MACH RESIDENTIAL

NORFOLK MANSIONS

Internal Daylight Assessment

New Image Architects

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MACH Acoustics Ltd
3rd Floor 4 York Court
Upper York Street
Bristol
BS2 8QF

t: 0117 944 1388
e: info@machacoustics.com
w: www.machacoustics.com

Eagle House
163 City Road
London
EC1V 1NR

Consultants	AR	Andrew Rickard	andrew@machacoustics.com
	CB	Claire Bye	claire@machacoustics.com
	CJ	Chris Jones	chris@machacoustics.com
	JC	Josh Childs	josh@machacoustics.com
	LT	Leonard Terry	leonard@machacoustics.com
	MR	Max Reynolds	max@machacoustics.com
	OP	Oscar Pope	oscar@machacoustics.com
	PS	Patrick Shuttleworth	patrick@machacoustics.com
	PJ	Phil Jordan	phil@machacoustics.com
	RP	Rory Peliza	rory@machacoustics.com
	SH	Stefan Hannan	stefan@machacoustics.com
	SD	Steffan Davies	steffan.d@machacoustics.com
	YW	Hsuan-Yang Wang	yang@machacoustics.com
	ZN	Ze Nunes	ze@machacoustics.com
	ZV	Zoe Vernon	zoe@machacoustics.com
Finance	TT	Tracy Toal	tracy@machacoustics.com
	ZG	Zheng Ge	zheng@machacoustics.com

1.0 INTRODUCTION

This report outlines a daylight assessment of the proposed conversion of existing lower ground floor to include 2 apartments in Norfolk Mansions, London. MACH has been requested to carry out an assessment of the quality of internal daylight levels within the proposed apartments.

This document details the methodology and results of the daylight assessment of the 2 apartments at Norfolk Mansions, London, which has been carried out using 3D modelling software, IES. The assessment has been carried out as per the architectural drawings provided by New Images Architects.

2.0 PROPOSED DEVELOPMENT

The development is situated in a dense urban area. There is a 4storey building on the west and 3 storey building on the east.

A portion of lower ground floor at Norfolk Mansions, London, will be refurbished and converted into 2 apartments. The entrances to these apartments are from the lower ground floor. Unit 2 is a studio with combined living, Dining, Kitchen and bedroom space. Unit 3 has combined living and kitchen spaces with separate space for Bedroom.

