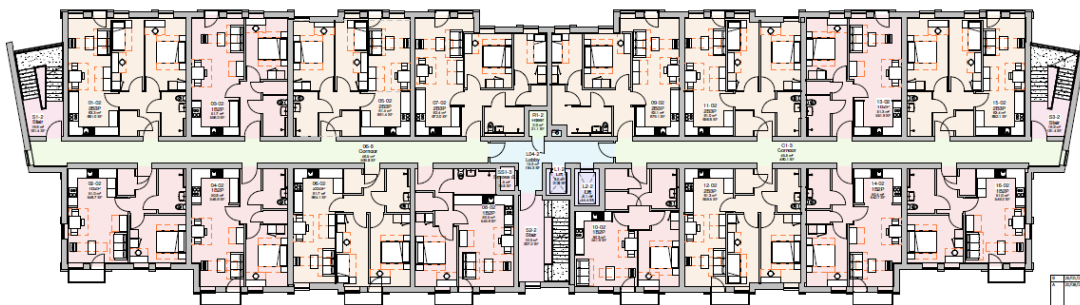
4.0 Proposed Development

The proposed development consists of eight new dwellings across four stories from First to Fourth Floor, with reception and commercial areas at Basement and Ground Floor as detailed in the drawings below.

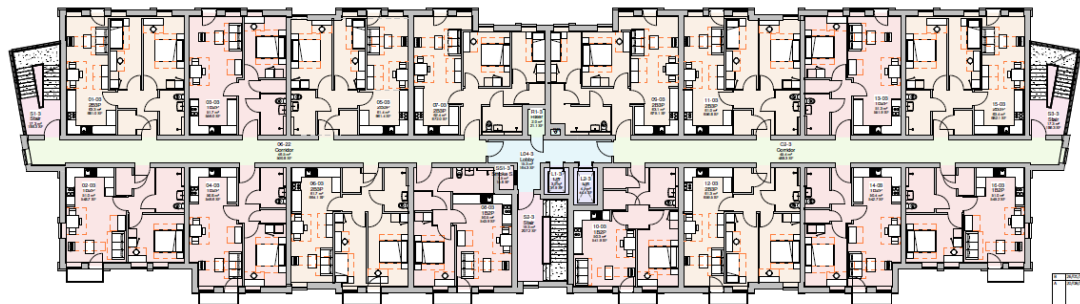




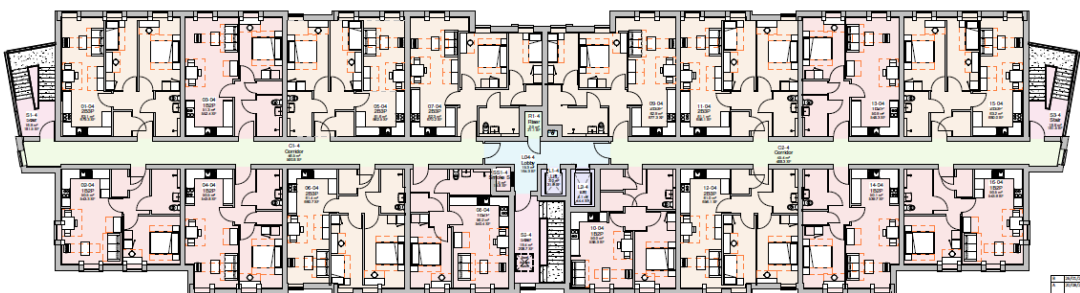
01 First Floor GA Plan
1:100



02 Second Floor GA Plan
1:100



03 Third Floor Plan
1:100



04 Fourth Floor
1:100





West Elevation
1:100



East Elevation
1:100

4.1 Proposed Input Data

Room Attributes:

Working plane height 0.85

Room surface maintenance factor 0.95

Internal and exterior surfaces and obstructions need to be modelled including appropriate surface reflectances. Fixtures and fittings need not be included. Surface reflectances should represent real conditions. Where reflectance values have not been measured or specified, default values to be used in the calculation are given in Table C4 (Appendix C of BR 209, 2022 Edition) as outlined below:

Table C4 – Recommended default surface reflectances	
Surface	Default reflectance
Interior walls	0.5
Ceilings	0.7
Floors	0.2
Exterior walls and obstructions	0.2
Exterior ground	0.2

Glazing Maintenance Factors:

A maintenance factor needs to be applied to the glazing transmission to account for dirt on the windows. Full details are given in the National Annex to BS EN 17037, however for the more common residential applications, values are given in BR 209. These assume the windows will be regularly cleaned and a maintenance factor of 0.96 is applied for windows without overhangs.

