MACH GROUP | ENERGY

238 KILBURN HIGH ROAD, LONDON

Daylight and Sunlight Assessment Report

Osel Architecture

238 KILBURN HIGH ROAD, LONDON

Daylight and Sunlight Assessment Report

Osel Architecture

MACH Acoustics Ltd

3rd Floor 1 York Court
Upper York Street
Bristol
BS2 8QF
T: 0117 944 1388

Eagle House
163 City Road
London
EC1V 1NR
T: 0203 488 4559

info@machacoustics.com
www.machacoustics.com

Document Description:	Daylight and Sunlight Assessment
Document Reference:	230324 – 238 Kilburn High Road– Daylight and Sunlight Assessment Report

Revision	Description	Author	Checked by	Issued by	Issue Date
00	First Issue	Gareth Davies	Josh Childs	Josh Childs	24/03/2023
01	-	Josh Childs	-	Josh Childs	23/08/2023

CONTENTS

EXECUTIVE SUMMARY

MACH have carried out a daylight and sunlight impact assessment for the proposed 238 Kilburn High Road in London. The assessment has been carried out as per the methodology provided within the BRE document "BR209 – *Site Layout Planning for Sunlight and Daylight: A Guide to Good Practice (2022)*'. Two daylight models have been carried out as follows:

1. Impact assessment of the proposed development on the Internal Daylight levels of the existing flats in 240 Kilburn High Road (owned by the client).
2. Daylight and Sunlight Impact assessment on the properties to the rear of the proposed development at 1-23 Grangeway.

From the assessment, the following has been determined:

- There will be a minor reduction in internal daylight levels within the assessed flats at 240 Kilburn High Road (client owned). It is considered that the predominant shading factor to these properties is from the adjacent 1-23 Grangeway building. The predicted internal daylight levels are considered typical of high rise/urban accommodation.

- From the table to the right, it can be seen that the development's impact on neighbouring windows is largely in compliance with BRE guidance, with most of the assessed windows comfortably passing the recommended BRE criteria. Amongst all the assessed windows, there is only one window that falls slightly below BRE recommendations for daylight metrics.

- Despite the initial shortfall of one window in the VSC and APSH criteria, it was determined that the existing balcony above it was the primary factor in limiting exposure to daylight levels.

- As such, considering the complexity of the site and surroundings, it is apparent that the proposed design has been set to reduce impact on the adjacent properties. Considering the close proximity of the site to adjacent buildings, some degree of impact is expected to occur to allow for any development to occur. However, the neighbouring windows are seen to achieve good daylight levels.

Figure 0.1: View of the Existing 238 Kilburn High Road (red) with the Assessed 240 Kilburn High Road (blue) and 1-23 Grangeway (yellow) and Adjacencies

Space	Room Type	BRE Target (New-Build)	ADF	
			Existing	Proposed
Fourth Floor	Living Room/Kitchen	1.5	3.0	2.8
Third Floor	Living Room/Kitchen	1.5	2.4	1.2
Second Floor	Living Room/Kitchen	1.5	2.0	0.8
First Floor	Living Room/Kitchen	1.5	0.6	0.5

Table 0.1: Summary of the Internal Daylight Level Assessment

Property	No. of assessed Windows	No. of BRE Pass	Percentage of Pass
1-23 Grangeway Road	9	8	89%

Table 0.2: Summary of the External Daylight and Sunlight Impact Assessment

1.0 INTRODUCTION

This report outlines an impact daylight assessment of the proposed 238 Kilburn Road, London. The purpose of this assessment is to evaluate the daylight and sunlight impact of the proposed development on the adjacent properties.

This document details the methodology and results of the internal and external daylight assessment for adjacent properties, which have been carried out using 3D daylight modelling software.

The internal daylight assessment aims to evaluate the impact that blocking the windows on the south facade of 240 Kilburn High Road (refurbished as part of this development and owned by the client) will have on the daylight levels within the affected flats.

The assessment has been carried out as per information provided from topographical data, architectural drawings, provided 3D model, existing planning drawings and site photographs. For a small number of properties, some assumptions have been made when modelling the exact window sizes and locations as they were not observable from the site boundary, possible viewpoints and no drawings were available for reference.

It is important to note that any assumptions made within the daylight model are for properties that are considered low risk.

2.0 EXISTING SITE

The existing development is understood to be composed of two floors with the ground floor including a Class E commercial unit. 240 Kilburn High Road is the adjacent property and is composed of 5 floors which include residential and commercial spaces (located on the ground floor).

The figure opposite represents the existing elevations of the development.

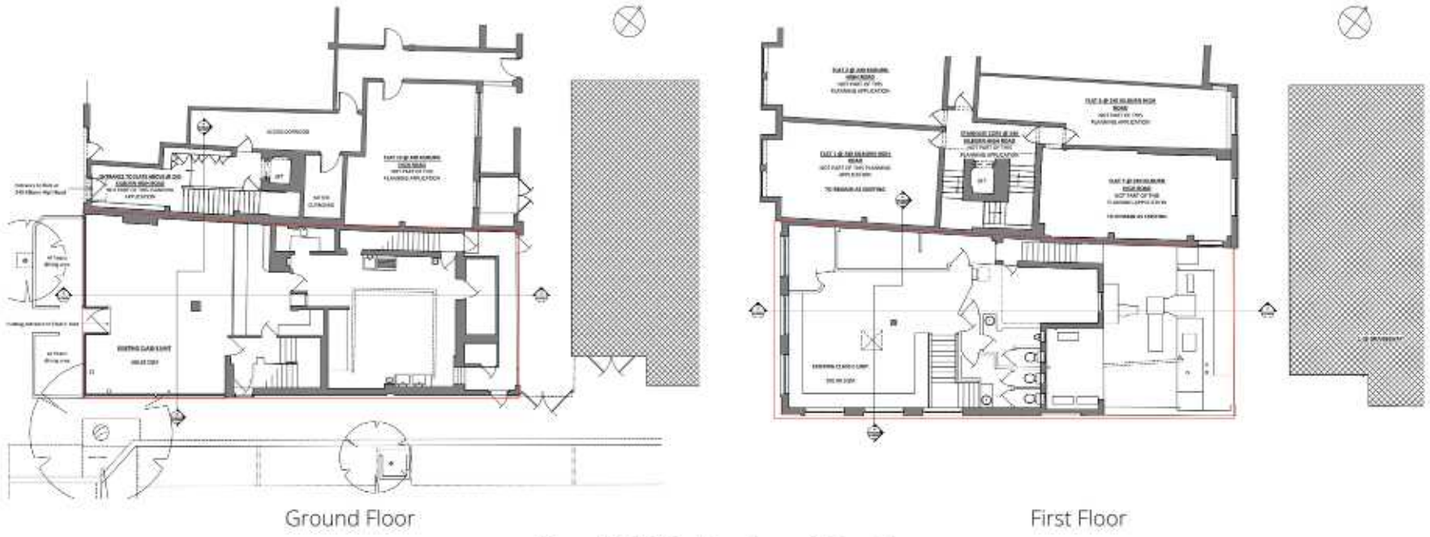
West Elevation

South Elevation

East Elevation

Figure 2.1: Existing Site Elevations

The figures to the opposite show the floor plans of the existing property (238-240 Kilburn High Road).



