

Daylighting Impact Assessment

Land West of 300 Kings Road, Reading

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1.0 Introduction

This report has been prepared by Fabric Building Physics Ltd to assess the potential daylighting impact of the proposed new development at the land west of 300 Kings Road, Reading on the neighbouring residential properties.

1.1 Site Context

The development site is an existing carpark located between the office building at 300 Kings Road and the residential building at the corner of 286 Kings Road and Fatherson Road. There are residential properties to the south and west of the development site and open space and further carpark to the north of Kings Road.



Figure 1: Aerial View of Site Location

1.2 Planning Policy

The Reading Borough Council planning applications checklist (July 2013) states a requirement for a Sunlight and Daylight Assessment for all applications involving:

- Buildings exceeding four storeys in height where adjoining other developed land or public open spaces,
- Where proposed buildings or extensions could lead to overshadowing of other
- proposed buildings or spaces within the same development site
- Where the application site is itself subject to significant shading from adjoining buildings or trees.

Policy CS7: Design and the Public Realm

All development must be of high design quality that maintains and enhances the character and appearance of the area of Reading in which it is located. The various components of development form, including: -

- Layout: urban structure and urban grain;
- Landscape;
- Density and mix;
- Scale: height and massing; and
- Architectural detail and materials.

Will be assessed to ensure that the development proposed makes a positive contribution to the following urban design objectives: -

- Character - a place with its own identity and sense of place
- Continuity and enclosure
- Quality of the public realm
- Ease of movement and permeability
- Legibility - clear image and easy to understand
- Adaptability – capable of adaptation over time
- Diversity – meets a wide range of needs.

Developments will also be assessed to ensure that they: -

- Respond positively to their local context and create or reinforce local character and distinctiveness, including protecting and enhancing the historic environment of the Borough and providing value to the public realm;
- Create safe and accessible environments where crime and disorder or fear of crime does not undermine quality of life or community cohesion;

Address the needs of all in society and are accessible, usable and easy to understand by them and are visually attractive as a result of good high quality

built forms and spaces, the inclusion of public art and appropriate materials and landscaping.

Reading Borough Council: Sites & Detailed Policies Document (Adopted Oct 2012) Policy DM4: Safeguarding Amenity

Development will not cause a significant detrimental impact to the living environment of existing or new residential properties, in terms of:

- Privacy and overlooking;
- Access to sunlight and daylight;
- Visual dominance and overbearing effects of a development;
- Noise and disturbance;
- Artificial lighting;
- Vibration;
- Dust and fumes;
- Smell; or
- Crime and safety.

The position of habitable rooms, windows and outdoor living spaces will be particularly important. A back-to-back distance of 20 metres between dwellings is usually appropriate, although the circumstances on individual sites may enable dwellings to be closer without a detrimental effect on privacy.

As well as immediate impacts, other aspects to which this policy applies will include matters such as hours of operation of businesses, and effects of traffic movements, particularly of heavy goods vehicles (HGVs). Proposals which would generate regular movements of HGVs on residential roads will not be acceptable.

Where an otherwise acceptable development could change its character to a use that would have a greater impact on amenity without needing planning permission, conditions will be applied to restrict such changes.

2.0 BRE Guidelines

BRE report 209 – Site Layout Planning for Sunlight and Daylight (2011) defines the criteria and methodology for the assessment of daylight, sunlight and overshadowing within new and existing developments. The purpose of the guide is to provide a framework to ensure adequate daylighting is provided in new development and minimise the impact of new development on adjacent existing buildings.

The handbook provides guideline standards to be maintained in existing buildings and a simplified methodology to determine whether any negative impact is 'material' or within acceptable limits. The handbook discusses the limits of applicability of the defined standards, with particular emphasis on the need to interpret the guideline standards flexibly subject to the site context, constraints and design requirements;

The advice given here is not mandatory and this document should not be seen as an instrument of planning policy; its aim is to help rather than constrain the designer. Although it gives numerical guidelines, these should be interpreted flexibly because natural lighting is only one of many factors in site layout design. In special circumstances the Developer or Planning Authority may wish to use different target values. (Page 1, Paragraph 1.6)

Note that numerical values given here are purely advisory. Different criteria may be used, based upon the requirements for daylighting in an area viewed against other site layout constraints. Another important issue is whether the existing building is itself a good neighbour, standing a reasonable distance from the boundary and taking no more than its fair share of light'. (Page 7, Paragraph 2.2.3)

2.1 Daylight

Where a proposed development does not subtend the 25° angle from a point 2m above ground level projected from an existing building, it can be concluded that the development proposals will not have a material impact on the existing daylighting levels and therefore no further analysis is required. This process is to be undertaken for all adjacent / potentially affected buildings.

