DAYLIGHT + SUNLIGHT ANALYSIS

PROPOSED RESIDENTIAL DEVELOPMENT AT THE JUNCTION OF GRANGE ROAD, NUTGROVE AVENUE AND LORETO TERRACE, RATHFARNHAM, DUBLIN 14.

ADDITIONAL INFORMATION Reg. Ref. SD22A/0126

By

CDP Architecture,

4 The Mall,

Main Street, Lucan Village,

County Dublin.

July 2022

Table of Contents

1.0 Glossary

Vertical Sky Component

Ratio of the part of illuminance, at a point on a given vertical plane, that is received directly from a CIE (Commission Internationale De L'Eclairge) standard overcast sky, to illuminance on a horizontal plane due to an unobstructed hemisphere of this sky;

No Skyline

Sky factor is a room based assessment that looks at how much of the sky any particular point in the room can see. The working plane represents a level of usual activities e.g. working at a desk, eating dinner, cooking food and the aim is that the no-skyline (the line behind which no skylight is received) excludes those spaces

CIE Standard Overcast Sky;

A completely overcast sky, which is the darkest at the horizon and brightest at the zenith (vertically overhead);

Annual Probable Sunlight Hours (APSH):

The long-term average of the total number of hours during the year in which direct sunlight reaches the unobstructed ground (when clouds are taken into account);

Average Daylight Factor (ADF).

This is the ratio of total daylight flux incident on the working plane to the area of the working plane, expressed as a percentage of the outdoor illuminance on a horizontal plane due to an unobstructed CIE Standard Overcast Sky.

Daylight, Natural Light:

Combined Sunlight and Skylight;

Sunlight:

Part of solar radiation that reaches the earth's surface as parallel rays after selective attenuation by the atmosphere;

Skylight:

Part of solar radiation that reaches the earth's surface as a result of scattering in the atmosphere;

2.0 Introduction

This impact assessment on residential amenity has been prepared as a response to the Additional Information request from South Dublin County Council dated 24th June 2022, relating to a planning application for the proposed development at the junction of Grange Road, Nutgrove Avenue and Loreto Terrace, Rathfarnham, Dublin 14.

The additional information requests are as follows;

Additional Information Request Item 6-

Sunlight/Daylight.
The reconfigured units are provided with a variety of shapes and layouts. There is concern regarding some of the units, in terms of levels on sunlight and daylight. The applicant should supply a Sunlight and Daylight Analysis by way of additional information which should assess the scheme against the BS EN 17037 standard.
The units of concern are:

- Units 9, 22 and 35 are long, narrow, single-aspect studio units. There is concern that the 'no sky line' and internal light levels would not be adequate.

- A number of single aspect units at ground level appear to be sited under an overhang at first floor. There is concern that the 'no sky line', vertical sky component, and internal light levels, would indicate insufficient lighting to habitable spaces. This applies to units 2, 3, 4, 5, 7, 8, 9, and 10.

- Unit 26 is provided with opaque glazing along one side which would be ok, but for the subdivision of the living space and lack of any view from the only window serving the main living area. This is not considered to be an appropriate treatment for a habitable room. Unit 26, which is provided in place of permitted unit 211, should be reconfigured to maximise the unobstructed light to living areas.

The reconfigured units, specifically the units of concern: 2, 3, 4, 5, 7, 8, 9, 10, 22, 26 & 35 (see reference image 2, 3 & 4) have been carefully assessed against the BS EN 17037 standard.

The aim of the study is to record and analyse the results for the following:

- The daylight/sunlight levels within the habitable areas of selected apartments, to give an indication of the expected daylight/sunlight levels throughout the proposed development.

The calculation methodology for daylight and sunlight is based on the British Research Establishments "Site Layout Planning for Daylight and Sunlight: A Good Practice Guide" by PJ Littlefair, 2011 Second Edition which is the established guidance intended for use in the UK and the Republic of Ireland. It has been developed in conjunction with daylight and sunlight recommendations in BS 8206: Part 2: 'Lighting for Buildings Practice for Daylighting'. This reference document is used and accepted in the field of sunlight/daylight analysis and is specifically referred to in many Local Authorities' planning policy guidance for daylighting. The permissible reduction in light outlined within the guideline document is accepted as the industry standards.

A 3D geometric model of the site was created using software 3D Sketch Up Model - Plug In: MBS Daylight for Sketch Up Version 5.1.0.5 and using drawings prepared by CDP Architecture. The analysis procedure considers the following daylighting and sun lighting calculation methodology: Average Daylight Factor (ADF).

It should be noted that the guidance in this document should be seen as advice only and it should not constrain the design, "The advice given here is not mandatory and the guide 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 since natural lighting is only one of many factors in site layout design" (Littlefair, 2011).