Glazing Transmittance:

Element	Normal Light Transmittance	Maintenance Factor
Windows	0.68	0.96
Rooflights	0.68	0.76

Transmittance is the total light transmitted by a system, usually given for normal incidence. This is the quantity most easily measured, although it is not the most convenient to work with mathematically.

An average frame width of 0.10m has been applied to the inner edge of all glazing throughout the model.

Weather File:

In line with the guidance of BR 209, we have used the closest EPW weather file for the development, which is Manchester.

5.0 Daylight and Sunlight Analysis

View of the site from the South, showing the number of hours of direct sunlight received by each window of the new development on 21st March:

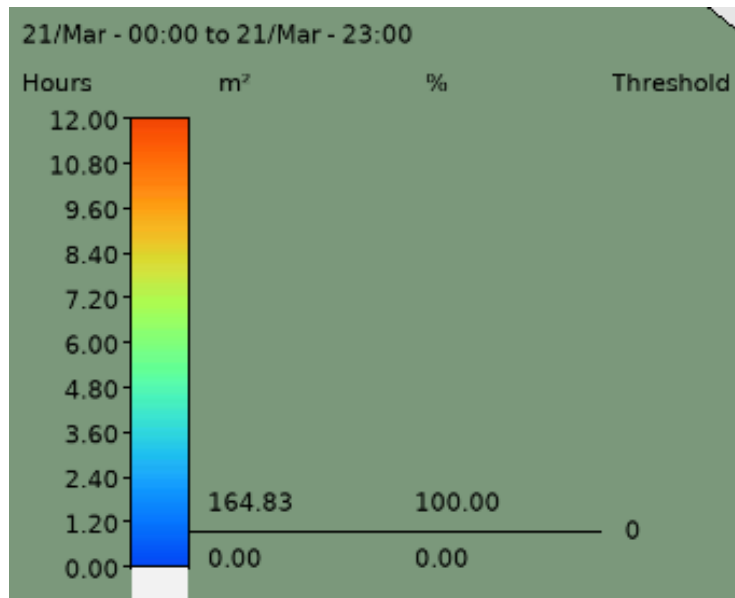


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Land off Royle Road, Rochdale

The legend in the bottom left corner of the image shows the number of hours of direct sunlight received by each window on 21st March.