Where proposed development does subtend the 25° line, the potential impact on existing buildings is assessed using Vertical Sky Component and No Sky Line calculations. The latter requires knowledge of the internal floorplan of the potentially affected building.

For new development, the BRE guidelines state:

Daylight provision in new rooms may be checked using the average daylight factor calculation. The ADF is a measure of the overall amount of daylight in a space... In housing, BS 8206 also gives minimum values of ADF of 2%

for kitchens, 1.5% for living rooms and 1% for bedrooms. (Page 7, Paragraph 2.2.3)

2.1.1 Vertical Sky Component

The Vertical Sky Component (VSC) is defined as:

This is the ratio of the direct sky illuminance falling on the vertical wall at a reference point (usually the centre of the window), to the simultaneous horizontal illuminance under an unobstructed sky. The standard CIE (Commission Internationale de L'Eclairage) overcast sky is used, and the ratio is expressed as a percentage.

This is the principle measurement of how much sky is visible from a vertical surface and is used to assess the impact of new development on adjacent properties. An unobstructed vertical surface can achieve a maximum VSC of 39.6%.

The BRE guidelines state that for a room to be able to continue to receive sufficient daylight, the windows should be capable of achieving a VSC of greater than 27 per cent. Furthermore, new development should seek to limit any reduction below this level to within 0.8 times the original value to ensure adequate daylighting potential is maintained.

2.1.2 No Sky Line

The no sky line / view of sky divides points on the working plane (0.85m above FFL for residential) which have and do not have a direct view of the sky. Areas located beyond the no-sky line will usually appear darker and more gloomy compared with the rest of the room. The BRE handbook states:

If, following construction of a new development, the no sky line moves so that the area of the existing room, which does received direct skylight, is reduced to less than 0.8 times its former value this will be noticeable to the occupants, and more of the room will appear poorly lit. This is also true if the no-sky line encroaches on key areas like kitchen sinks and worktops.

2.1.3 Average Daylight Factor

The Average Daylight Factor (ADF) is the ratio of illuminance achieved on a working plane in a room, relative to the unobstructed horizontal illuminance achieved outside. The CIE standard overcast sky is used and the ratio is expressed as a percentage

2.2 Sunlight

For access to direct sunlight, the BRE guidelines propose a single methodology, Annual Probable Sunlight Hours, to assess direct solar access for both existing and new build development. Separate criteria are defined for the assessment of direct sun in external open spaces.

2.2.1 Annual Probable Sunlight Hours

The BRE guidelines states that:

In general a dwelling, or non-domestic building which has a particular requirement for sunlight, will appear reasonably sunlit provided:

- *At least one main window wall faces within 90° of due south and*
- *The centre of at least one window to a main living room can receive 25% of annual probable sunlight hours, including at least 5% of annual probable sunlight hours in the winter months between 21 September and 21 March.*
- *Where groups of dwellings are planned, site layout design should aim to maximise the number of dwellings with a main living room that meets the above recommendations.*

The APSH assesses the likelihood of direct sunlight including the effects of cloud cover rather than relying solely on solar geometry. BR209 defines 'probable sunlight hours' as the total number of hours in the year that sun is expected to shine on unobstructed ground, allowing for average levels of cloud cover for the location in question based on historical climate data. APSH is measured at the window face and are calculated for each window using the sunlight availability indicators provided in BR 209 Appendix A for the latitude that most closely matches the site.

For existing adjacent dwellings, where a main window faces within 90 degrees of south and development proposals subtend the 25° line, there is potential for the existing sunlight amenity to be adversely affected. This will be the case if the centre of the window:

- *Receives less than 25% of APSH or less than 5% APSH between 21st September and 21 March and*
- *Receives less than 0.8 times its former sunlight hours during either period and*
- *Has a reduction in sunlight hours received over the whole year greater than 4% of APSH*

3.0 Reference Windows

Refer to drawings in the Appendix for location of reference windows considered in this assessment.

4.0 Analysis Results

4.1 Existing Buildings

Drawing 1803/VSC/01 details the results of the Vertical Sky Component assessment on the adjacent residential properties close to the development proposals. The results demonstrate that none of the existing windows are predicted to experience a reduction to their existing VSC greater than 13% (W4) of their existing value. Window W4 serves a bedroom in a ground floor flat at 1-12 Muirfield Close. This is within acceptable limits as defined by the BRE.

A significantly majority of the windows assessed are predicted to experience a 1-2% reduction to their existing VSC. It was not necessary to assess the impact on direct sunlight as the development proposals are located to the north of the existing dwellings.

It can therefore be concluded that the development proposals will not result in an unacceptable impact on the daylighting levels at the existing properties.