The guidance from 'Site Layout Planning for Daylight and Sunlight', should be seen as not being suitable for rigid application to all developments in the context of national and local policies for the consolidation and densification of urban areas.

The 'Urban Design Manual, A Best Practice Guide' (Environment, Heritage and Local Government, 2009) states that it may not always be possible to meet the criteria within 'Site Layout Planning for Daylight and Sunlight' for urban areas. "Where design standards are to be used (such as the UK document Site Layout Planning for Daylight and Sunlight, published by the BRE), it should be acknowledged that for higher density proposals in urban areas it may not be possible to achieve the specified criteria, and standards may need to be adjusted locally to recognise the need for appropriate heights or street widths" (Environment, Heritage and Local Government, 2009).

In line with the provisions of the 'Apartment Guidelines' as discussed above, the 'Building Heights' guidelines make allowances for where a proposal may not fully meet all requirements of daylight provisions. With this report discretion should be applied where it is desired that a scheme meets wider planning objectives such as comprehensive urban regeneration. This is applicable to the subject scheme whereby the requirement to provide for a sustainable level of development results in a need for some discretion to be applied in terms of completely meeting performance standards.

In general, the design meets with the principles of the BRE guide and BS 8206-2 2008 (British Standard Institution, 2008) and the latest guidelines for new apartments as issued by the Department of Housing with good quality daylight available across a substantial portion of the development. Good levels of sunlight will also be available in the development's amenity areas.

2.1 BRE Guidelines

The purpose of this guide is to provide advice on a buildings site plan and layout to achieve good levels of daylighting and sun lighting. The guide provides calculation methodologies which aims to assist clients, consultants and planning officials make informed decisions on site layout to ensure no significant loss of light occurs. It should be noted that the guidance in this document should be seen as advice only and it should not constrain the design.

If this guidance is followed the end result is a site which is positioned and laid out in such a way which will provide adequate levels of sun lighting and daylighting while creating an ambience that will appeal to any building occupant.

3.0 Existing Site and Current Proposal

The subject site is located at the junction of Grange Road, Nutgrove Avenue and Loreto Terrace, Rathfarnham, Dublin 14 which measures 0.2638 ha. The site is surrounded by Grange Road to the west, Loreto Terrace to the south, Nutgrove Avenue to the north and Loreto to the East, the site has a frontage of 24m approximately along Nutgrove Avenue and approximately 48m along Loreto Terrace.

Loreto Terrace beyond the site provides access to a narrow cul-de-sac on the eastern side of the site and to the southwest by Loreto Terrace the carriageway ranges in widths from 7m close to its junction with Grange Road to 5.5m in the southern corner of the subject site. There is a 2m footpath which runs along the edge of the site.

The subject site does not accommodate any buildings or structures and comprises a level area of land under unkempt grass which is fenced off and unoccupied. The junction between Grange Road and Nutgrove Avenue is controlled by signals and there is also an area across the road which is open space. The site is surrounded by several bungalows with dormers and two storey dwellings.