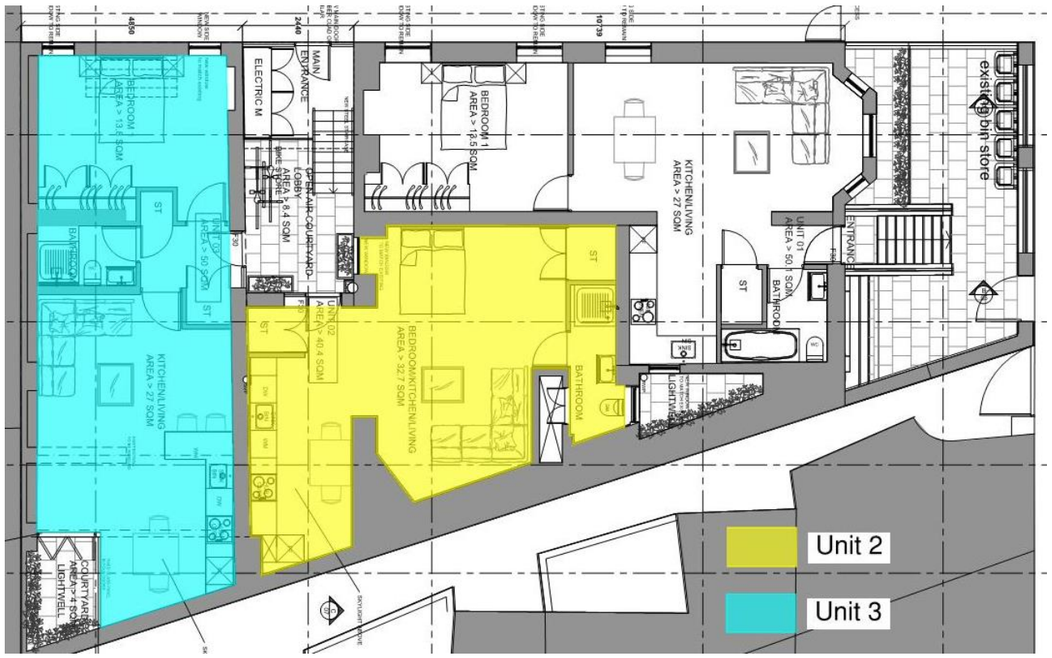

Figure 2.1: Proposed floor plan

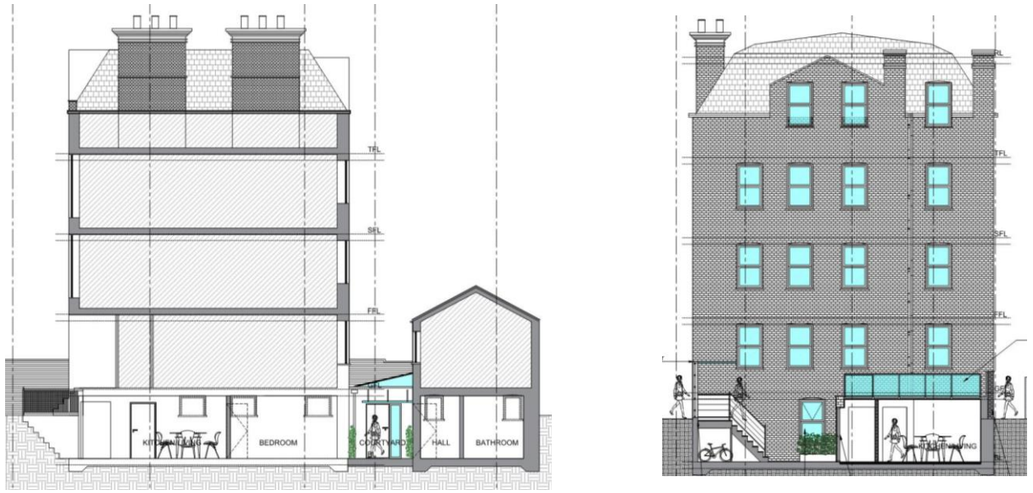

Figure 2.2: Section of proposed development

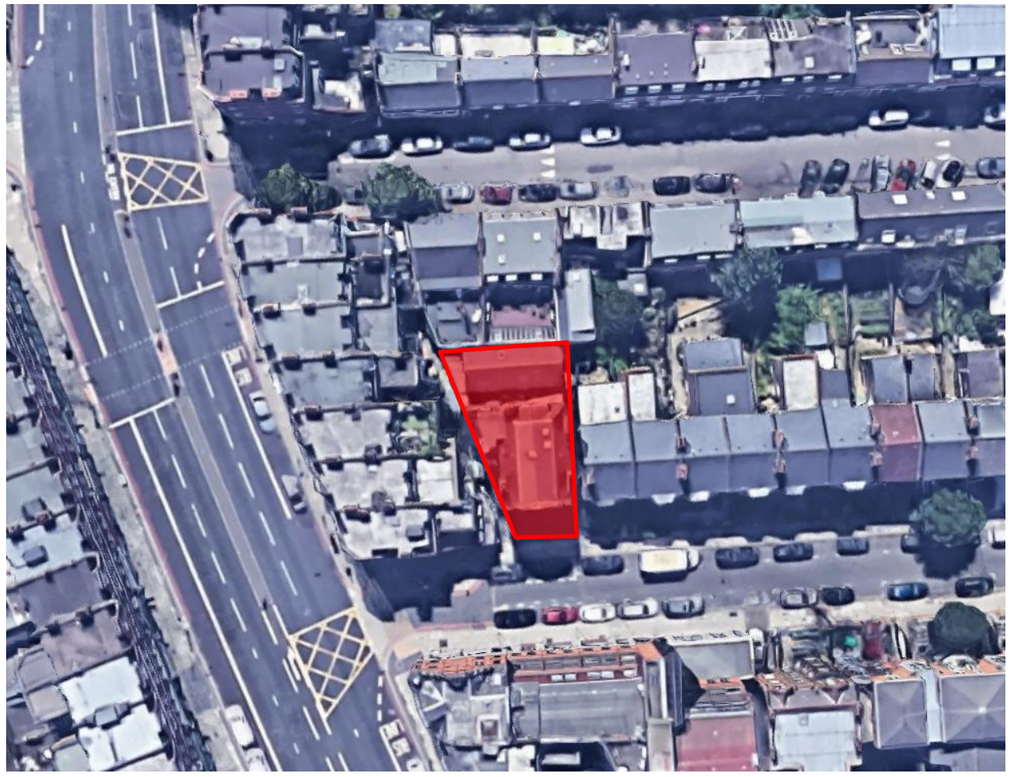

Figure 2.3: Site location

3.0 ASSESSMENT CRITERIA

3.1 Planning Requirements

For the development to be granted planning permission, Internal daylight level assessment needs to be carried out for the development, in accordance to BRE guidance.

It is therefore required to carry out an assessment of the development to determine if sufficient daylight is achieved in each living space. Typical assessment methodology will be used, as outlined within the Building Research Establishment (BRE) document *'Site Layout Planning for Sunlight and Daylight: A Guide to Good Practice (2011)'*.

3.2 BRE – Site Layout Planning for Sunlight and Daylight: A Guide to Good Practice (2011)

The BRE document states that the daylight criteria should only apply to living and occupied areas within the development, which includes kitchens, living rooms and bedrooms. As such, assessment for the proposed development will be carried out for the Living Area/Kitchen and Bedroom.

Average Daylight Factor

The most effective way to assess quality and quantity of daylight within a living area is by calculating the Average Daylight Factor (ADF). The ADF, which measures the overall amount of daylight in a space, is the ratio of the average illuminance on the working plane in a room to the illuminance on an unobstructed horizontal surface outdoors, expressed as a percentage.

The ADF takes into account the VSC value, i.e. the amount of daylight received on windows, the size and number of windows, the diffuse visible transmittance of the glazing used, the maintenance factor and the reflectance of the room surfaces. Therefore, it is considered as a more detailed and representative measure of the daylight levels within a living area. In housing, BS 8206-2 recommends minimum values of ADF of 2% for kitchens, 1.5% for living rooms and 1% for bedrooms.

As the development includes an open plan kitchen and living/dining space, each room is to be assessed to a minimum ADF value of between 1.5-2%.

Position of the No-Skyline