4.2 Proposed Accommodation

Drawing 1803/ADF/001 & VOS/001 detail the predicted Average Daylight Factor and View of Sky for the proposed dwellings. The results indicate that all habitable rooms except for bedroom 3 in flat 03-03 will exceed the BRE average daylight threshold and receive an acceptable area of the working plane with a direct view of the sky. This is considered an acceptable level of performance compared to the site constraints for the scheme.

It is therefore contended that the development proposals satisfy the BRE guidelines for internal daylighting standards.

5.0 Appendix 1 - Glossary

Daylight

Visible part of the global solar radiation – includes sunlight and skylight components as described below.

Sunlight

Visible part of the solar radiation that reaches the Earth's surface directly as parallel rays after selective attenuation by the atmosphere. Note, this is sometimes known as beam radiation.

Skylight

Visible part of the solar spectrum that reaches the Earth's surface diffusely as a result of scattering by the Earth's atmosphere.

Obstruction Angle

The angular altitude of the top of an obstruction above the horizontal, measured from a given reference point in a vertical plane in a section drawn perpendicular to the vertical plane.

Annual Probable Sunlight Hours (APSH)

Long-term average of the total number of hours during the year that direct sunlight reaches a reference point. The reference point can be located on a horizontal or vertical surface. The APSH calculation includes the statistical likelihood of cloud cover in a specific location. It is therefore a more appropriate predictor of sunlight hours than shadow diagrams which do not consider cloud cover.

Vertical Sky Component (VSC)

The ratio, expressed as a percentage, of that part of illuminance, at a point on a given vertical plane that is received directly from a standard overcast sky, to illuminance on a horizontal plane due to an unobstructed hemisphere of this sky. This is the principle measurement of how much sky is visible from a vertical surface and is used to assess the impact of new development on adjacent properties.

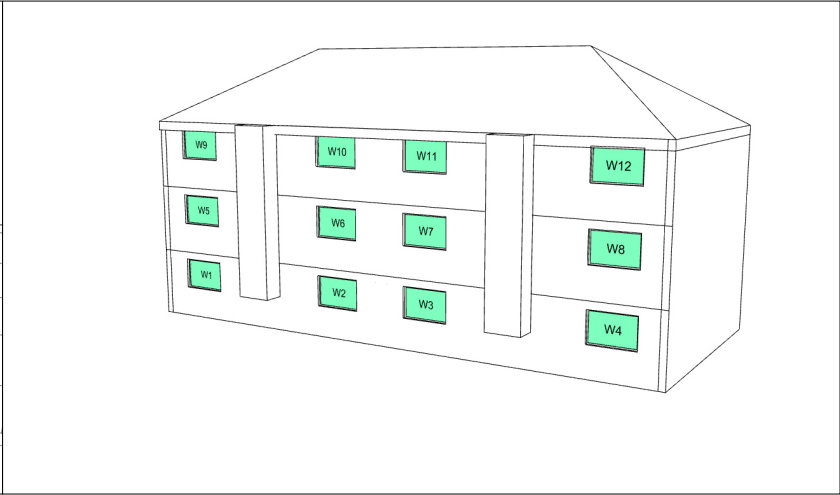
Visible Sky Angle θ (VSA)

An angular measurement that results from deducting the obstruction angle from a right angle taken from a given reference point in a vertical plane. Ignoring the effects of shading by window reveals, the VSA is equal to 90° minus the Obstruction Angle.