Ground Floor

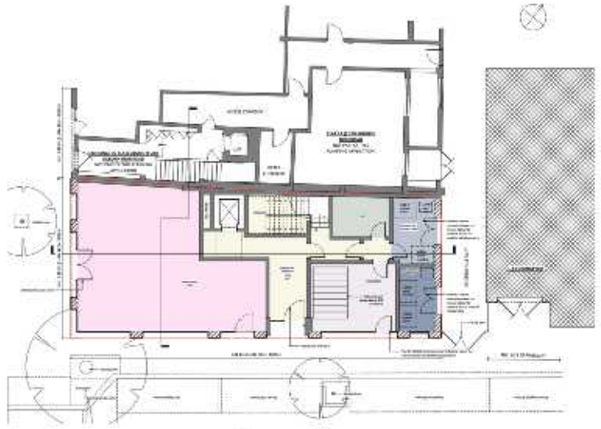
First Floor

Figure 2.2: Existing Development Floor Plans

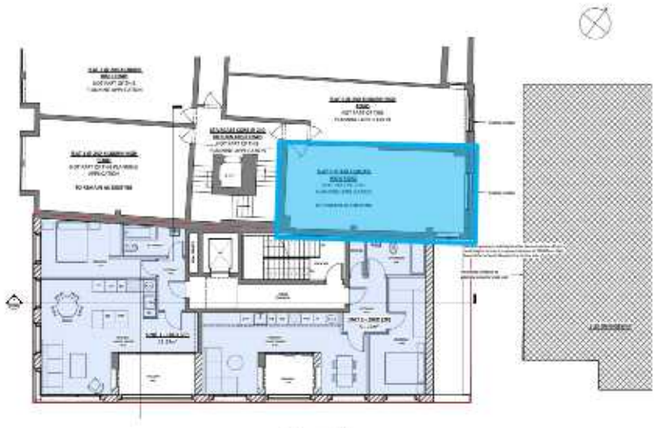
3.0 PROPOSED DEVELOPMENT

The proposed development is to include the demolition of the existing property and the erection of a 5-storey residential building with the ground floor keeping its Class E commercial unit. Some of the new flats in 238 Kilburn High Road will be merged with spaces in the current 240 Kilburn High Road.

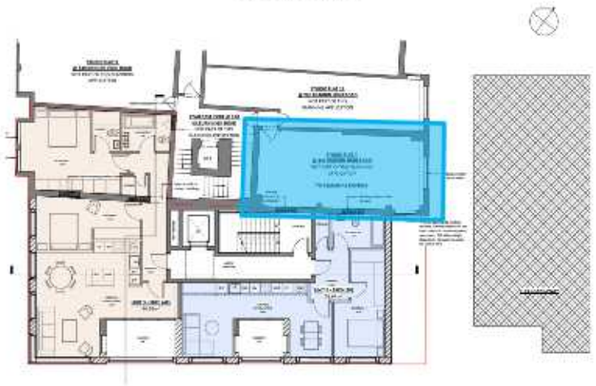
The figures opposite show the floor plans of the proposed development. The flats that are assessed within the internal daylight analysis are highlighted in blue.



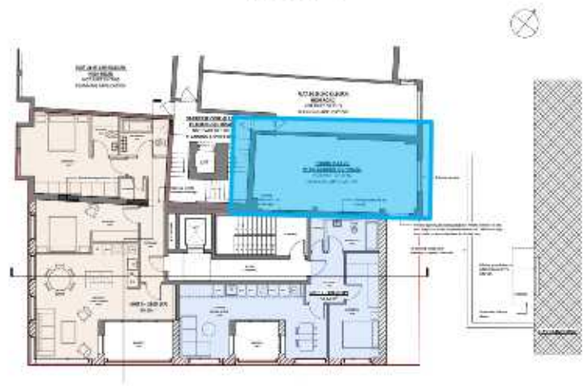
Ground Floor



First Floor



Second Floor

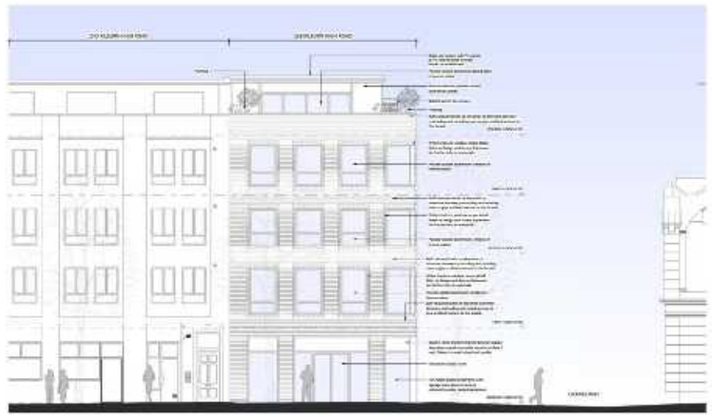


Third Floor

Fourth Floor

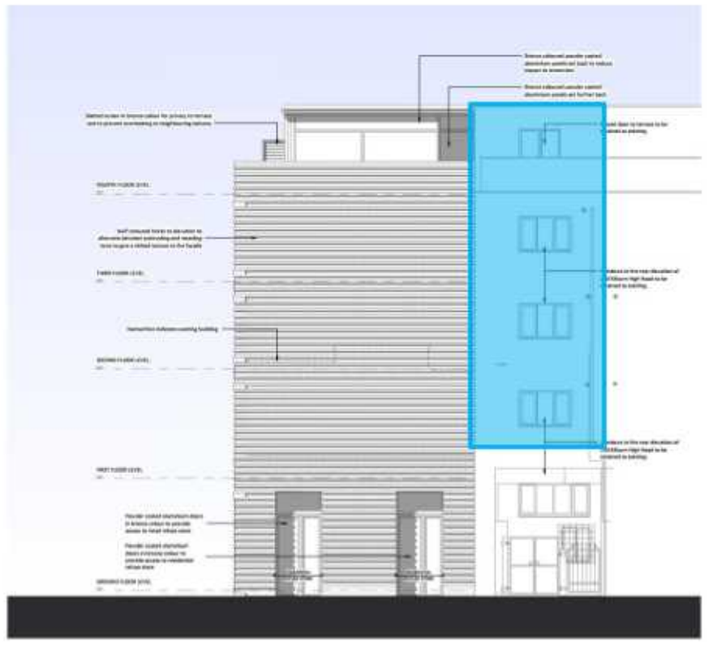
Figure 3.1: Proposed Development Floor Plans

The figures opposite represent the elevations of the proposed development, the flats that are part of the internal daylight assessment are highlighted in blue.



West Elevation

South Elevation



East Elevation

Figure 3.2: Proposed Elevation Plans

4.0 ASSESSMENT METHODOLOGY

4.1 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, an assessment for the proposed development will be carried out for the Living Area/Kitchen and Bedroom.

Adoption of BRE Guidance

It is important to note that the guidance provided within BR209 is for recommendation only, and thus not a strict set of targets that needs to adhere to at all locations. It is acknowledged in the document that sites of high density or historical context may be particularly restricted by the guidance within the document, and as such alternative performance targets may be suitable.