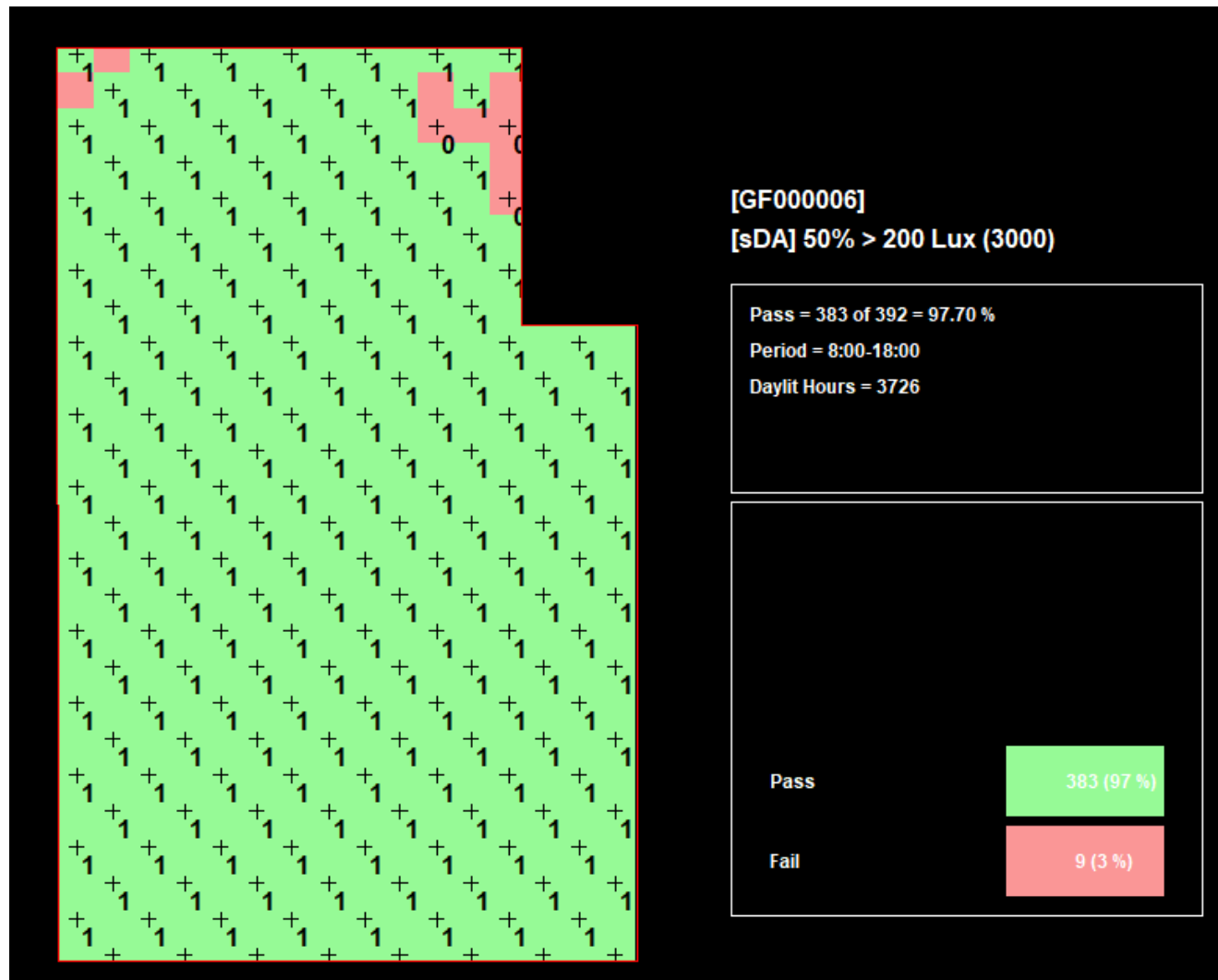
The warmer the colour, the higher the number of Sunlight Hours that are received by each window.



View of the site from the North, showing the number of hours of direct sunlight received by each window of the new development on 21st March:



An example image to demonstrate the grid point Daylight Illuminance for the Living / Dining / Kitchen space in Flat 2.



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Results table to confirm compliance for the Ground Floor:

Location			Vertical Sky Component (VSC)						Daylight Illuminance, ET (Lux)			Window		Probable Sunlight Hours (PSH) 21st March		
Room	Room Use	Window	EXISTING	PROPOSED	MEAN	%LOSS	Reduction	PASS/	> 200Lux (Living & Kitchen)	> 100Lux (Bedroom)	PASS /	Angle from	Aspect	PROPOSED	Reduction	PASS/
			VSC	VSC	VSC	VSC	Factor	FAIL	% of Grid Points	% of Grid Points	FAIL	North		Hours	Factor	FAIL
Flat 01 Royle Road																
1/1	GF_01_Bedroom 1	W1	N/A	40.03	39.99	N/A	N/A	PASS	N/A	100.00	PASS	0.00	N	N/A		
1/1	GF_01_Bedroom 1	W2	N/A	39.94		N/A	N/A	PASS	N/A		PASS	0.00	N	N/A		
1/2	GF_01_Bedroom 2	W3	N/A	40.12	40.08	N/A	N/A	PASS	N/A	99.17	PASS	0.00	N	N/A		
1/2	GF_01_Bedroom 2	W4	N/A	40.03		N/A	N/A	PASS	N/A		PASS	0.00	N	N/A		
1/3	GF_01_Living 1	W5	N/A	40.00	39.99	N/A	N/A	PASS	49.75	N/A	FAIL	0.00	N	0.00	N/A	Fail
1/4	GF_01_Living 1	W6	N/A	39.91		N/A	N/A	PASS		N/A	FAIL	0.00	N	0.00	N/A	Fail
1/5	GF_01_Living 1	W7	N/A	40.07		N/A	N/A	PASS		N/A	FAIL	0.00	N	0.00	N/A	Fail
1/6	GF_01_Living 1	W8	N/A	39.98		N/A	N/A	PASS		N/A	FAIL	0.00	N	0.00	N/A	Fail
Flat 02 Royle Road																
2/1	GF_02_Bedroom 1	W9	N/A	39.23	37.91	N/A	N/A	PASS	N/A	100.00	PASS	180.00	S	N/A		
2/2	GF_02_Bedroom 1	W10	N/A	38.54		N/A	N/A	PASS	N/A		PASS	180.00	S	N/A		
2/3	GF_02_Bedroom 1	W11	N/A	36.93		N/A	N/A	PASS	N/A		PASS	180.00	S	N/A		
2/4	GF_02_Bedroom 1	W12	N/A	36.95	N/A	N/A	PASS	N/A	PASS		180.00	S	N/A			
2/5	GF_02_Living 1	W13	N/A	40.04	39.96	N/A	N/A	PASS	98.47	N/A	PASS	180.00	S	10.50	N/A	PASS
2/6	GF_02_Living 1	W14	N/A	39.95		N/A	N/A	PASS		N/A	PASS	180.00	S	10.50	N/A	PASS
2/7	GF_02_Living 1	W15	N/A	39.95		N/A	N/A	PASS		N/A	PASS	180.00	S	10.50	N/A	PASS
2/8	GF_02_Living 1	W16	N/A	39.89		N/A	N/A	PASS		N/A	PASS	180.00	S	10.50	N/A	PASS
Flat 03 Royle Road																
3/1	GF_03_Bedroom 1	W17	N/A	40.0	39.94	N/A	N/A	PASS	N/A	100.00	PASS	0.00	N	N/A		
3/2	GF_03_Bedroom 1	W18	N/A	39.9		N/A	N/A	PASS	N/A		PASS	0.00	N	N/A		
3/5	GF_03_Living 1	W21	N/A	40.18	40.03	N/A	N/A	PASS	52.92	N/A	PASS	0.00	N	0.00	N/A	Fail