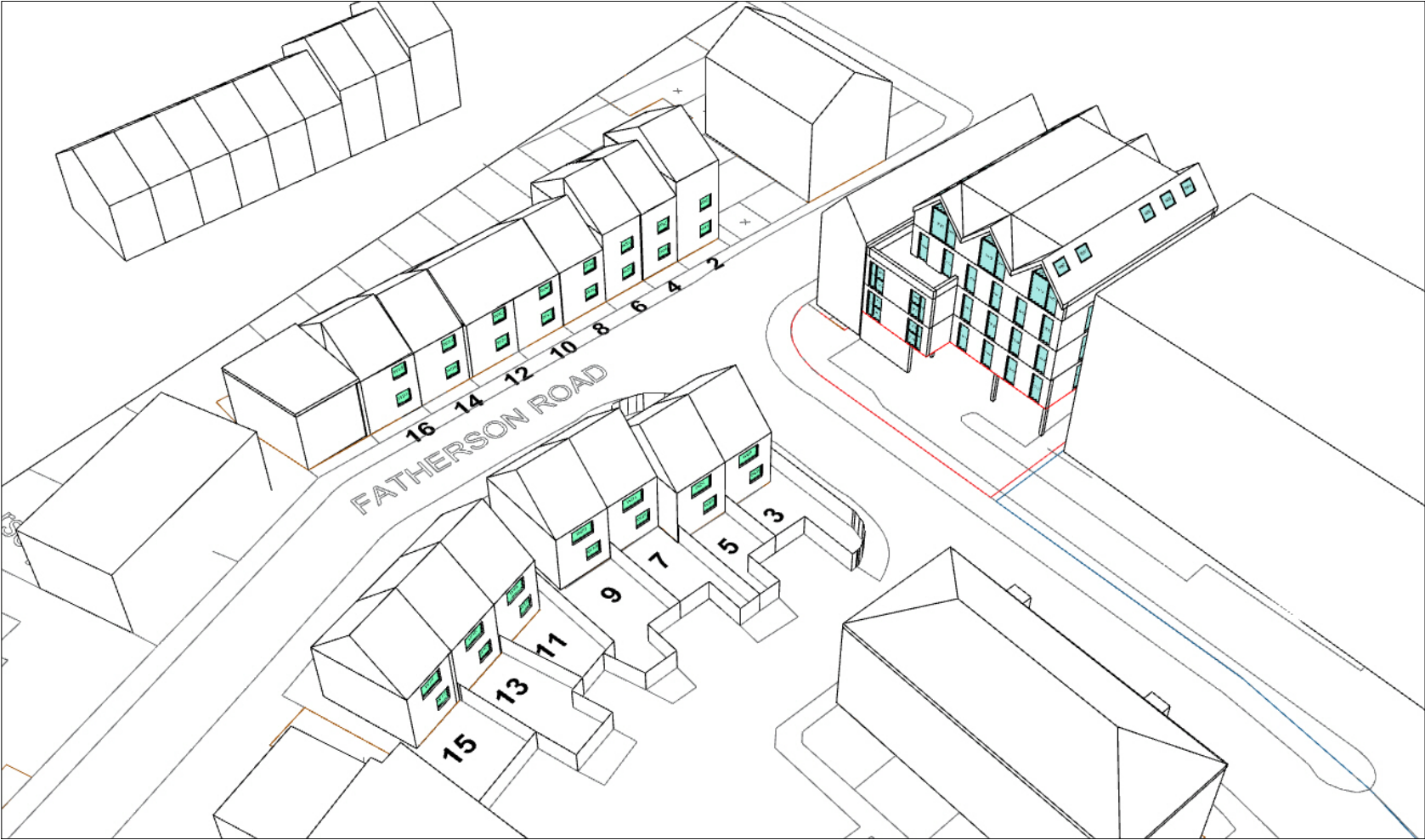
6.0 Appendix 2 – Adjacent VSC Results



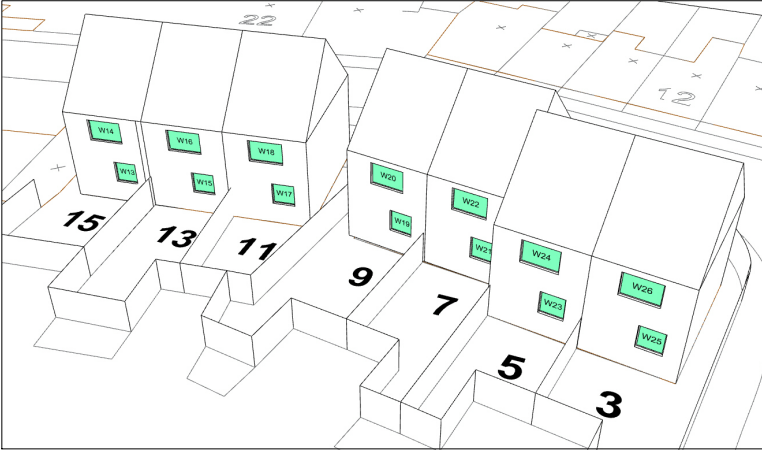
2-16 Fatherson Road



Muirfield Close Flats



Proposed Site Overview



3-15 Fatherson Road

Win Ref	Existing VSC %	Proposed VSC %	Reduction
W1	18.13	17.89	1%
W2	19.16	18.43	4%
W3	20.04	18.87	6%
W4	22.36	19.52	13%
W5	21.3	21.03	1%
W6	22.32	21.73	3%
W7	23.19	22.18	4%
W8	25.15	22.86	9%
W9	22.65	22.43	1%
W10	24.55	24.06	2%
W11	25.74	24.96	3%
W12	28.15	26.44	6%
W13	29.71	29.39	1%
W14	33.43	33.15	1%
W15	31.13	30.76	1%
W16	33.58	33.25	1%
W17	31.1	30.76	1%
W18	33.27	32.86	1%
W19	30.68	30.66	0%
W20	33.09	32.97	0%
W21	24.5	24.47	0%
W22	30.54	30.54	0%
W23	28.63	28.44	1%
W24	31.23	30.99	1%
W25	28.32	27.91	1%
W26	30.87	30.43	1%
W27	28.43	28	2%
W28	31.81	31.41	1%
W29	27.81	27.28	2%
W30	31.22	30.8	1%
W31	27.73	27.19	2%
W32	30.98	30.48	2%
W33	27.72	27.17	2%
W34	30.83	30.34	2%
W35	28.29	27.79	2%
W36	31.04	30.59	1%
W37	28.06	27.63	2%
W38	30.74	30.37	1%
W39	27.88	27.6	1%
W40	30.55	30.29	1%
W41	26.62	26.56	0%
W42	29.46	29.45	0%