However, it does not provide guidance on dual-use spaces as seen in the proposed development. As the floor area of living spaces is larger than kitchen areas, it is recommended that a daylight factor above 1.5% is seen as acceptable. For the assessment ADF target of 1.5% for lounge/kitchen space has been used.

Average Daylight Factor

The most effective way to assess the 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 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 considers the Visual Sky Component (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.

BRE 2011 Guidance

The previous BRE guidance regarding Sunlight and Daylight was released in 2011 and is referenced by HQM and BREEAM. This document advises using average daylight factor as the measure of internal daylight performance. These are the same values defined in BS 8206-2 as minimum of 2% for kitchens, 1.5% for living rooms and 1% for bedrooms.

Summary of Targets

For this study, only the Average Daylight Factor has been considered. ADF is a complex and representative calculation as it considers the angle of visible sky reaching the windows as well as the room layout, use and surface reflectance. This has been followed by the Daylight Distribution Criteria, which ensures that the adequate area of the assessed space achieve minimum daylight Factor value.

A summary of the relevant performance targets is provided in the table below.

Measure of Interior Daylight	Benchmark	Daylight Criterion
Average Daylight Factor	1.5 – 2.0 %	Typical value of ADF for living rooms/kitchens.
	1.0 %	Typical value of ADF for bedrooms.

Table 4.1: Summary of BRE internal daylight criteria

Applying BRE Guidance to the Proposed Development

The use of internal space in the development should be considered, as BRE provides daylight parameters for living rooms and kitchens separately. As per ADF criteria standard does not provide guidance on dual-use spaces as seen in the proposed development. As the floor area of living spaces is larger than kitchen areas, it is considered that a daylight factor above 1.5% is seen as acceptable. For the assessment, an ADF target of 1.5% for lounge/kitchen space has been used.

;

4.2 BRE BR209 – Site Layout Planning for Sunlight and Daylight: A Guide to Good Practice (2022)

The BRE guidance provides advice on site layout planning to help achieving good daylighting and sun-lighting within buildings and in the open spaces between them. It also gives guidance on site layout for solar energy, on sunlight of gardens and amenity spaces. The guide is not mandatory, it aims to help ensure good conditions in the local environment or between buildings rather than constrain the designer. Hence, although it provides numerical guidelines, these guidelines should be interpreted flexibly since natural lighting is only one of many factors in site layout design.

Three methods are adopted to determine the level of impact the proposed development has on adjacent properties. The methods are as follows

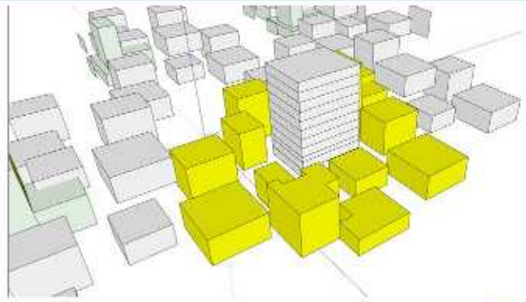
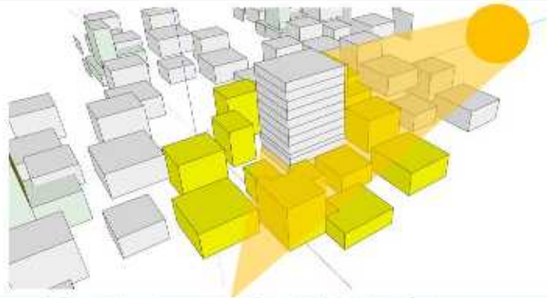
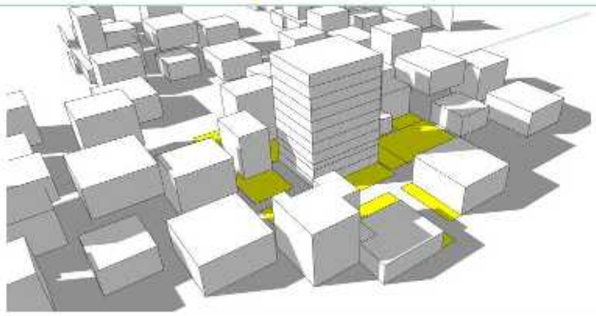
Assessment Methods	Description
Daylight Impact on Existing Buildings	
Sunlight Impact on Existing Buildings	
Sunlight Impact On gardens and amenity spaces	

Table 4.2: Types of Impact Daylight Assessments

4.2.1 Daylight Impact on Existing Buildings

4.2.1.1 Vertical Sky Component Method

The VSC is a unit of measurement that represents the amount of available daylight from the sky, received at a window. It is the ratio between the amount of sky visible at the centre of a window compared to the amount of light that would be available from a totally unobstructed hemisphere of sky. The maximum percentage value for a window with a completely unobstructed view through 90° in every direction is 40%.

In order to maintain good levels of daylight the BRE guidance recommend that the VSC of a window should be 27% or greater. Where this level is not achieved, an additional assessment called the Comparison Method should be carried out.

4.2.1.2 Comparison Method

The comparison test considers the VSC results of the baseline (existing) conditions and the VSC results of the development in place. The comparison method states that if the resultant VSC from the proposed development is less than 80% of the existing value, occupants of the existing building will notice a reduction in the amount of daylight.

Result	Description	Pass/Fail
VSC > 27%	Enough skylight should still be reaching the window of the existing building	Pass
VSC < 27% & VSC Change % > 80%	The area lit by the window is likely to appear gloomy, However, the reduction is likely unnoticed.	Pass
VSC < 27% & VSC Change % < 80%	A reduction will be noticed in the amount of skylight	Fail