A measure to assess the distribution of daylight in a space is the percentage of area that lies beyond the no-skyline i.e. the area that receives no direct skylight. This is important as it indicates how good the distribution of daylight is in a room. If more than 20% of the working plane lies beyond the no-skyline poor daylight levels are expected within the space.

Table 3.1 summarises the assessment criteria, as described in the BRE Guide, that should be applied to the development in order to ensure good daylight levels. For the purposes of this study, only the Average Daylight Factor and No-Sky view methods described above have been considered. Contrary to the VSC, that measures daylight levels only on the windowpane, the ADF is a more complex and representative calculation as it takes into account the angle of visible sky reaching the windows as well as the room layout, use and surface reflectance.

Summary of Targets

A summary of the relevant performance targets is provided in the table below. As discussed previously, the Average Daylight Factor criteria is seen to be the most relevant, however the No Skyline is also assessed.

Measure of Interior Daylight	Benchmark	Daylight Criterion
Average Daylight Factor	2.0 %	Minimum value of ADF for kitchens
	1.5 %	Minimum value of ADF for living rooms
	1.0 %	Minimum value of ADF for bedrooms
No-Sky View	80%	There will be a good distribution of light in the room if at least 80% of the working plane receives direct sunlight

Table 3.1: Summary of BRE internal daylight criteria

4.0 DAYLIGHT MODEL

A 3D model of the development has been created within thermal modelling software IES, which has been used to carry out the daylight assessment within each space. This model takes into account the geometry and internal finishes of the development, as well as the shading from adjacent buildings.

4.1 Model Inputs

The internal finishes of each space have been confirmed by the architect as the following;

- Floors – Birch timber or similar
- Walls – Painted white
- Ceiling – Painted white

A number of assumptions have been made within the model;

- As per BRE guidance, a working plane has been set at 0.85m above the finished floor level.
- The proposed double glazing has an assumed diffuse visible transmittance of 0.8, and an internal and external reflectance of 0.10.
- The reflectance of external surfaces of the development and adjacent buildings has been included as this has significant impact on a number of the dwellings.