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Project

Land west of 300 Kings Road

Title

Existing Dwellings - VSC

Drawing No:

1803/VSC/001

Scale

NTS

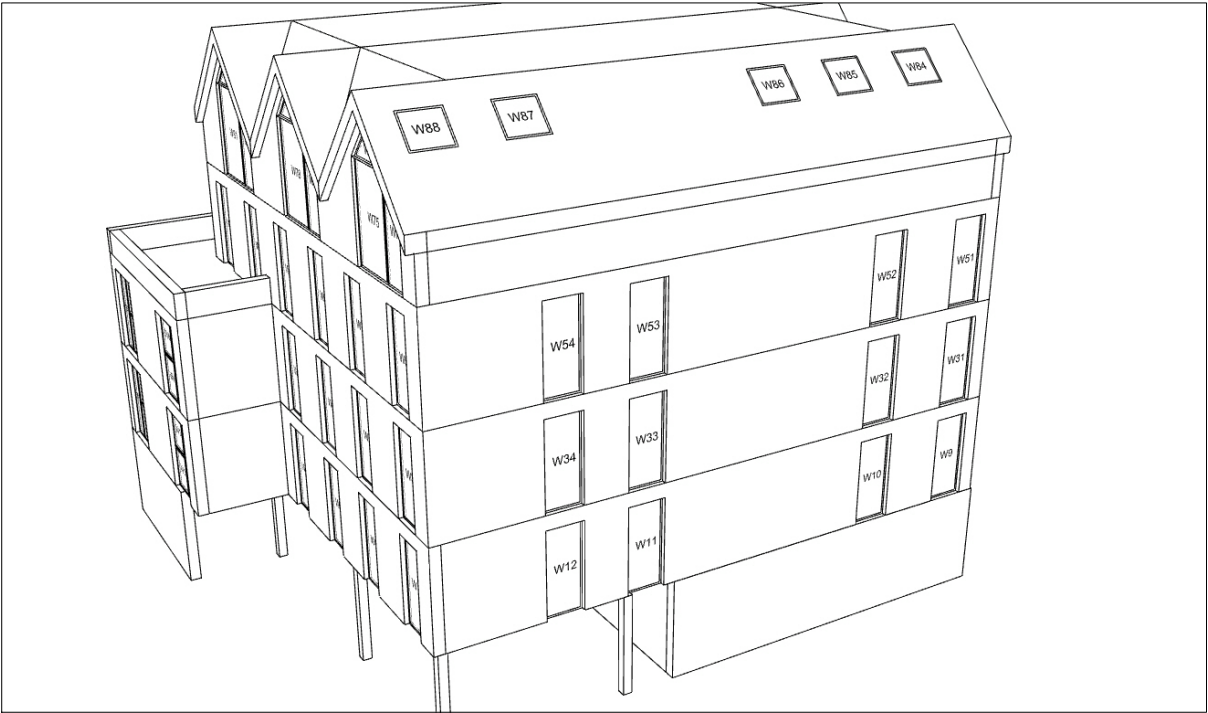
Date

22/03/2018

7.0 Appendix 3 – Window Reference Locations



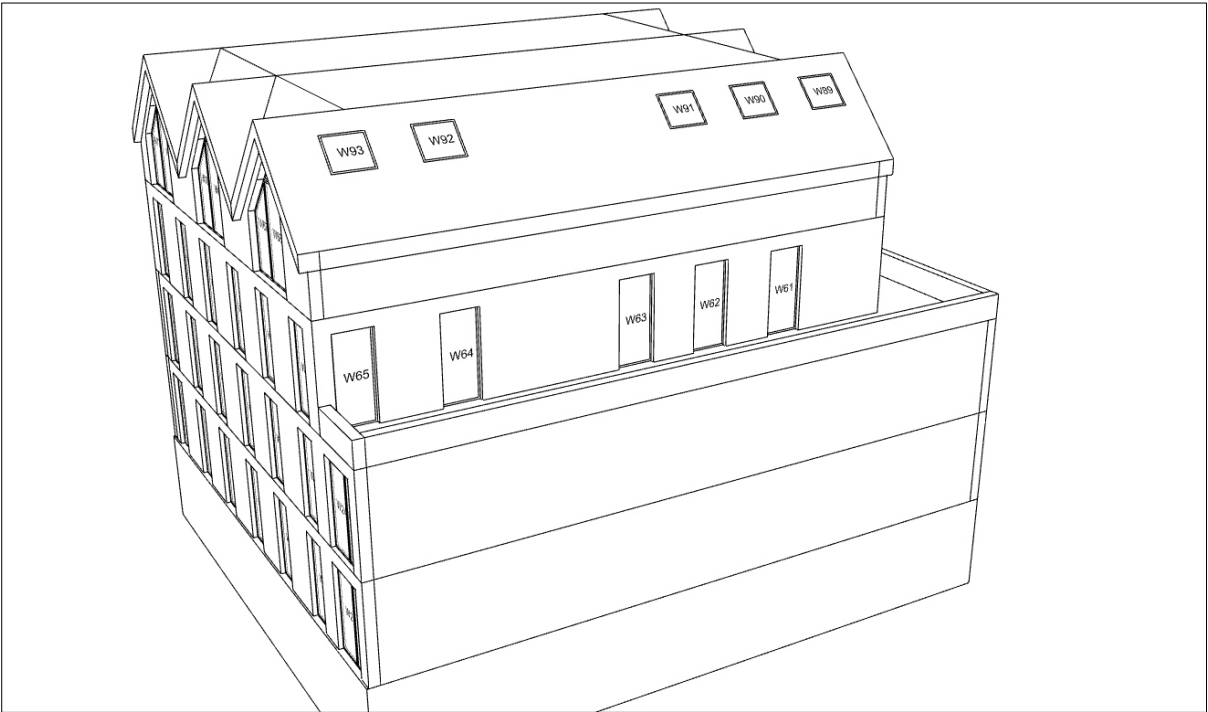
North Elevation



East Elevation



South Elevation



West Elevation

8.0 Appendix 4 – Proposed Average Daylight Factor

Room	Window ID	VERTICAL SKY COMPONENT	FLOOR AREA m²	Net Glass Area	Lower Window ADF	Upper Window ADF	Window ADF
01-01 LDK	1	29.31	34.60	1.06	0.08	0.31	0.39
	2	32.79	34.60	2.00	0.17	0.64	0.81
	3	36.36	34.60	2.00	0.19	0.70	0.89
01-01 Bed 1	5	37.21	12.40	2.00	0.38	1.44	1.83
01-01 Bed 2	4	37.22	8.75	2.00	0.54	2.04	2.58
01-02 LDK	7	37.22	26.5	2.00	0.24	0.89	1.12
	8	37.24	26.5	2.00	0.24	0.89	1.12
	9	8.44	26.5	2.23	0.10	0.38	0.48
	10	2.10	26.5	2.23	0.05	0.19	0.23
01-02 Bed 1	6	37.22	8.86	2.00	0.53	2.01	2.55
01-03 LDK	11	1.13	34.4	2.23	0.03	0.12	0.15
	12	2.88	34.4	2.23	0.05	0.17	0.22
	13	34.77	34.4	2.00	0.18	0.68	0.86
	14	34.39	34.4	2.00	0.18	0.67	0.85
01-03 Bed 1	16	25.06	12.6	2.00	0.29	1.09	1.38