Table 4.3: Impact categories for Daylight Assessment

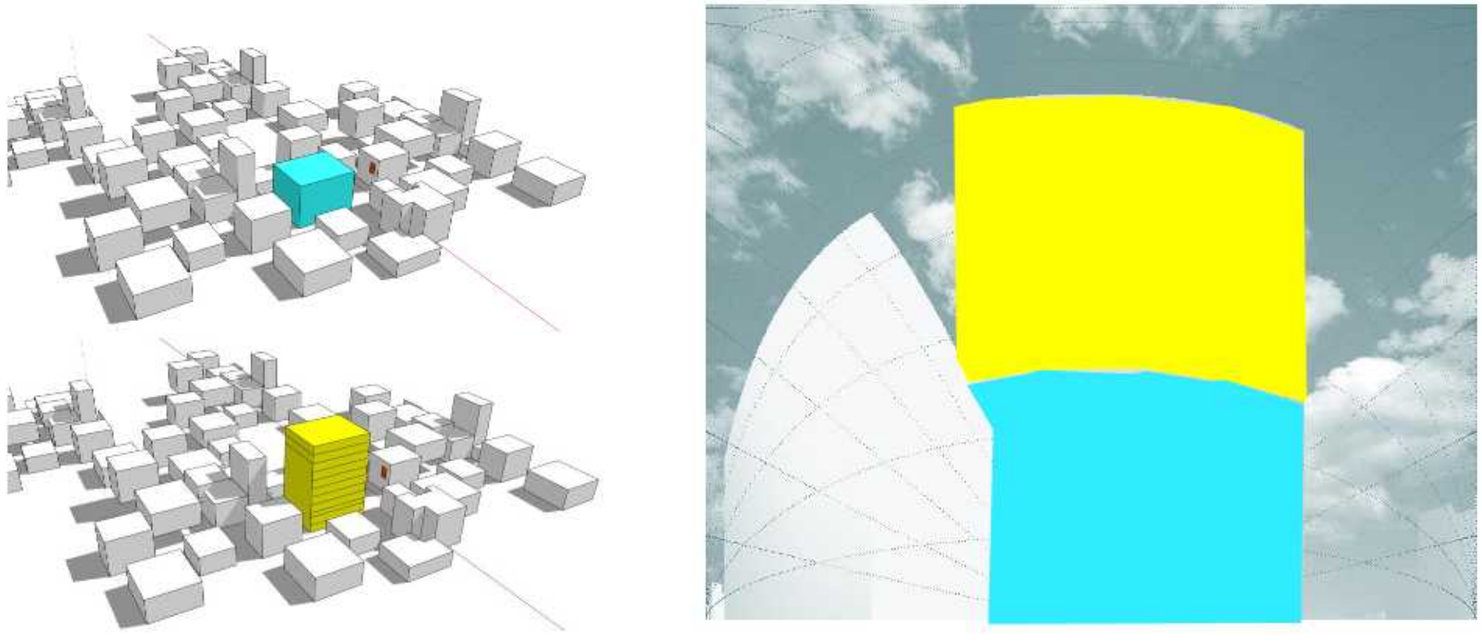


Figure 4.1: Example Waldram Diagram for VSC results – existing shown in blue and proposed in yellow

4.2.2 Sunlight Impact on Existing Buildings

BR209 states that sunlight impact on nearby properties should be assessed if there is a living room with a window that faces -/+90° of due south. Where this is the case, a sunlight impact may occur if the centre of the window;

- Receives less than 25% of annual probable sunlight hours (APSH), or less than 5% of annual probable sunlight hours between 21 September and 21 March; and
- Receives less than 0.8 times its former sunlight hours during either period; and
- Has a reduction in sunlight over the whole year greater than 4% of annual probable sunlight hours.

If the impacted room has multiple windows on the same wall, the highest value of APSH should be taken. if the room has two windows on opposite walls, the APSH due to each can be added together.

The APSH value is important to consider within living rooms, kitchens and bedrooms are less important, although care should be taken not to majorly impact the amount of sun reaching that room.

The table to the opposite shows the predicted impact based on the calculated APSH and WPSH values.

Result	Description	Pass/Fail
APSH > 25% WPSH > 5%	Room still receives enough sunlight.	Pass
APSH < 25% & APSH Change % > 80% WPSH < 5% & WPSH Change % > 80%	the room would appear cold; however, the reduction is likely unnoticed.	Pass
APSH < 25% & APSH Change % < 80% WPSH < 5% & WPSH Change % < 80%	A reduction of sunlight will be noticed.	Fail

Table 4.4: Impact categories for Sunlight Assessment

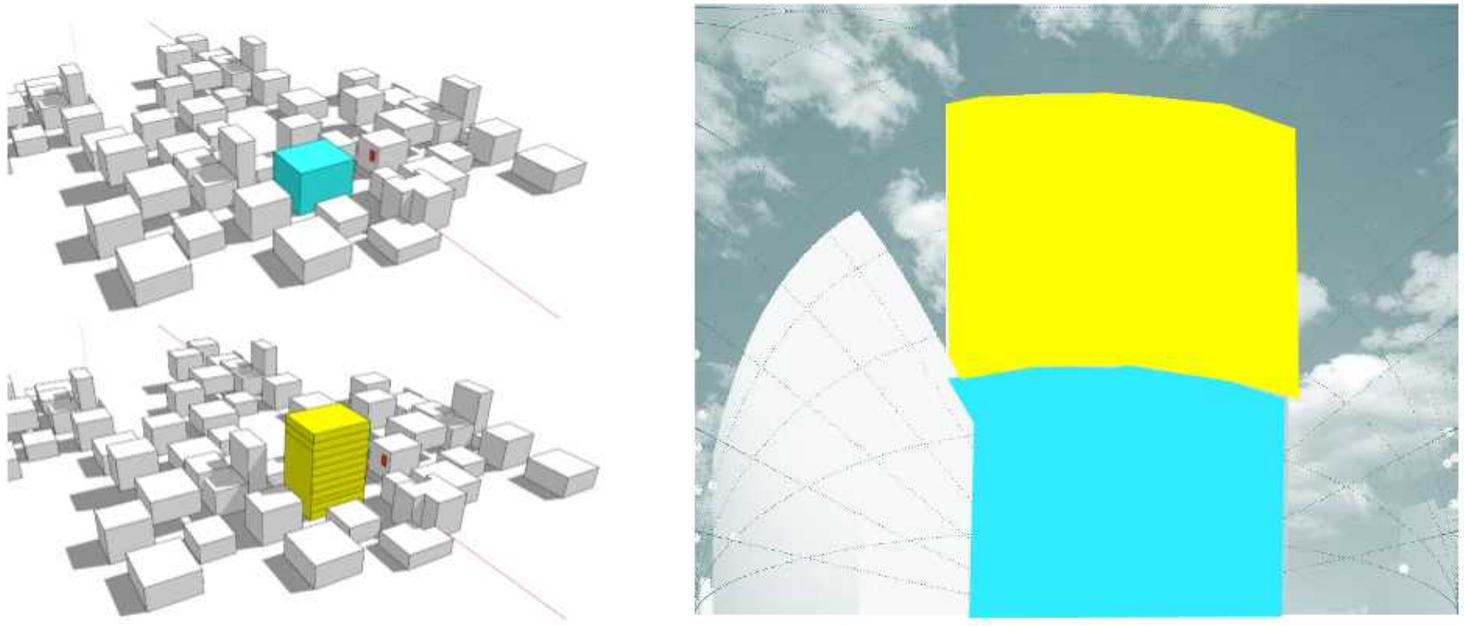


Figure 4.2: Example Waldram Diagram for APSH results for the window highlighted in red – existing shown in blue and proposed in yellow

4.3 Environmental Impact Assessment Methodology

Within Appendix H of the BRE Guide, advice is provided in how the guidelines can be applied as part of an Environmental Impact Assessment methodology, which is summarised in the table to the opposite.

4.4 Application and Flexibility of BRE Guidelines

The guidance provided within BR209 is for recommendation only, and thus not a strict set of targets that needs to be adhered to at all sites/locations. It is clearly acknowledged in the document that sites of high density or historical context may be particularly restricted by the guidance within the document, and as such alternative performance targets may be suitable.

The numerical criteria suggested by the BRE are therefore designed to provide industry advice/guidance to plan/design with daylight in mind. Alternative values may be appropriate in certain circumstances such as highly dense urban areas around London, for e.g. the approach to creating alternative criteria is detailed within Appendix F of the BRE.

Impact Category	Description
Negligible	• Loss of light is well within the guidelines, or • Only a small number of windows or limited area of open space are affected
Minor Adverse Impact	• The loss of light is only marginally outside the guidelines • An affected room has other sources of skylight or sunlight • The affected building or open space only has a low-level requirement for skylight or sunlight • There are particular reasons why an alternative, less stringent, guideline should be applied
Major Adverse Impact	• A large number of windows or large area of open space are affected • The loss of light is substantially outside the guidelines • All the windows in a particular property are affected • The affected indoor or outdoor spaces have a particularly strong requirement for skylight or sunlight, e.g. a living room in a dwelling or a children's playground

Table 4.5: Impact categories for daylight sunlight impact

5.0 INTERNAL DAYLIGHT IMPACT ASSESSMENT

An internal daylight model of the existing properties at 240 Kilburn High Road has been carried out.