The images across provide screenshots of the daylight model built within thermal model software IES. As shown, shading from adjacent buildings has been included.

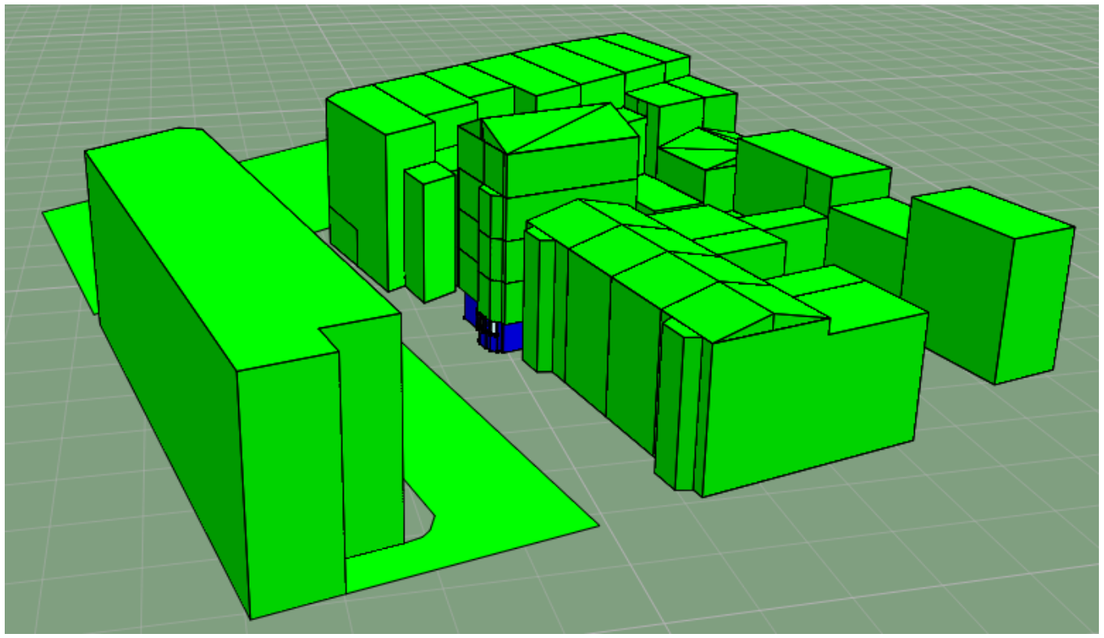

Figure 4.1: Birds Eye view, IES Daylight model (Blue: proposed Development; Green: Adjacent Buildings)

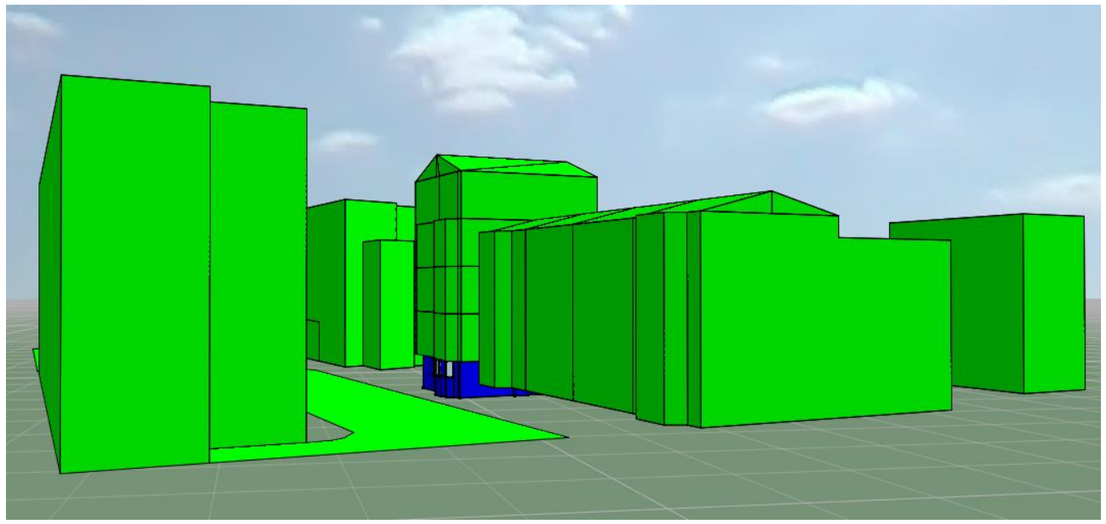

Figure 4.2: North-West view, IES Daylight model (Blue: proposed Development; Green: Adjacent Buildings)