01-03 Bed 2	15	32.74	8.26	2.00	0.50	1.90	2.41
01-04 LDK	20	34.03	23.2	1.13	0.14	0.53	0.67
	21	34.49	23.2	0.93	0.12	0.44	0.55
	22	34.39	23.2	0.93	0.12	0.44	0.55
01-04 Bed 1	17	33.97	9.34	1.13	0.25	0.95	1.20
	18	34.72	9.34	0.93	0.21	0.79	1.00
	19	34.73	9.34	0.93	0.21	0.79	1.00
02-01 LDK	23	29.94	34.60	1.06	0.08	0.32	0.40
	24	33.71	34.60	2.00	0.17	0.66	0.83
	25	36.65	34.60	2.00	0.19	0.71	0.90
02-01 Bed 1	27	37.21	12.40	2.00	0.38	1.44	1.83
02-01 Bed 2	26	37.24	8.75	2.00	0.54	2.04	2.59
02-02 LDK	29	37.22	26.5	2.00	0.24	0.89	1.12
	30	37.18	26.5	2.00	0.24	0.89	1.12
	31	8.90	26.5	2.23	0.10	0.39	0.50
	32	2.66	26.5	2.23	0.05	0.20	0.26
02-02 Bed 1	28	37.22	8.86	2.00	0.53	2.01	2.55
02-03 LDK	33	1.79	34.4	2.23	0.04	0.14	0.18
	34	3.58	34.4	2.23	0.05	0.19	0.24
	35	36.45	34.4	2.00	0.19	0.71	0.90
	36	36.25	34.4	2.00	0.19	0.70	0.89
02-03 Bed 1	38	27.70	12.6	2.00	0.31	1.17	1.48
02-03 Bed 2	37	35.22	8.26	2.00	0.54	2.02	2.56
02-04 LDK	43	36.34	23.2	0.93	0.12	0.46	0.58
	44	36.75	23.2	0.93	0.12	0.46	0.59
	45	37.12	23.2	2.00	0.27	1.01	1.27
02-04 Bed 1	39	35.93	9.34	1.13	0.26	0.99	1.26
	40	36.44	9.34	0.93	0.22	0.83	1.05
	41	36.97	9.34	0.93	0.22	0.84	1.06