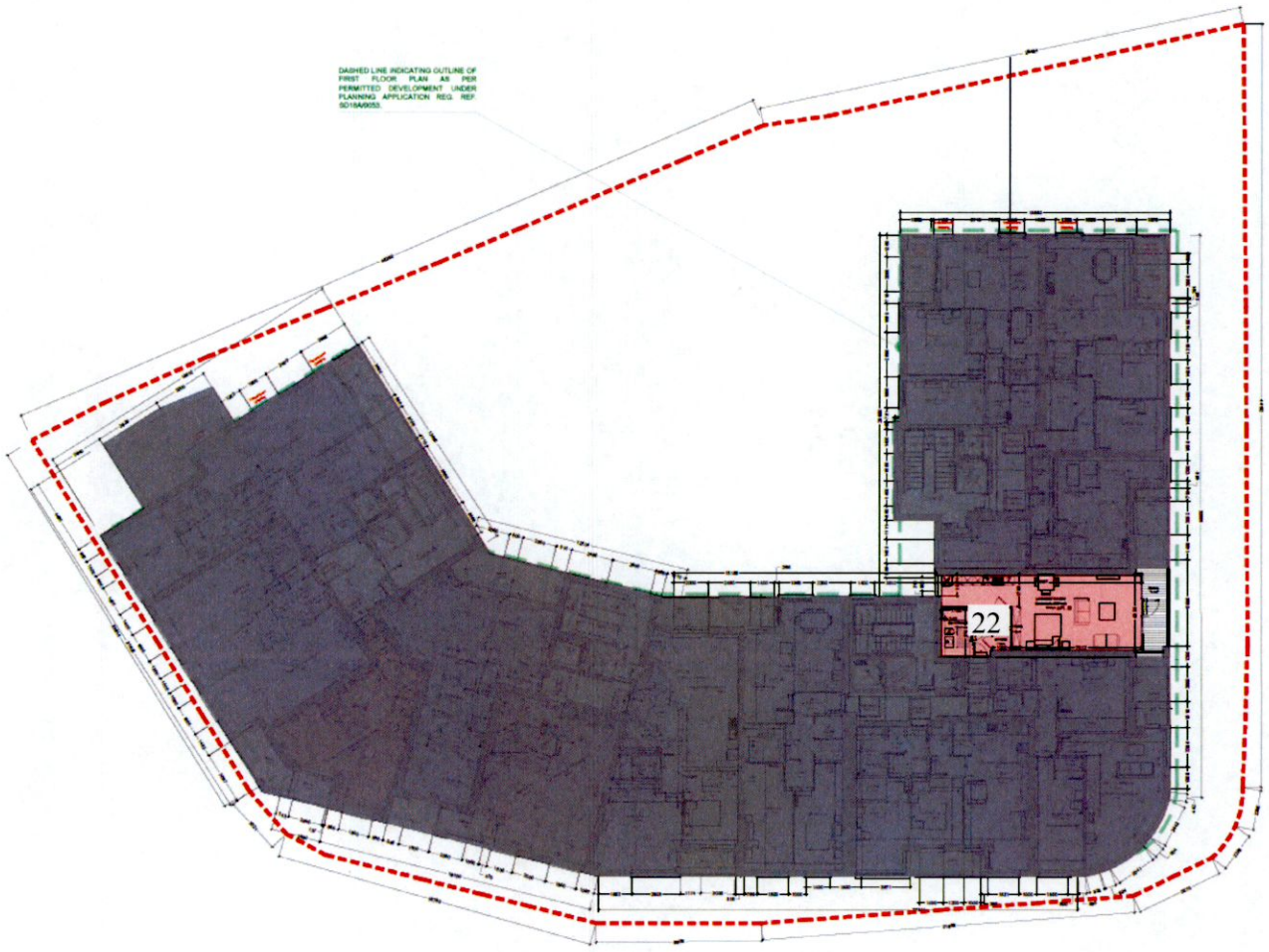
The site is in a suitable, accessible location and of adequate side to accommodate a sustainable density of a residential development.