The level of daylight in the proposed living spaces is affected by the geometry and internal finishes of these rooms and their adjacencies, as such the daylight assessment within this report shall focus on modelling these rooms with the adjacent surfaces.

5.1 Daylight Model

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

Note: Geometry for the assessed rooms within the development has been modelled as per the provided architectural drawings, site photographs, with reference to Google Earth pictures, along with provided architectural 3D model.

5.2 Model Inputs

The internal finishes of each space have been assumed as the following;

- Floors – Grey carpet
- Walls – Painted white
- Ceiling – Painted white

In addition, a few 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 0.70.

Figure 5.1 and Figure 5.2 to the right provide screenshots of the overall daylight model built within thermal model software IES, with the adjacent properties, showing the properties which have been considered within the model.

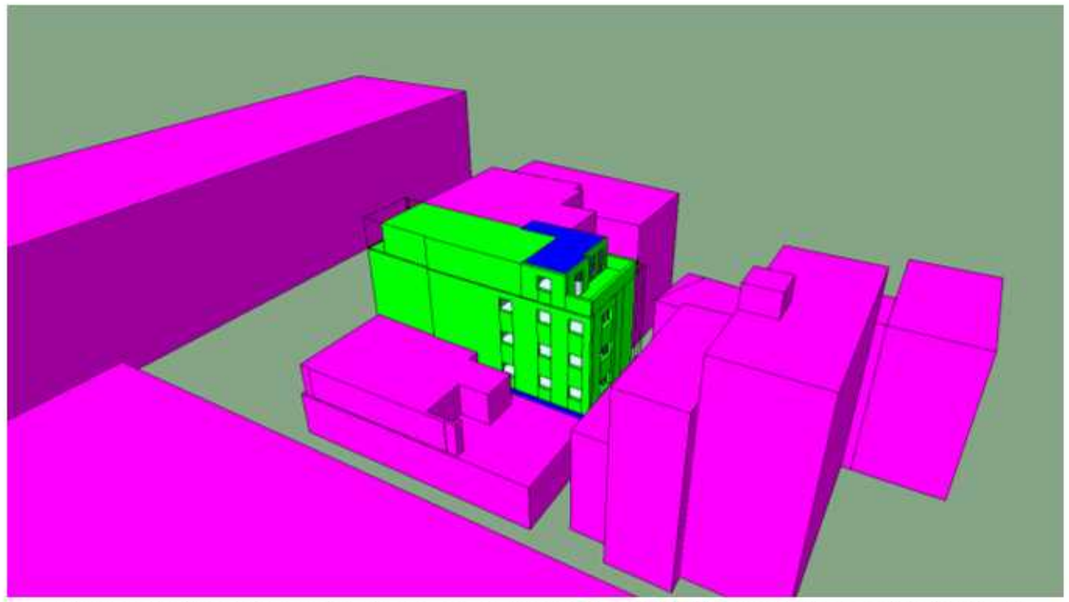


Figure 5.1: 3D View of the IES model of the Existing Development, Assessed Properties, and Impactful Adjacencies

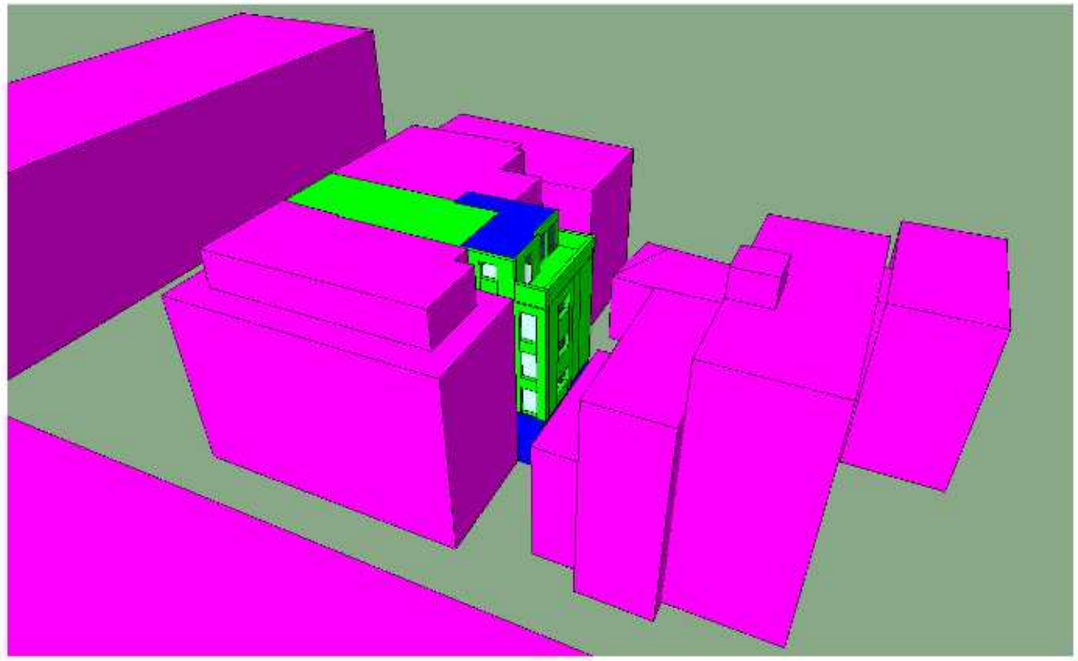


Figure 5.2: 3D View of the IES model of the Proposed Development, Assessed Properties, and Impactful Adjacencies

5.3 Results

The results of the internal daylight assessment of the existing flats at 240 Kilburn High Road are provided in Table 5.2 opposite, showing daylight distribution plots with the Average Daylight Factor (ADF) indicated. A summary of the results is provided in Table 5.1.

The fourth floor flat is shown to have a minimal reduction in daylight levels due to the proposed development at 238 Kilburn High Road, however, it will still comfortably meet the BRE targets living/kitchen areas.

It is predicted that there will be a drop in internal daylight values for the second and third floors. The results of the proposed design provide good levels of daylight for the third floor living area, which falls just shy of the BRE target for a new-build flat. Taking into account that the space is a refurbishment in an urban environment, this is considered to be suitable.