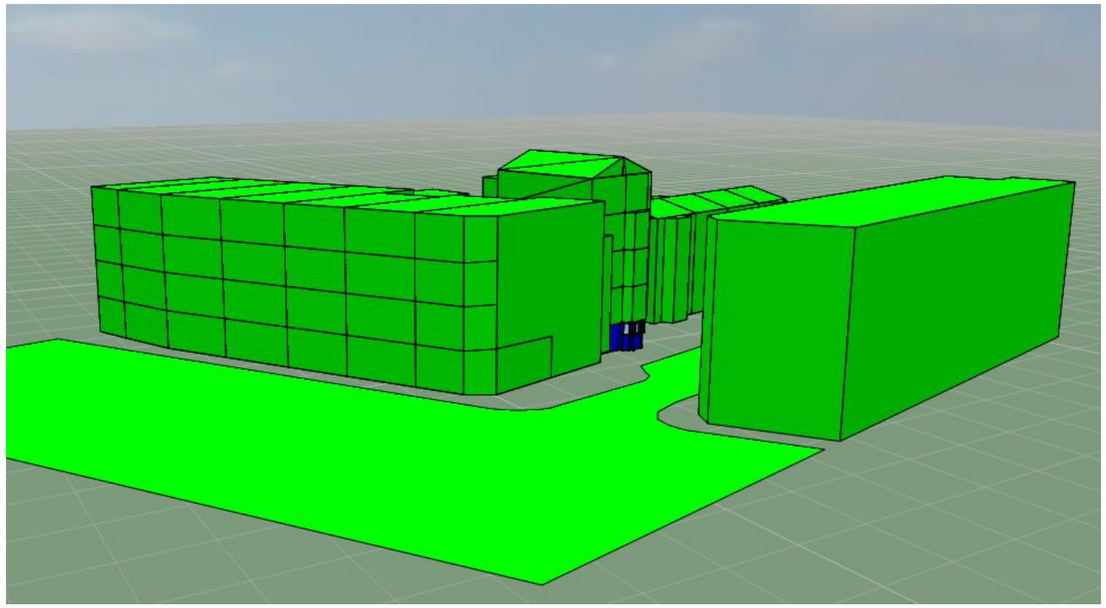

Figure 4.3: : North-East view, IES Daylight model (Blue: proposed Development; Green: Adjacent Buildings)

5.0 RESULTS

A daylight assessment has been undertaken for the 2 apartments in Norfolk Mansions. As previously discussed, the Average Daylight Factor and No-Skyline assessments have been carried out, as per guidance from the BRE. As the development is a refurbishment it is seen that a poor sky view performance can be expected due to the restrictions of the existing building, and as such it is considered that daylight factor is the most suitable method of assessing quality of daylight.

Summary of results is tabulated below. It is shown that Unit 2 passes the daylight factor criteria. The Unit 3 Living Area meets daylight factor criteria, while the bedroom falls below the minimum criteria. All spaces are shown to fail the minimum sky view requirement.

Dwelling	Spaces	ADF			Sky View		
		BRE Criteria	Predicted	Pass/Fail	BRE Criteria	Predicted	Pass/Fail
Unit 2	Kitchen/Living Area/ Bedroom	1.0 - 2.0 %	3.1	Pass	80%	48%	Fail
Unit 3	Kitchen/Living Area	1.5 - 2.0 %	2.4	Pass	80%	35%	Fail
	Bedroom	1.0 %	0.3	Fail	80%	30%	Fail

Table 5.1: Daylight model predictions

5.1 Unit 2

It is able to achieve the average daylight factor recommended by BRE. However, it fails to achieve the minimum Sky view requirements. This is partly due to presence of adjacent tall structures. It blocks majority of the view.