Reference Image 1: Satellite Map Extract *Site Boundary*

Reference Image 2: Ground Floor Plan

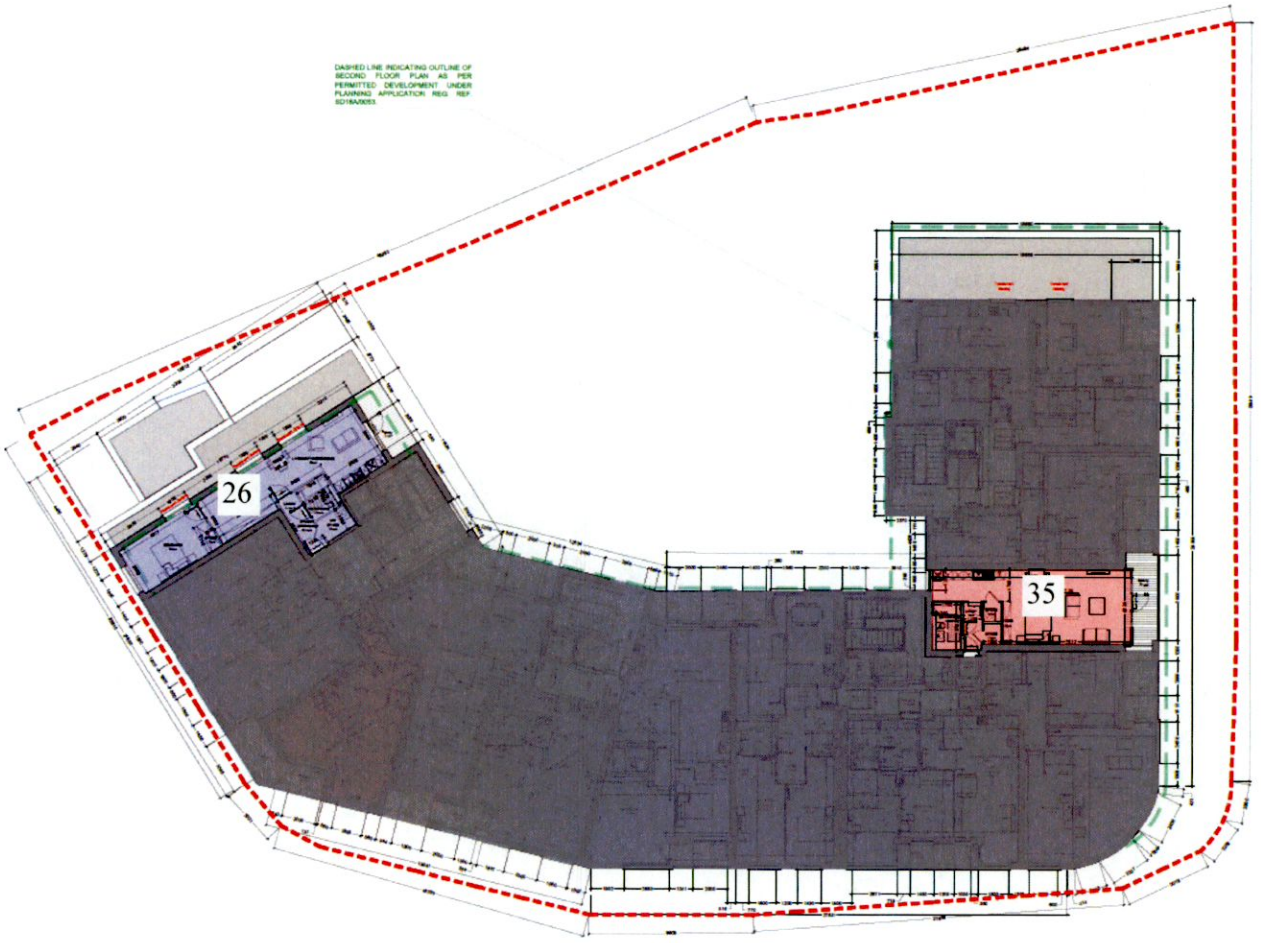
Site Boundary ----------

Units 2, 3, 4, 5, 7, 8, 9 & 10 located on the ground floor (see reference image 2) have been carefully assessed for 'no sky line', vertical sky component and internal light levels and the results show that the habitable spaces in these units meet the requirements as per the BRE guide and BS 8206-2 2008 (British Standard Institution, 2008) and the latest guidelines for new apartments as issued by the Department of Housing



Reference Image 3: First Floor Plan *Site Boundary*

Unit 22 located on the first floor (see reference image 3) has been carefully assessed for 'no sky line', and internal light levels and the results show that the habitable spaces in this unit meet the requirements as per the BRE guide and BS 8206-2 2008 (British Standard Institution, 2008) and the latest guidelines for new apartments as issued by the Department of Housing



Reference Image 4: Second Floor Plan

Site Boundary ----------

Units 26 & 35 located the second floor (see reference image 4) have been carefully assessed for 'no sky line', vertical sky component and internal light levels and the results show that the habitable spaces in these units meet the requirements as per the BRE guide and BS 8206-2 2008 (British Standard Institution, 2008) and the latest guidelines for new apartments as issued by the Department of Housing

3.0 Assessment Methodology

BRE Guidelines – 'Site Layout Planning for Daylight and Sunlight' puts forth assessment methodologies which consider daylight and sunlight for new developments.

3.1 Average Daylight Factor (ADF)

The method of calculation selected for the daylight analysis for this development is the Average Daylight Factor (ADF). This is the most detailed and thus most accurate method which considers not only the amount of sky visible from the vertical face of the window, but also the window size, room size and room use. The Average Daylight Factor (ADF) is a ratio between indoor illuminance and outdoor illuminance expressed as a percentage. In dwellings, the following figures should be used to assess if there is a good level of natural light in a space.

- Bedrooms = 1% ADF

- Living / Kitchen / Dining = 2% ADF

This method of assessment takes into account the total glazed area to the room, the transmittance quality of the glazing proposed, the total area of the room surfaces including ceilings and floors, and the internal average reflectance for the room being assessed. The method also takes into account the **Vertical Sky Component** (unobstructed sky) and the quantum of reflected light off external surfaces.

ADF can be calculated using the following formula:
ADF = TM AwØ A(1-R2)

Where: T= diffuse visible transmittance of the glazing, including corrections. For clean, clear double glazing with a low E coating a value of 0.68 can be used. As per BRE 209.

M= is the maintenance factor of the glass, allowing for the effects of dirt. BS8206-2:2008 section A1.3 recommends a value of 0.9 for vertical glazing in an urban location.

Aw= is the net glazed area of the windows, in m2 . I have assumed 15% mullions.

Ø= is the angle of visible sky in degrees. It should be measured half way up the window. A= is the total area of the room surfaces: ceiling, floor, walls and windows, in m2 .

R= is the average reflectance of a room. For a fairly light-coloured room a value of 0.5 can be used.

It is important to note that Vertical Sky Component Analysis was not used as part of the analysis as a more detailed Average Daylight Factor has been undertaken. The VSC is a simple geometrical calculation which provides an early indication of the potential for daylight entering the space. However, it does not assess or quantify the actual daylight levels inside the rooms.