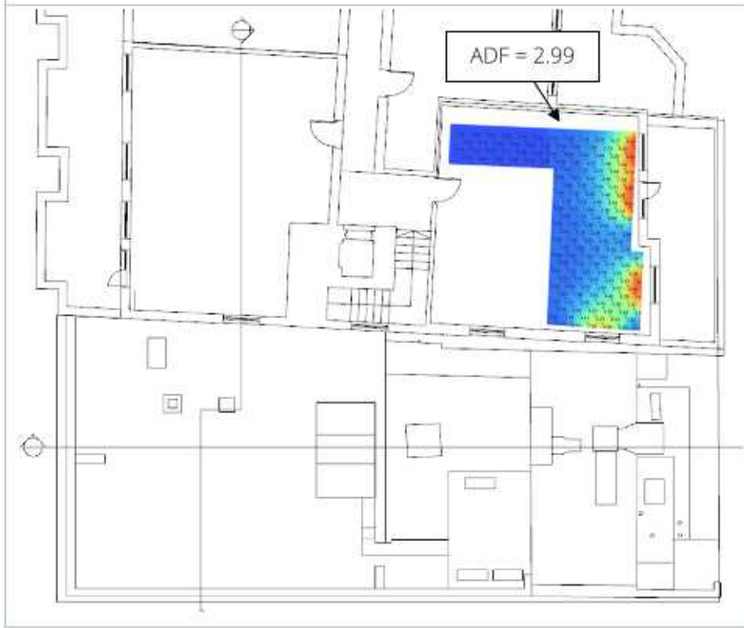
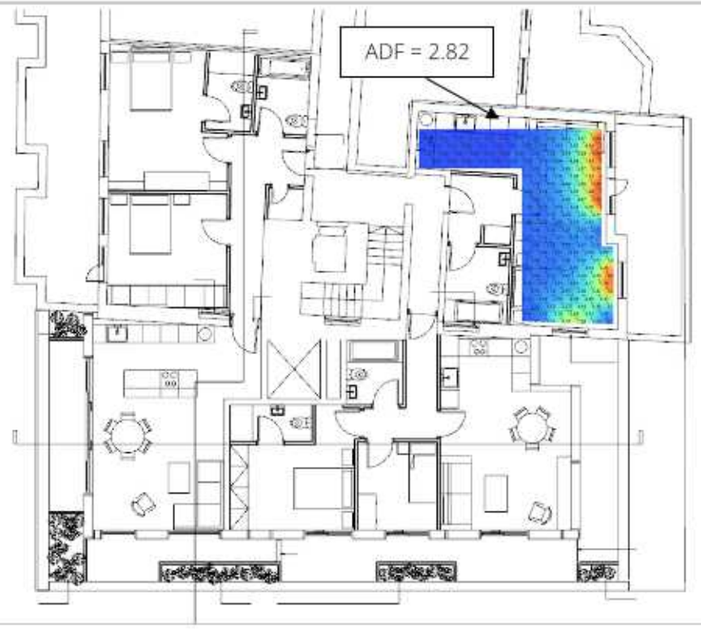
The results of the first and second floor flats are shown to fall below BRE guidance; however as the dwellings have the same layout of the third floor dwelling above, it is considered that new layout of the dwellings is suitable, and that the daylight levels are considered to be largely limited upon by the close proximity of the adjacent 1-23 Grangeway building.

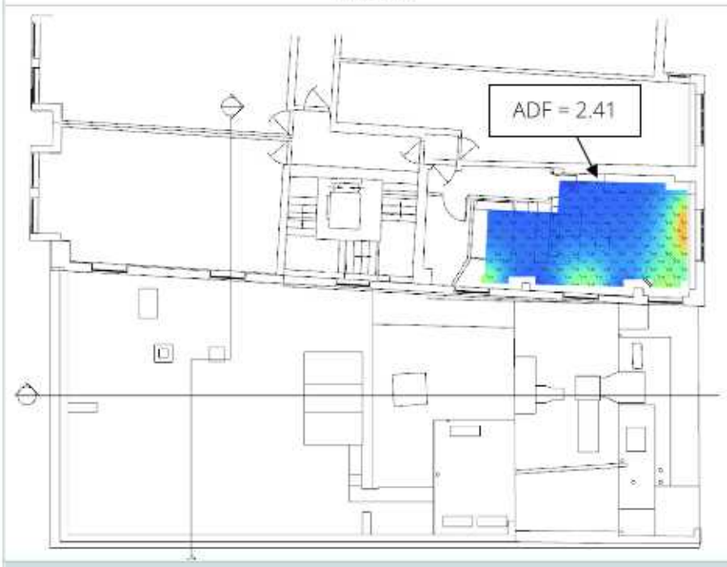
It is important to note that the dwellings assessed are client owned, and that BRE guidance for internal daylight are largely considered for new build developments. It is stated within BRE guidance that the daylight targets can be taken applied when considered other factors within the site.

Considering the limitations of the site which include the proximity to other large developments such as 1-23 Grangeway and 234 Kilburn High Road, and the loss of 2 windows to the flats on the first, second, and third floors, the reduction in ADF is seen as acceptable within the context of the site.

Space	Room Type	BRE Target (New-Build)	Average Daylight Factor	
			Existing	Proposed
Fourth Floor	Living Room/Kitchen	1.5	3.0	2.8
Third Floor	Living Room/Kitchen	1.5	2.4	1.2
Second Floor	Living Room/Kitchen	1.5	2.0	0.8
First Floor	Living Room/Kitchen	1.5	0.6	0.5

Table 5.1: ADF Results

Fourth Floor	
Existing	Proposed
	

Third Floor	
Existing	Proposed
	

Second Floor	
Existing	Proposed
	

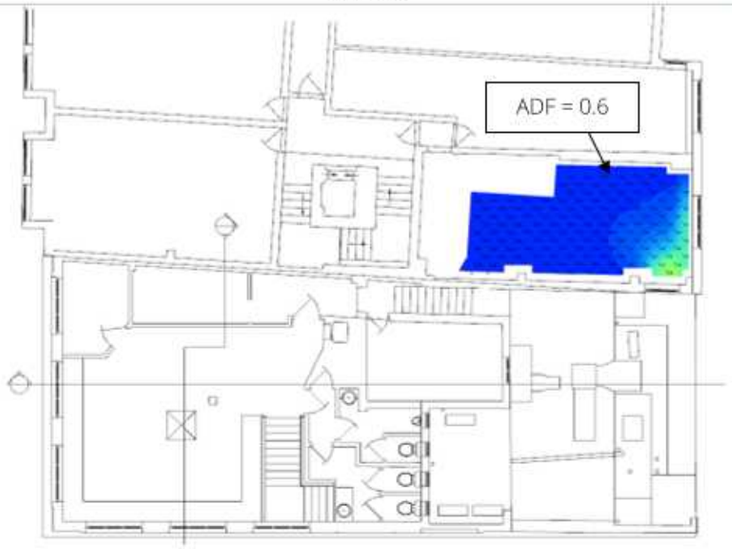
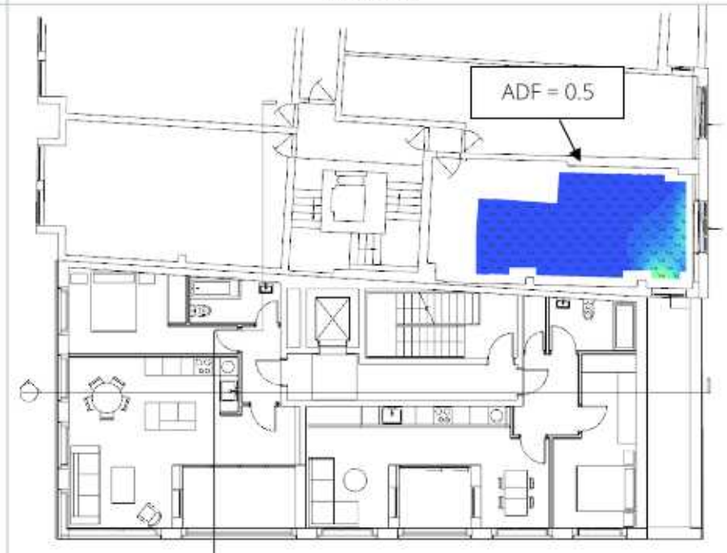
First Floor	
Existing	Proposed
	

Table 5.2: Daylight Factor Plots for the Assessed Flats

6.0 DAYLIGHT AND SUNLIGHT IMPACT ASSESSMENT

6.1 Nearest Sensitive Properties

The potentially sensitive properties adjacent to the proposed development have been identified as the following;

1. 1-23 Grangeway Road

The buildings identified above are the closest and thereby can be seen as a worst-case assessment in regard to daylight impact.