Dwelling	ADF			Sky View		
	BRE Criteria	Predicted	Pass/Fail	BRE Criteria	Predicted	Pass/Fail
Kitchen/Living Area/ Bedroom	1.0 - 2.0 %	3.1	Pass	80%	48%	Fail

Table 5.2: Daylight model predictions (Unit 2)

There is potential for Glare as uniformity of light in the space is around 0.02. Adjacent figure shows the floorplan with predicted Daylight factors.

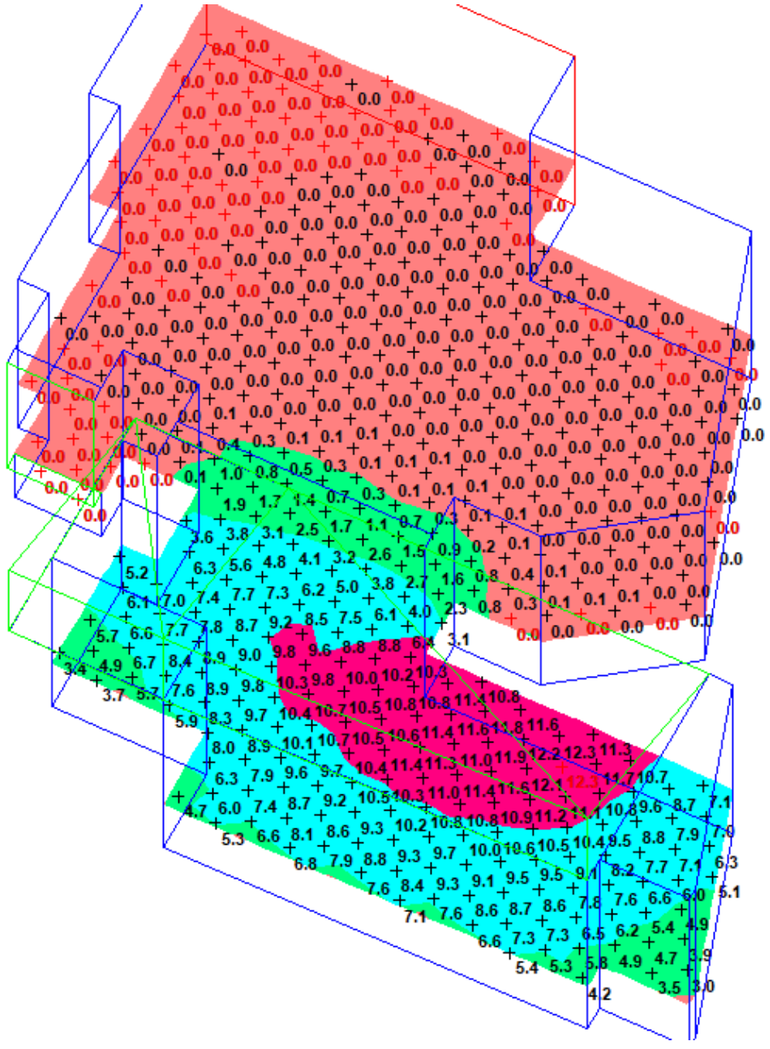

Figure 5.1: Daylight factor plot for Unit 2 at Norfolk Mansions

5.2 Unit 3

The combined space (Living room/ Kitchen) is able to achieve the required average daylight factor recommended by BRE. However, the bedroom fails to achieve the recommended average daylight factor. Both the spaces fail to achieve the minimum Sky view requirements. Adjacent figures show the average daylight factors predicted for the Bedroom and Living room/Kitchen.

Dwelling	ADF			Sky View		
	BRE Criteria	Predicted	Pass/Fail	BRE Criteria	Predicted	Pass/Fail
Kitchen/Living Area	1.5 - 2.0 %	2.4	Pass	80%	35%	Fail
Bedroom	1.0 %	0.3	Fail	80%	30%	Fail

Table 5.3: Daylight model predictions (Unit 3)