3.2 No Sky Line

This method assesses the change in position of the No Sky Line between the existing and proposed situations. Sky factor is a room based assessment that looks at how much of the sky any particular point in the room can see. The working plane represents a level of usual activities e.g. working at a desk, eating dinner, cooking food and the aim is that the no-skyline (the line behind which no skylight is received) excludes those spaces. It does take into account the number and size of windows to a room, but still does not give any qualitative or quantitative assessment of the light in the room, only where sky can or cannot be seen.

There will be a good distribution of light in the room if at least 80% of the working plane receives direct skylight.

The above assessments have been carried out using computer-based methods. Three-dimensional computer models of the existing site, the existing buildings, and the proposed development have all been generated and simulated under appropriate sky conditions in order to obtain accurate predictions.

It is important to note that whilst the methods presented in the BRE guide provide designers and planners with a clear and objective way of assessing the sunlight and daylight levels associated with a new development, the particular performance targets which are included in the guide are intended to be used with a degree of discretion and flexibility. Within the introductory section 1.6 of the BRE guide the following advice is provided:

"The advice given here is not mandatory and this guide should not be seen as an instrument of planning policy; Its aim is to help rather than constrain the designer."

4.0 Sunlight and Daylight Results

Assessment of skylight and daylight access levels available to the habitable spaces of selected apartments: An assessment of the extent to which the proposed development could impact on the skylight access levels and daylight levels available to the principal living rooms of the units of concern.

4.1 Average Daylight Factor (ADF) Analysis Results

Reference Image 5: Ground Floor Level Assessed Rooms

Floor	Unit Type	Unit No.	Room Name	Room Use	ADF Required (%)	ADF Results (%)	Meets Minimum ADF Criteria
Ground Floor	2 Bed Apt	2	A	Bedroom	1.0	1	YES
			B	Bedroom	1.0	1	YES
			C	L/K/D	2.0	2	YES
	Studio	3	D	L/K/D/Bedroom	2.0	2	YES
	2 Bed Apt	4	E	Bedroom	1.0	1	YES
			G	Bedroom	1.0	1	YES
			F	L/K/D	2.0	2	YES
	1 Bed Apt	5	H	Bedroom	1.0	1	YES
			I	L/K/D	2.0	2	YES
	2 Bed Apt	7	J	Bedroom	1.0	1	YES
			K	Bedroom	1.0	1	YES
			L	L/K/D	2.0	2	YES
	2 Bed Apt	8	N	Bedroom	1.0	1	YES
			O	Bedroom	1.0	1	YES
			M	L/K/D	2.0	2	YES
	Studio	9	P	L/K/D/Bedroom	2.0	2	YES
	1 Bed Apt	10	R	Bedroom	1.0	1	YES
			Q	L/K/D	2.0	2	YES

Table 1: Ground Floor Level Assessed Rooms

Reference Image 6: First Floor Level Assessed Rooms

Floor	Unit Type	Unit No.	Room Name	Room Use	ADF Required (%)	ADF Results (%)	Meets Minimum ADF Criteria
First Floor	Studio	22	S	L/K/D/Bedroom	2	2	YES

Table 2: First Floor Level Assessed Rooms

Reference Image 7: Second Floor Level Assessed Rooms

Floor	Unit Type	Unit No.	Room Name	Room Use	ADF Required (%)	ADF Results (%)	Meets Minimum ADF Criteria
Second Floor	1 Bed Apt	26	T	Bedroom	1	1	YES
			U	L/K/D	2	2	YES
	Studio	35	V	L/K/D/Bedroom	2	2	YES