The site map to the opposite outlines the location of the existing development (in red) and the adjacent developments (in yellow). The developments highlighted (in blue) are included in the model as they affect the daylight levels within the assessed dwellings.

Figure 6.1: Shows the Existing Development and Adjacent Dwellings

6.2 Daylight Model

The figure to the opposite provides a screenshot of the overall daylight model of the existing (marked in red) and proposed (marked in green) development and adjacent properties, showing the properties which have been considered within the model.

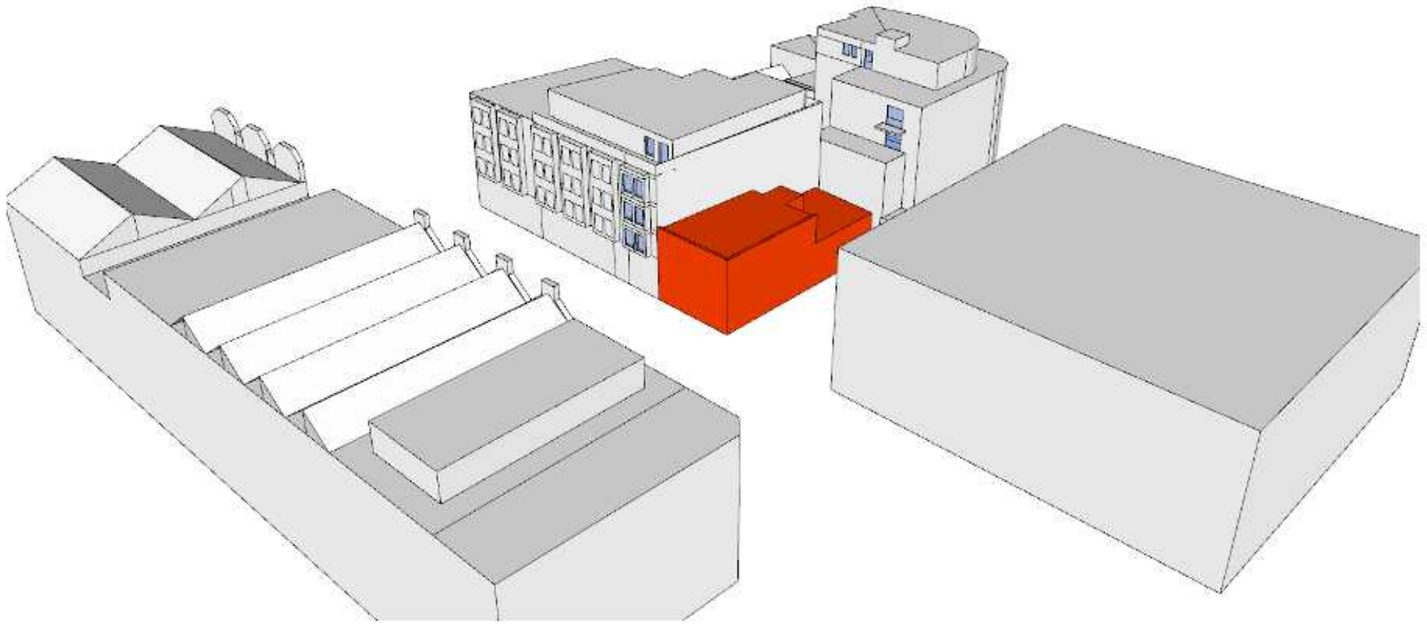
6.3 Assessment Criteria

As mentioned in section 4.2, the methods of assessment that have been carried out are as follows;

- Vertical Sky Component (VSC) – the amount of sky that can be seen from the centre point of a window. For existing buildings, windows need to achieve a value of 27 or at least 80% of the existing value.
- Annual Probable Sunlight Hours (APSH) – the percentage of available sunlight hours that a window will receive over the year. For existing buildings this needs to be 25%, or at least 80% of the existing value.
- Winter Probable Sunlight Hours (WPSH) – the percentage of available sunlight hours that a window will receive over the year. For existing buildings this needs to be 5%, or at least 80% of the existing value.
- Overshadowing on adjacent amenity spaces - At least half of the garden or the amenity space should receive at least 2 hours of sunlight on 21 March, or at least 80% of the existing value.

6.4 Assessed Window Locations

Some elevations of the assessed properties have been omitted from the analysis as it is determined in terms of the assessed values, that the proposed development will have a minimal to no impact on daylight access from the windows located on these facades.



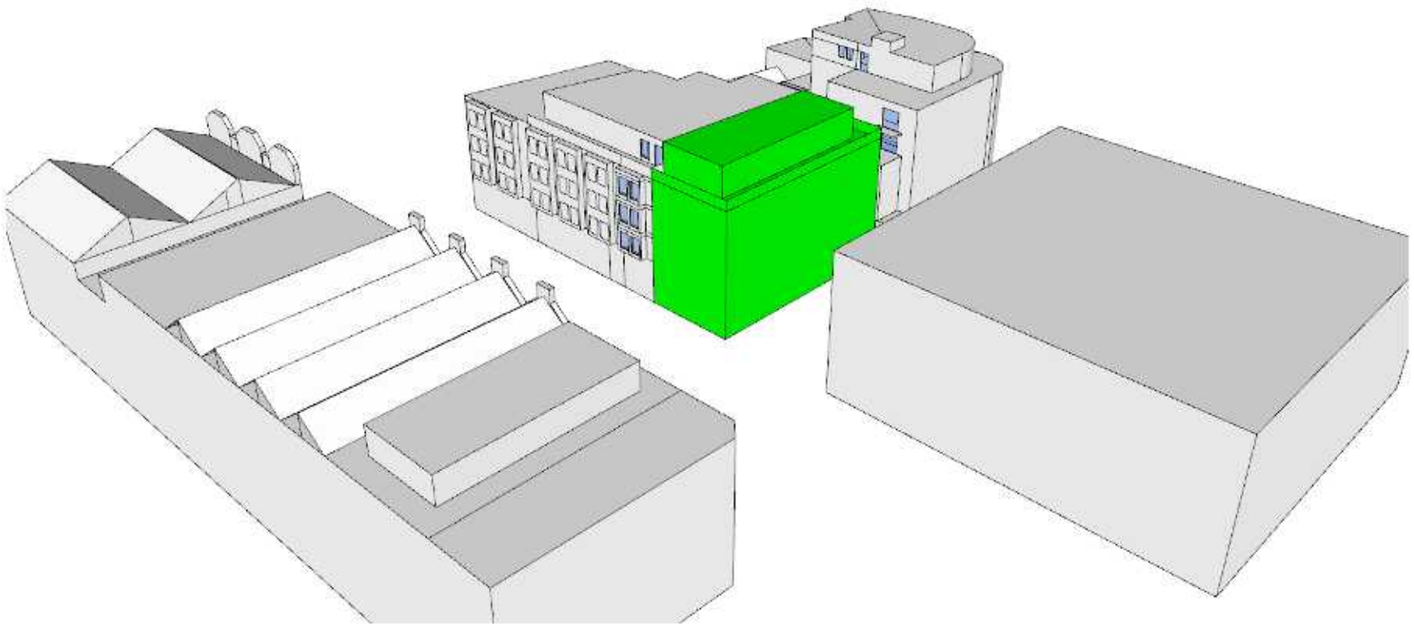


Figure 6.2: Daylight model screenshots of the Existing (red) and Proposed (green) Development and Adjacent Properties