2.00	1.50	1.00
Kitchen	Living	Bed
2.10	2.10	-
		1.83
		2.58
2.97	2.97	-
		2.55
2.08	2.08	-
-	-	1.38
-	-	2.41
1.77	1.77	-
-	-	3.20
2.13	2.13	-
-	-	1.83
-	-	2.59
3.00	3.00	-
-	-	2.55
2.21	2.21	-
-	-	1.48
-	-	2.56
2.44	2.44	-
-	-	3.37

Room	Window ID	VERTICAL SKY COMPONENT	FLOOR AREA m²	Net Glass Area	Lower Window ADF	Upper Window ADF	Window ADF
03-01 LKD	45	37.12	29.1	2.00	0.21	0.78	0.99
	46	37.20	29.1	2.00	0.21	0.79	0.99
	63	24.80	29.1	2.23	0.17	0.64	0.81
	64	25.26	29.1	2.23	0.17	0.65	0.82
	65	26.74	29.1	2.23	0.18	0.67	0.85
03-01 Bed 1	47	37.21	8.48	2.00	0.55	2.08	2.63
03-01 Bed 2	62	24.88	7.72	2.23	0.49	1.83	2.31
03-02 LKD	49	37.23	27.6	2.00	0.23	0.87	1.10
	50	37.21	27.6	2.00	0.23	0.87	1.10
	51	10.34	27.6	2.23	0.11	0.42	0.53
	52	4.54	27.6	2.23	0.07	0.26	0.33
03-02 Bed 1	48	37.24	8.27	2.00	0.56	2.11	2.67
03-03 LKD	58	37.23	36.6	2.00	0.16	0.60	0.76
	59	37.17	36.7	2.00	0.16	0.60	0.75
	60	36.77	36.8	2.00	0.16	0.59	0.75
	61	25.16	36.9	2.23	0.13	0.49	0.62
03-03 Bed 1	56	37.21	13.5	2.00	0.41	1.56	1.97
	57	37.21	13.6	2.00	0.41	1.55	1.96
03-03 Bed 2	54	5.41	10.5	2.23	0.16	0.59	0.75
	55	37.20	10.6	2.00	0.47	1.78	2.25
03-03 Bed 3	53	3.84	9.18	2.23	0.15	0.55	0.70
	72	36.94	30.4	3.52	0.39	1.46	1.85
04-01 LKD	73	35.40	30.5	1.63	0.17	0.65	0.82
	74	27.17	30.6	0.45	0.04	0.15	0.18
	84	37.48	30.7	1.00	0.11	0.42	0.53
	85	36.40	30.8	1.00	0.11	0.41	0.51
	86	31.42	30.9	1.00	0.10	0.36	0.45
04-01 Bed 1	66	36.89	16.2	3.52	0.61	2.31	2.92
	67	35.38	16.2	1.63	0.27	1.03	1.30
	68	27.21	16.2	0.45	0.06	0.23	0.29
	92	78.08	16.2	1.00	0.00	0.00	0.00
	93	78.06	16.2	1.00	0.00	0.00	0.00
04-01 Bed 2	69	36.95	7.54	3.52	1.08	4.07	5.15
	70	35.41	7.55	1.63	0.48	1.81	2.29
	71	27.17	7.56	0.45	0.11	0.41	0.51
04-02 LKD	81	36.37	27.3	3.52	0.42	1.56	1.98
	82	31.27	27.4	1.63	0.17	0.64	0.80
	83	37.93	27.5	0.45	0.06	0.21	0.26
	89	75.39	27.6	1.00	0.43	1.61	2.04
	90	75.56	27.7	1.00	0.43	1.62	2.05
04-02 Bed 1	91	76.1	27.8	1.00	0.44	1.64	2.08
	75	37.89	13.0	3.52	0.73	2.77	3.50
	76	37.5	13.1	1.63	0.34	1.26	1.60
04-02 Bed 2	77	36.38	13.2	0.45	0.09	0.34	0.43
	79	37.90	8.88	1.63	0.45	1.68	2.12
04-01 Bed 3	78	31.43	7.17	3.52	0.93	3.48	4.41
	80	37.56	7.18	0.45	0.14	0.52	0.66