Table 3: Second Floor Level Assessed Rooms

4.2 No Sky Line (NSL) Analysis Results

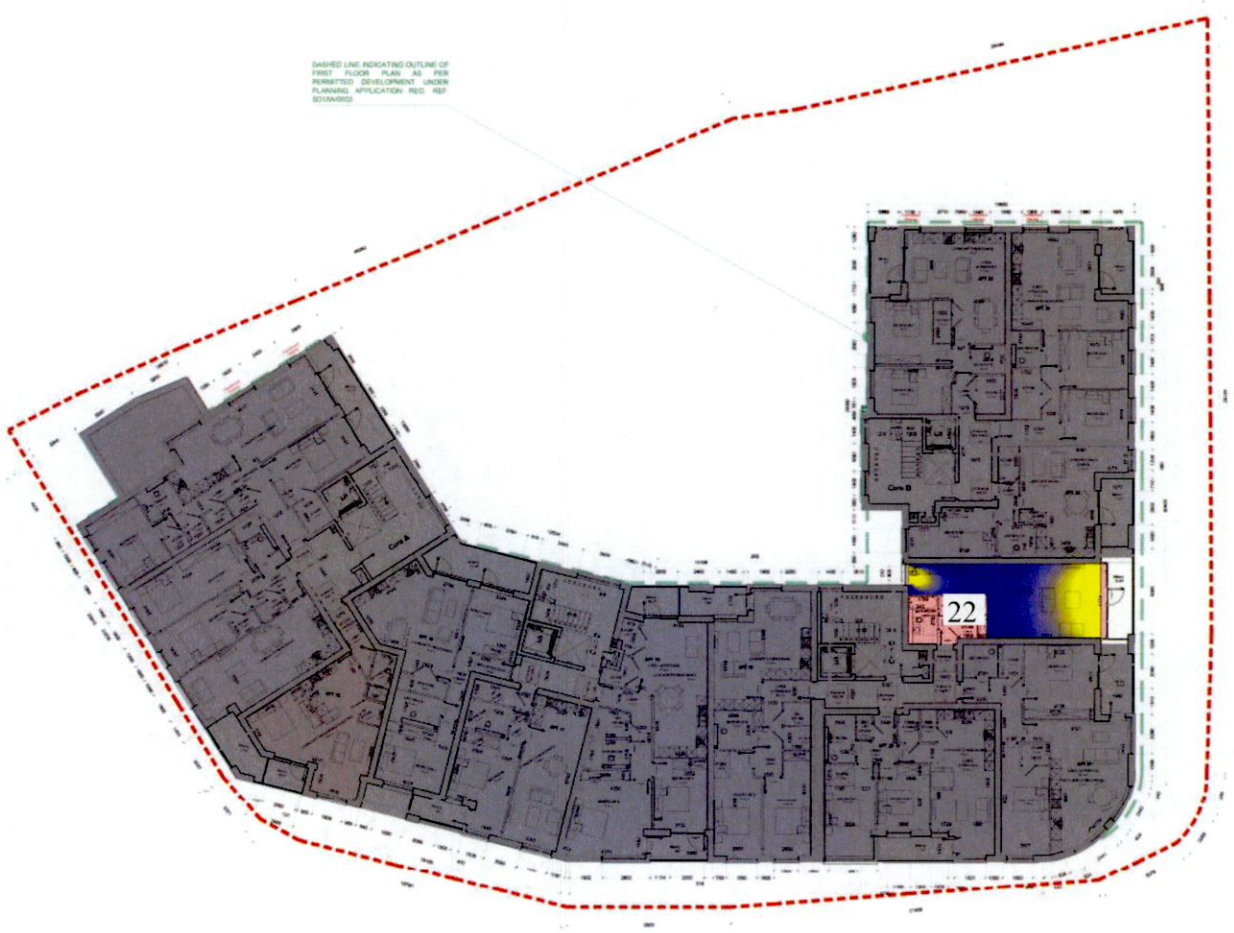
Floor	Unit Type	Unit No.	Room Name	Room Use	Room Area	Lit Area Pr	Proposed %	Meets BRE Criteria
Ground Floor	2 Bed Apt	2	A	Bedroom	13.649147	13.626703	99.84%	YES
			B	Bedroom	7.048017	6.985637	99.11%	YES
			C	L/K/D	28.25528	25.33628	89.67%	YES
	Studio	3	D	L/K/D/Bedroom	32.154574	32.154574	100.00%	YES
	2 Bed Apt	4	E	Bedroom	12.692789	12.025262	94.74%	YES
	1 Bed Apt	5	H	Bedroom	12.930959	12.758359	98.67%	YES
			I	L/K/D	23.886992	23.886992	100.00%	YES
	2 Bed Apt	7	J	Bedroom	12.852561	12.829034	99.82%	YES
			K	Bedroom	12.548613	12.425905	99.02%	YES
			L	L/K/D	29.573408	28.147025	95.18%	YES
	2 Bed Apt	8	N	Bedroom	12.608271	12.608271	100.00%	YES
			O	Bedroom	9.08204	9.08204	100.00%	YES
			M	L/K/D	29.81451	29.81451	100.00%	YES
	Studio	9	P	L/K/D/Bedroom	35.647765	35.455853	99.46%	YES
	1 Bed Apt	10	R	Bedroom	12.234666	10.522205	86.00%	YES
			Q	L/K/D	28.486744	28.48674	100.00%	YES
First Floor	Studio	22	S	L/K/D/Bedroom	35.661752	35.661752	100.00%	YES
Second Floor	1 Bed Apt	26	T	Bedroom	14.378202	14.333761	99.69%	YES
			U	L/K/D	30.857438	30.639709	99.29%	YES
	Studio	35	V	L/K/D/Bedroom	35.719507	35.719507	100.00%	YES

Table 4: No Sky Line (SKL) Analysis - Units 2, 3, 4, 5, 7, 8, 9, 10, 22, 26 & 35

Reference Image 8: Ground Floor Plan *Site Boundary* ----------

Please see Table 4 and reference image 8.