6.5 Assessment Results (VSC, APSH, & WPSH)

Vertical Sky Component (VSC), Annual Probable Sunlight Hour (APSH), and Winter Probable Sunlight Hour (WPSH) predictions have been carried out for the identified windows at the adjacent properties before and after the proposed development, so to determine the level of impact. The table opposite shows the predicted VSC, APSH and WPSH results for the adjacent dwellings.

It is shown that for the assessed windows, any reduction upon the APSH and WPSH levels are in accordance with BRE guidance and as such is not seen to have a significant impact.

From 9 windows assessed, only 1 window located on 1-23 Grangeway is predicted to experience a slight reduction in VSC levels beyond BRE guidance. However, it is important to note that this window is prominently impacted by the balcony located on the floor above it, limiting any daylight and sunlight to this window.

BRE Guidance 2.1.17 states that balconies and overhangs significantly reduce the amount of light entering to the room situated underneath, with paragraph 3.2.9 of the BRE also confirming this. Hence, any minor loss in daylight would lead to high percentages of change. An additional assessment has been conducted and described in section 6.6 in the report.

Property	Window Ref.	Orientation	Predicted VSC				Predicted APSH				Predicted WPSH			
			Before	After	Change	Pass/Fail	Before	After	Change	Pass/Fail	Before	After	Change	Pass/Fail
1-23 Grangeway	W1	West	26.05	25.79	99%	Pass	43	43	100%	Pass	6	6	100%	Pass
	W2	West	22.57	22.3	99%	Pass	41	41	100%	Pass	3	3	100%	Pass
	W3	West	17.55	17.47	100%	Pass	27	27	100%	Pass	1	1	100%	Pass
	W4	West	12.94	12.94	100%	Pass	18	18	100%	Pass	0	0	100%	Pass
	W5	West	37.69	37.53	100%	Pass	63	63	100%	Pass	22	22	100%	Pass
	W6	West	37.7	37.51	99%	Pass	63	63	100%	Pass	22	22	100%	Pass
	W7	West	38.15	37.93	99%	Pass	64	64	100%	Pass	23	23	100%	Pass
	W8	West	35.1	31.88	91%	Pass	63	58	92%	Pass	23	19	83%	Pass
	W9	West	10.34	4.85	47%	*	20	12	60%	*	15	10	67%	Pass

* This window is seen to be primarily impacted by the balcony located above it

Table 6.1: VSC, APSH and WPSH predictions at the Adjacent Properties

6.6 Assessment Considerations – 1-23 Grangeway

As shown in the section above, the VSC and APSH analysis of 1-23 Grangeway presented one window that would see a slight reduction in VSC and APSH level. This window (W9) is located on the fourth floor of the apartment block and is seen to be predominantly impacted by the balcony located on the floor above. As mentioned previously, the BRE Guidance 2.1.17 states in paragraph 2.2.13:

> *"Existing windows with balconies above them typically receive less daylight. Because the balcony cuts out light from the top part of the sky, even a modest obstruction opposite may result in a large relative impact on the VSC, and on the area receiving direct skylight. One way to demonstrate this would be to carry out an additional calculation of the VSC and area receiving direct skylight, for both the existing and proposed situations, without the balcony in place."*

Thus, the VSC and APSH analysis was repeated for this window after the removal of the overhanging balcony, as seen in the images to the right.

The new VSC assessment has revealed that the BRE criteria is almost met once the balcony is removed, and the APSH level is now in accordance with the targeted values, proving that the main factor for a lower VSC and APSH value was the obstruction caused by the building's balcony.

Therefore, the balcony is seen to be the primary cause to the reduction in VSC and APSH levels for the fourth-floor window. Meaning that BRE guidance is well met when the balcony is not considered.

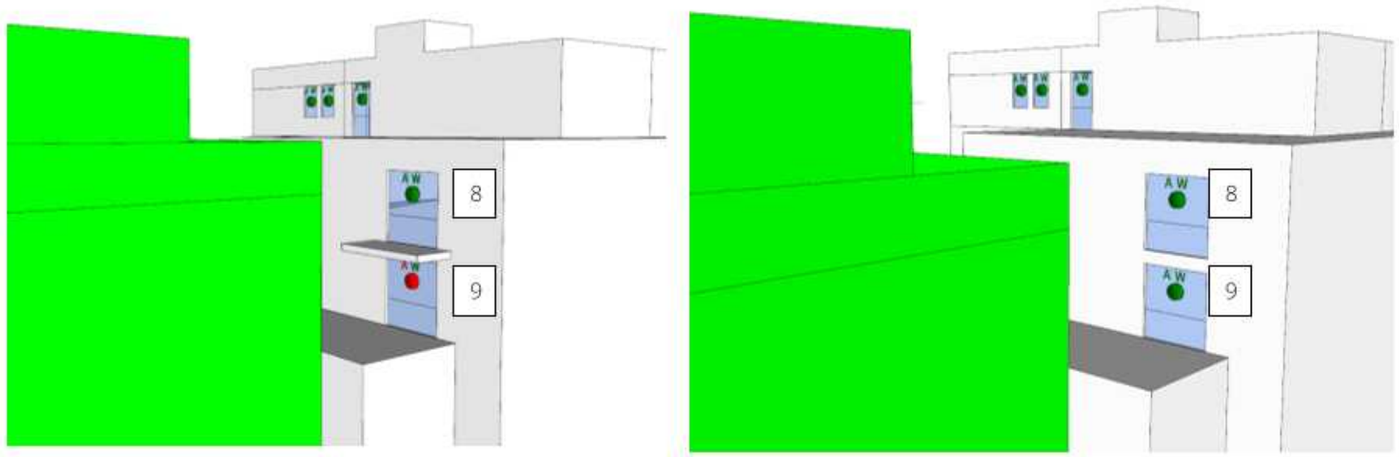


Figure 6.3: 1-23 Grangeway with overhanging balcony (left) and without overhanging balcony (right)

Property	Window Ref.	Orientation	Predicted VSC				Predicted APSH				Predicted WPSH			
			Before	After	Change	Pass/Fail	Before	After	Change	Pass/Fail	Before	After	Change	Pass/Fail
1-23 Grangeway	W9	West	31.19	25.39	81%	Pass	58	50	86%	Pass	22	17	77%	Pass

Table 6.2: VSC predictions at the adjacent 72-94 Zangwill Road after removal of the balconies