2.00	1.50	1.00
Kitchen	Living	Bed
4.47	4.47	-
-	-	2.63
-	-	2.31
3.07	3.07	-
-	-	2.67
2.88	2.88	-
-	-	3.93
-	-	3.00
-	-	0.70
4.35	4.35	-
4.52	4.52	-
-	-	7.95
9.21	9.21	-
-	-	5.53
-	-	2.12
-	-	5.07

9.0 Appendix 5 – Proposed View of Sky Calculations



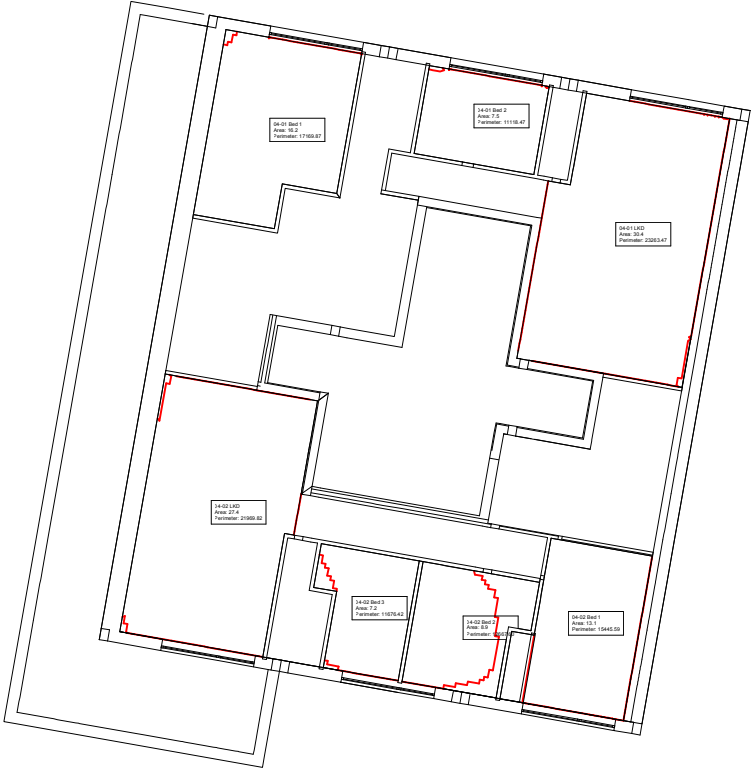
1st Floor



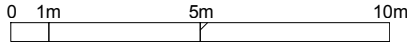
2nd Floor



3rd Floor



4th Floor



Name	Area m ²	Floor Area with VOS	Ratio
01-01 LDK	34.60	18.89	55%
01-01 Bed 1	12.40	9.56	77%
01-01 Bed 2	8.75	8.26	94%
01-02 LDK	26.50	20.28	77%
01-02 Bed 1	8.86	8.40	95%
01-03 LDK	34.40	22.39	65%
01-03 Bed 1	12.60	9.68	77%
01-03 Bed 2	8.26	7.84	95%
01-04 LDK	23.20	13.83	60%
01-04 Bed 1	9.34	8.69	93%
02-01 LDK	34.60	18.91	55%
02-01 Bed 1	12.40	9.57	77%
02-01 Bed 2	8.75	8.26	94%
02-02 LDK	26.50	20.32	77%
02-02 Bed 1	8.86	8.40	95%
02-03 LDK	34.40	23.84	69%
02-03 Bed 1	12.60	10.01	79%
02-03 Bed 2	8.26	7.87	95%
02-04 LDK	23.20	14.44	62%
02-04 Bed 1	9.34	8.69	93%
03-01 LKD	29.10	28.00	96%
03-01 Bed 1	8.48	8.16	96%
03-01 Bed 2	7.72	7.34	95%
03-02 LKD	27.60	20.51	74%
03-02 Bed 1	8.27	7.86	95%
03-03 LKD	36.60	28.55	78%
03-03 Bed 1	13.50	13.30	99%
03-03 Bed 2	10.50	9.77	93%
03-03 Bed 3	9.18	1.00	11%
04-01 LKD	30.40	30.34	100%
04-01 Bed 1	13.10	13.10	100%
04-01 Bed 2	8.90	6.60	74%
04-01 Bed 3	7.17	6.80	95%
04-02 LKD	27.30	27.20	100%
04-02 Bed 1	13.10	13.00	99%
04-02 Bed 2	8.88	6.84	77%
04-02 Bed 3	7.20	6.80	94%