3/6	GF_03_Living 1	W22	N/A	40.10		N/A	N/A	PASS		N/A	PASS	0.00	N	0.00	N/A	Fail
3/7	GF_03_Living 1	W23	N/A	39.96		N/A	N/A	PASS		N/A	PASS	0.00	N	0.00	N/A	Fail
3/8	GF_03_Living 1	W24	N/A	39.87		N/A	N/A	PASS		N/A	PASS	0.00	N	0.00	N/A	Fail
Flat 04 Royle Road																
4/1	GF_04_Bedroom 1	W25	N/A	40.0	39.98	N/A	N/A	PASS	N/A	100.00	PASS	180.00	S	N/A		
4/2	GF_04_Bedroom 1	W26	N/A	39.9		N/A	N/A	PASS	N/A		PASS	180.00	S	N/A		
4/7	GF_04_Living 1	W31	N/A	39.92	39.98	N/A	N/A	PASS	62.72	N/A	PASS	180.00	S	11.50	N/A	PASS
4/8	GF_04_Living 1	W32	N/A	39.83		N/A	N/A	PASS		N/A	PASS	180.00	S	11.50	N/A	PASS
4/9	GF_04_Living 1	W33	N/A	40.13		N/A	N/A	PASS		N/A	PASS	180.00	S	11.50	N/A	PASS
4/10	GF_04_Living 1	W34	N/A	40.04		N/A	N/A	PASS		N/A	PASS	180.00	S	11.50	N/A	PASS
Flat 05 Royle Road																
4/1	GF_05_Bedroom 1	W33	N/A	40.0	39.93	N/A	N/A	PASS	N/A	55.21	PASS	0.00	N	N/A		
4/2	GF_05_Bedroom 1	W34	N/A	39.9		N/A	N/A	PASS	N/A		PASS	0.00	N	N/A		
4/1	GF_05_Bedroom 2	W37	N/A	39.1	39.23	N/A	N/A	PASS	N/A	100.00	PASS	0.00	N	N/A		
4/2	GF_05_Bedroom 2	W38	N/A	39.3		N/A	N/A	PASS	N/A		PASS	0.00	N	N/A		
4/5	GF_05_Living 1	W41	N/A	40.0	40.01	N/A	N/A	PASS	47.55	N/A	FAIL	0.00	N	0.00	N/A	Fail
4/6	GF_05_Living 1	W42	N/A	39.92		N/A	N/A	PASS		N/A	FAIL	0.00	N	0.00	N/A	Fail
4/7	GF_05_Living 1	W43	N/A	40.09		N/A	N/A	PASS		N/A	FAIL	0.00	N	0.00	N/A	Fail
4/8	GF_05_Living 1	W44	N/A	40.00		N/A	N/A	PASS		N/A	FAIL	0.00	N	0.00	N/A	Fail
Flat 06 Royle Road																
6/1	GF_06_Bedroom 1	W43	N/A	40.1	40.09	N/A	N/A	PASS	N/A	100.00	PASS	180.00	S	N/A		
6/2	GF_06_Bedroom 1	W44	N/A	40.0		N/A	N/A	PASS	N/A		PASS	180.00	S	N/A		
6/5	GF_06_Bedroom 2	W47	N/A	39.9	39.89	N/A	N/A	PASS	N/A	100.00	PASS	180.00	S	N/A		
6/6	GF_06_Bedroom 2	W48	N/A	39.8		N/A	N/A	PASS	N/A		PASS	180.00	S	N/A		
6/9	GF_05_Kitchen/Living 1	W51	N/A	39.09	38.98	N/A	N/A	PASS	42.04	N/A	FAIL	180.00	S	11.50	N/A	PASS
6/10	GF_05_Kitchen/Living 1	W52	N/A	38.86		N/A	N/A	PASS		N/A	FAIL	180.00	S	11.50	N/A	PASS