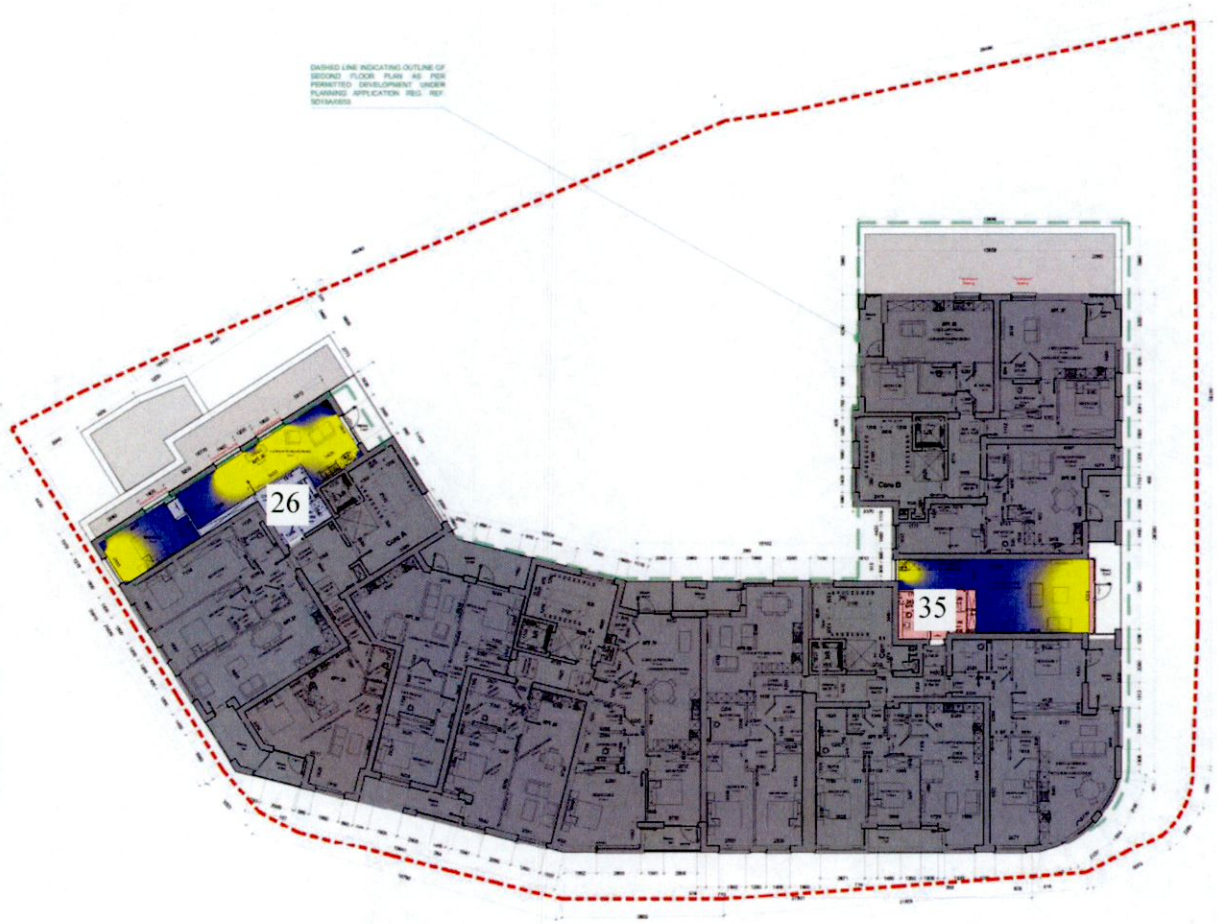
Units 2, 3, 4, 5, 7, 8, 9 & 10 located on the ground floor have been carefully assessed for 'no sky line' and all habitable rooms meet the minimum BRE requirements i.e., more than 80% of the working plane in the habitable rooms receives direct skylight.



Reference Image 9: First Floor Plan *Site Boundary*

Please see Table 4 and reference image 9.

Unit 22 located on the first floor has been carefully assessed for 'no sky line' and all habitable rooms meet the minimum BRE requirements i.e., more than 80% of the working plane in the habitable rooms receives direct skylight.



Reference Image 10: Second Floor Plan *Site Boundary* ----------

Please see Table 4 and reference image 10.

Units 26 & 35 located on the second floor have been carefully assessed for 'no sky line' and all habitable rooms meet the minimum BRE requirements i.e., more than 80% of the working plane in the habitable rooms receives direct skylight.