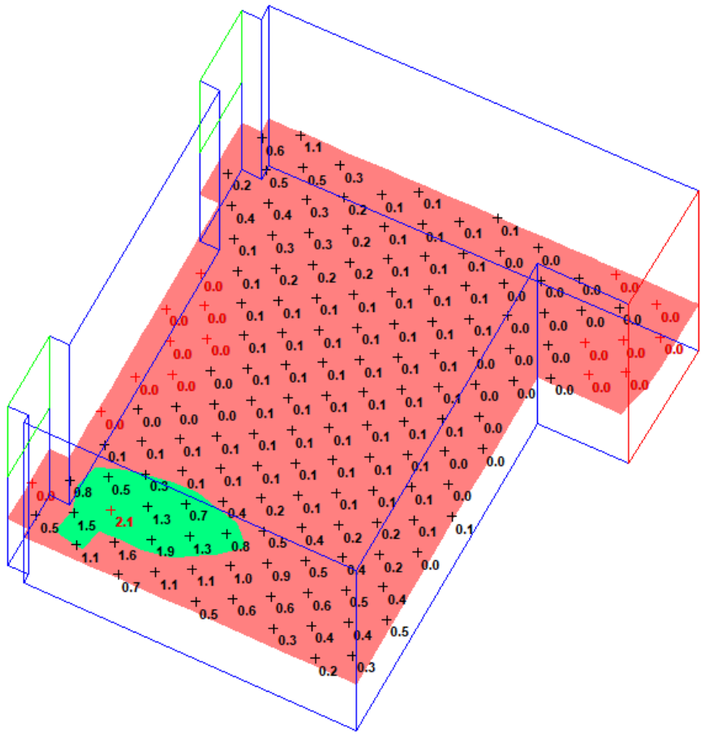

Figure 5.2: Daylight factor plot for Bedroom, Unit 3 at Norfolk Mansions

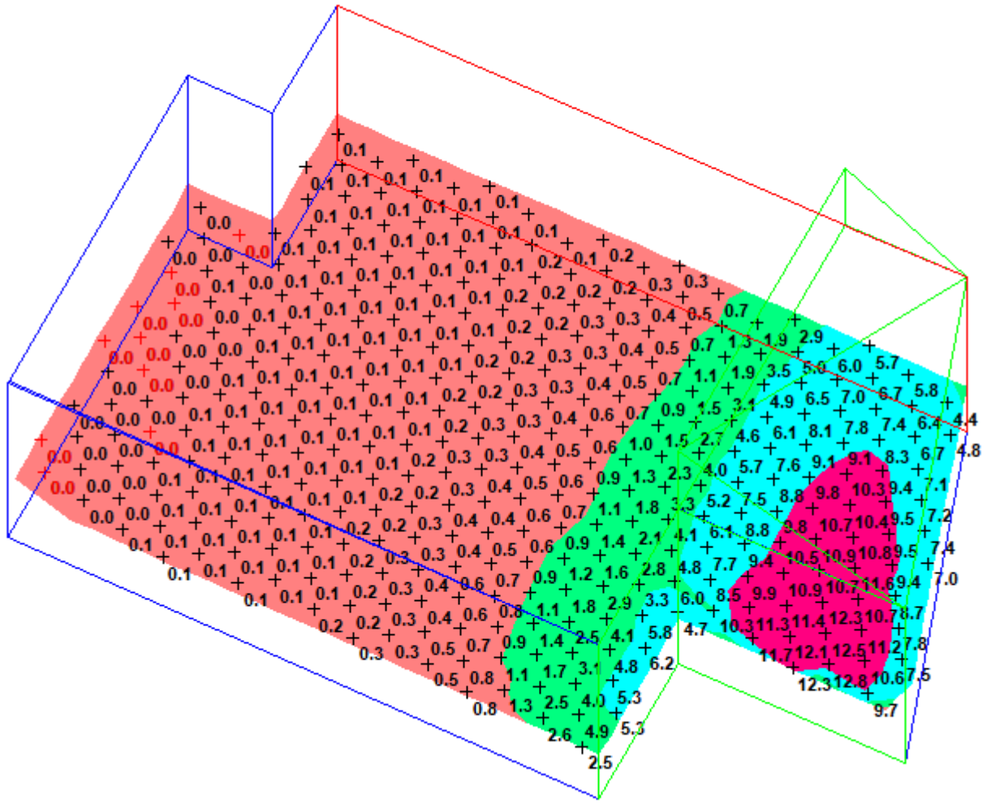

Figure 5.3: Daylight factor plot for Livingroom / Kitchen, Unit 3 at Norfolk Mansions

6.0 RECCOMENDATIONS

The bedroom of Unit 3 failed to achieve the recommended average daylight factors by BRE. To improve it, a glazing unit is suggested on the common wall between unit 3 Bedroom and Main entrance Area. Different glazing areas were assessed to determine the optimum size needed to achieve BRE criteria. The sizes of the glazing unit are summarized in table 6.1. The simulated average daylight factor results are summarized in Table 6.2. Figure 6.1,6.2 and 6.3 provide the locations of the suggested glazing unit.