Results table to confirm compliance for the First Floor:

Location			Vertical Sky Component (VSC)						Daylight Illuminance, ET (Lux)			Window		Probable Sunlight Hours (PSH) 21st March		
Room	Room Use	Window	EXISTING	PROPOSED	MEAN	%LOSS	Reduction	PASS/	> 200Lux (Living & Kitchen)	> 100Lux (Bedroom)	PASS /	Angle from	Aspect	PROPOSED	Reduction	PASS/
			VSC	VSC	VSC	VSC	Factor	FAIL	% of Grid Points	% of Grid Points	FAIL	North	Hours	Factor	FAIL	
Flat 01 Royle Road																
1/1	FF_01_Bedroom 1	W1	N/A	39.94	39.90	N/A	N/A	PASS	N/A	100.00	PASS	0.00	N	N/A		
1/1	FF_01_Bedroom 1	W2	N/A	39.85		N/A	N/A	PASS	N/A		PASS	0.00	N	N/A		
1/2	FF_01_Bedroom 2	W3	N/A	39.98	39.94	N/A	N/A	PASS	N/A	100.00	PASS	0.00	N	N/A		
1/2	FF_01_Bedroom 2	W4	N/A	39.89		N/A	N/A	PASS	N/A		PASS	0.00	N	N/A		
1/3	FF_01_Living 1	W5	N/A	40.15	40.07	N/A	N/A	PASS	50.00	N/A	FAIL	0.00	N	0.00	N/A	Fail
1/4	FF_01_Living 1	W6	N/A	40.07		N/A	N/A	PASS		N/A	FAIL	0.00	N	0.00	N/A	Fail
1/5	FF_01_Living 1	W7	N/A	39.98		N/A	N/A	PASS		N/A	FAIL	0.00	N	0.00	N/A	Fail
Flat 02 Royle Road																
2/1	FF_02_Bedroom 1	W9	N/A	38.76	37.92	N/A	N/A	PASS	N/A	100.00	PASS	180.00	S	N/A		
2/2	FF_02_Bedroom 1	W10	N/A	38.60		N/A	N/A	PASS	N/A		PASS	180.00	S	N/A		
2/3	FF_02_Bedroom 1	W11	N/A	37.07		N/A	N/A	PASS	N/A		PASS	180.00	S	N/A		
2/4	FF_02_Bedroom 1	W12	N/A	37.26		N/A	N/A	PASS	N/A		PASS	180.00	S	N/A		
2/5	FF_02_Living 1	W13	N/A	39.83	39.80	N/A	N/A	PASS	99.58	N/A	PASS	180.00	S	10.50	N/A	PASS
2/6	FF_02_Living 1	W14	N/A	39.74		N/A	N/A	PASS		N/A	PASS	180.00	S	10.50	N/A	PASS
2/7	FF_02_Living 1	W15	N/A	39.83		N/A	N/A	PASS		N/A	PASS	180.00	S	10.50	N/A	PASS
Flat 03 Royle Road																
3/1	FF_03_Bedroom 1	W17	N/A	40.0	39.98	N/A	N/A	PASS	N/A	100.00	PASS	0.00	N	N/A		
3/2	FF_03_Bedroom 1	W18	N/A	39.9		N/A	N/A	PASS	N/A		PASS	0.00	N	N/A		
3/5	FF_03_Living 1	W21	N/A	39.91	39.95	N/A	N/A	PASS	45.71	N/A	FAIL	0.00	N	0.00	N/A	Fail
3/6	FF_03_Living 1	W22	N/A	40.08		N/A	N/A	PASS		N/A	FAIL	0.00	N	0.00	N/A	Fail
3/7	FF_03_Living 1	W23	N/A	39.86		N/A	N/A	PASS		N/A	FAIL	0.00	N	0.00	N/A	Fail
Flat 04 Royle Road																
4/1	FF_04_Bedroom 1	W25	N/A	40.0	39.93	N/A	N/A	PASS	N/A	100.00	PASS	180.00	S	N/A		
4/2	FF_04_Bedroom 1	W26	N/A	39.9		N/A	N/A	PASS	N/A		PASS	180.00	S	N/A		
4/7	FF_04_Living 1	W31	N/A	40.05	39.98	N/A	N/A	PASS	58.16	N/A	PASS	180.00	S	11.50	N/A	PASS
4/8	FF_04_Living 1	W32	N/A	39.97		N/A	N/A	PASS		N/A	PASS	180.00	S	11.50	N/A	PASS
4/9	FF_04_Living 2	W33	N/A	39.91		N/A	N/A	PASS		N/A	PASS	180.00	S	11.50	N/A	PASS
Flat 05 Royle Road																
4/1	FF_05_Bedroom 1	W33	N/A	38.4	38.36	N/A	N/A	PASS	N/A	100.00	PASS	0.00	N	N/A		
4/2	FF_05_Bedroom 1	W34	N/A	38.4		N/A	N/A	PASS	N/A		PASS	0.00	N	N/A		
4/1	FF_05_Bedroom 2	W37	N/A	39.9	39.84	N/A	N/A	PASS	N/A	100.00	PASS	0.00	N	N/A		
4/2	FF_05_Bedroom 2	W38	N/A	39.8		N/A	N/A	PASS	N/A		PASS	0.00	N	N/A		
4/5	FF_05_Living 1	W41	N/A	40.2	40.04	N/A	N/A	PASS	46.25	N/A	FAIL	0.00	N	0.00	N/A	Fail
4/6	FF_05_Living 1	W42	N/A	40.07		N/A	N/A	PASS		N/A	FAIL	0.00	N	0.00	N/A	Fail
4/7	FF_05_Living 2	W43	N/A	39.90		N/A	N/A	PASS		N/A	FAIL	0.00	N	0.00	N/A	Fail
Flat 06 Royle Road																
6/1	FF_06_Bedroom 1	W43	N/A	40.0	39.99	N/A	N/A	PASS	N/A	100.00	PASS	180.00	S	N/A		
6/5	FF_06_Bedroom 2	W47	N/A	39.9	39.84	N/A	N/A	PASS	N/A	100.00	PASS	180.00	S	N/A		
6/6	FF_06_Bedroom 2	W48	N/A	39.8		N/A	N/A	PASS	N/A		PASS	180.00	S	N/A		
6/9	FF_05_Kitchen/Living 1	W51	N/A	39.07	38.88	N/A	N/A	PASS	44.21	N/A	FAIL	180.00	S	11.50	N/A	PASS
6/10	FF_05_Kitchen/Living 1	W52	N/A	38.69		N/A	N/A	PASS		N/A	FAIL	180.00	S	11.50	N/A	PASS