4.3 Analysis Summary

Upon assessing units 2, 3, 4, 5, 7, 8, 9, 10, 22, 26 & 35 for average daylight factor (ADF) and 'no sky line', it is evident that all habitable rooms in these units receive sufficient sunlight and daylight. Please see Table 1, Table 2, Table 3, Table 4 and reference images 5, 6, 7, 8, 9 and 10.

The skylight reaching the windows although reduced marginally, enough daylight and sunlight is available.

Having regard to this finding, it is reasonable to conclude that adequate levels of daylight and sunlight would be available to these units. The results indicate that all units of concern mentioned in Additional Information Request Item 6 meet or exceed the minimum criteria recommended by the BRE guidelines.

5.0 Conclusion

This report has been prepared to assess the levels of sunlight and skylight amenity that would be provided within the reconfigured units 2, 3, 4, 5, 7, 8, 9, 10, 22, 26 & 35 which are being proposed as part of a residential development at the junction of Grange Road, Nutgrove Avenue and Loreto Terrace, Rathfarnham, Dublin 14.

Using industry standard methodologies, the following is concluded:

- Average Daylight Factor (ADF): It is concluded that adequate levels of daylight amenity would be available to the units of concern as illustrated through the results tables. All living/kitchen/dining rooms achieve an ADF of 2% or higher and bedrooms achieve 1% or higher. The proposed development, therefore, is considered acceptable in relation to internal light levels and sky exposure.

- No Sky Line: All units including the North facing units at ground floor level sited under an overhang at first floor indicate sufficient lighting and exposure to sky in all habitable rooms. In all habitable rooms, more than 80% of the working plane receives direct skylight. Therefore, as outlined within the BRE Site Layout Planning for Daylight and Sunlight, the criteria for 'no sky line' is met.

From a planning perspective therefore, it is the concluded that the reconfigured units meet the recommended levels of sunlight and daylight acceptable within the BRE Report 'Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice – Second Edition'.

APPENDIX A: SOURCE MATERIAL

Granted Drawings & Reports Associated with Reg. Ref. No. SD18A/0053

CDP Architecture Drawing - 3.1.001 - Site Location Map (Record Place Map)
CDP Architecture Drawing - 3.1.002 - Site Location Map (Urban Place Map) (Position of Site Notices)
CDP Architecture Drawing - 3.1.003 - Existing Block Plan (Position of Site Notices)
CDP Architecture Drawing - 3.1.004 - As Granted - Block Plan
CDP Architecture Drawing - 3.1.005 - Proposed New Block Plan
CDP Architecture Drawing - 3.1.006 - Existing Site Plan / Removal Works
CDP Architecture Drawing - 3.1.007 - As Granted - Site Plan
CDP Architecture Drawing - 3.1.008 - Proposed New Site Plan with Ground Floor Plan
CDP Architecture Drawing - 3.1.009 - Proposed New Site Plan with Roof Plan
CDP Architecture Drawing - 3.1.100 - As Granted - Basement Floor Plan
CDP Architecture Drawing - 3.1.101 - As Granted - Ground Floor Plan
CDP Architecture Drawing - 3.1.102 - As Granted - First Floor Plan
CDP Architecture Drawing - 3.1.103 - As Granted - Second Floor Plan
CDP Architecture Drawing - 3.1.104 - As Granted - Roof Floor Plan
CDP Architecture Drawing - 3.1.105 - Proposed New Basement Floor Plan
CDP Architecture Drawing - 3.1.106 - Proposed New Ground Floor Plan
CDP Architecture Drawing - 3.1.107 - Proposed New First Floor Plan
CDP Architecture Drawing - 3.1.108 - Proposed New Second Floor Plan
CDP Architecture Drawing - 3.1.109 - Proposed New Roof Plan
CDP Architecture Drawing - 3.1.200 - As Granted - Elevations North West, North, South East and South West
CDP Architecture Drawing - 3.1.201 - Proposed New Elevations North West, North, South East and South West
CDP Architecture Drawing - 3.1.202 - As Granted - Contextual Elevations North West, North, South East and South West
CDP Architecture Drawing - 3.1.203 - Proposed New Contextual Elevations North West, North, South East and South West
CDP Architecture Drawing - 3.1.300 - As Granted - Sections AA, BB and CC
CDP Architecture Drawing - 3.1.301 - Proposed New Sections AA, BB and CC
CDP Architecture Drawing - 3.1.302 - As Granted - Contextual Sections AA, BB and CC
CDP Architecture Drawing - 3.1.303 - Proposed New Contextual Sections AA, BB and CC

CDP Architecture 3D Sketch Up Model - Plug In: MBS Daylight for Sketch Up Version 5.1.0.5

Site Photographs