Dwelling	Glazing Unit
Option 1	1m X 2.3 m
Option 2	2m X 2.3m
Option 3	2.5m X 2.3m

Table 6.1: Different sizes of glazing unit

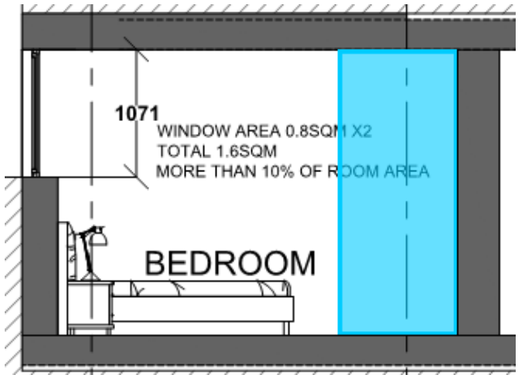

Figure 6.1: Option 1 (Location of Glazing unit)

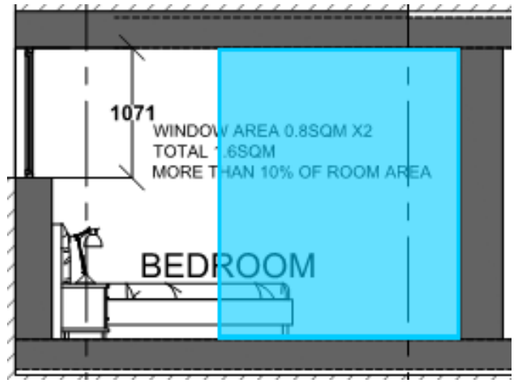

Figure 6.2: Option 2 (Location of Glazing unit)

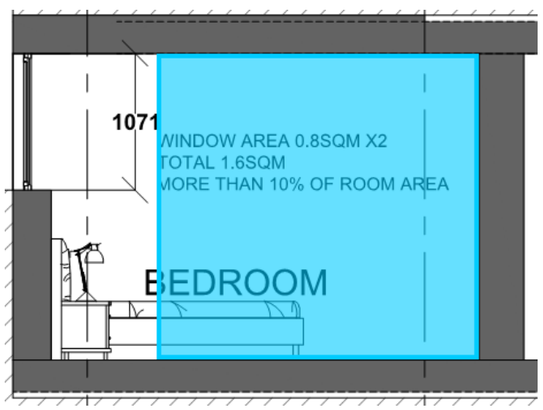

Figure 6.3: Option 3 (Location of Glazing unit)

Dwelling	ADF			Sky View		
	BRE Criteria	Predicted	Pass/Fail	BRE Criteria	Predicted	Pass/Fail
Existing	1.0 %	0.25	Fail	80%	0.3	Fail
Option 1		0.51	Fail		0.3	Fail
Option 2		0.91	Fail		0.3	Fail
Option 3		1.11	Pass		0.3	Fail

Table 6.2: Daylight model predictions for unit 3, Bedroom

Option 1 which includes the glazing unit sized 1m x 2.3m seems to improve the average daylight factor but is still halfway from the recommended average daylight factor by BRE.

Option 2 has the average daylight factor across the floor plan improve drastically. It is close to the recommended values from BRE but still under it.

As can be seen, results from Option 3 seem to pass the required value of average daylight factor by BRE. One thing to note is that due to the size of the glazing unit , 2.5m x 2.3m, privacy may get compromised in this option.

None of the options helped in improving the Sky view. This is partly due to the nature of the project being a refurbishment and partly due to the proximity of tall buildings to the bedroom of Unit 3.

It is suggested that Option 2 is chosen as it provides a balance between good average daylight factor and privacy of the user compared to Option 3. A daylight factor of 0.91 is seen to be suitable for a bedroom within the context of the surrounding environment.