DAYLIGHT ASSESSMENT FOR PROPOSED RESIDENTIAL DEVELOPMENT AT FRASCATI SHOPPING CENTRE, BLACKROCK,CO.DUBLIN

Prepared for IMRF II Frascati Limited Partnership acting through its general partner Davy IMRF II GP Limited.
Date: 23rd February 2018

Revision 02

BPG3.

Rev.	Description	Issued by	Date	Checked
01	Assessment of daylight conditions associated with proposed development at Frascati Shopping Centre, Blackrock	RW	18/10/2017	KR
02	Assessment expanded to address concerns arising at appeal stage.	RW	23/02/2018	KR

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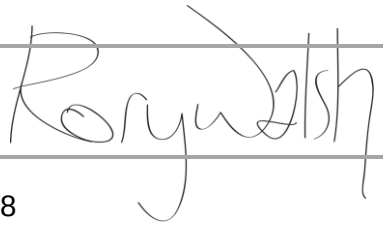
author	R Walsh
signature	
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CONTENTS

Glossary

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)
Daylight	combined sunlight and skylight
Skylight	part of solar radiation that reaches the earth's surface as a result of scattering in the atmosphere
Sunlight	part of solar radiation that reaches the earth's surface as parallel rays after selective attenuation by the atmosphere
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. The VSC does not include reflected light, either from the ground of from other buildings

INTRODUCTION

BPG3 have been appointed by IMRF II Frascati Limited Partnership acting through its general partner Davy IMRF II GP Limited to carry out a daylight assessment on a proposed development at the Frascati Shopping Centre, Blackrock, Co. Dublin. The findings of this assessment are reported on the following pages.

The proposed development was thought to be capable of producing altered lighting conditions in the immediate neighbourhood. The purpose of this study has been to quantify the magnitude of these alterations and to assess them with respect to a number of recognised standards and norms.

The study has considered all of the important components of daylight including skylight and sunlight and the associated shadow formations. The assessment has been carried out with regard to the principles outlined in BRE guide *'Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice'* 2nd Edition. This is the updated version of the method recommended in the governments guideline document *'Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas'*, 2009, which is in turn recommended within the development plan for this area, Dun Laoghaire-Rathdown Development Plan 2016-2022.

Two separate daylight studies are presented in this report. They are outlined as follows.

Study A: Impact on sunlight & skylight available to neighbouring residences

An assessment of the impact which the proposed new development will have on the sunlight & skylight levels available to the residences located in the immediate neighbourhood.

Study B: Impact on neighbouring gardens

An assessment of the impact which the proposed new development will have on the sunlight levels available to neighbouring gardens.

This report follows on from the report which was submitted with the original planning application (DLRCC Reg. Ref. D17A/0950) and has been expanded in a number of areas in order to address concerns which have been raised within 3rd party appeals. The additional material presented in this report is outlined as follows:

- The set of receptor points has been expanded to include all of the ground floor windows located on house numbers No.1 to No.4 George's Avenue.
- Sunlight levels for all assessment points, even those which do not qualify as assessable points under the BRE guidelines, have been included in this report.
- The sunlight impact on a number of outdoor terraces located within the Lisalea Apartment Complex has been assessed.

Methodology

The analysis has been carried out with regard to the principles outlined in the BRE guide *'Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice'*, 2nd Edition.

It is important to note that, whilst the methods in the BRE report provide designers and planners with a clear and objective way of assessing the daylight conditions associated with a new development, the performance targets which are included in the report are intended to be used with a degree of discretion and flexibility. Indeed the introductory section of the BRE report includes the following qualifications:

> *"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."*

As recommended in the BRE guide, a quantitative approach to the assessment of daylight conditions has been adopted in this study. Numeric calculations have been carried out to establish the sunlight and skylight conditions which will register at a number of test points. The results of these calculations are presented in tables.

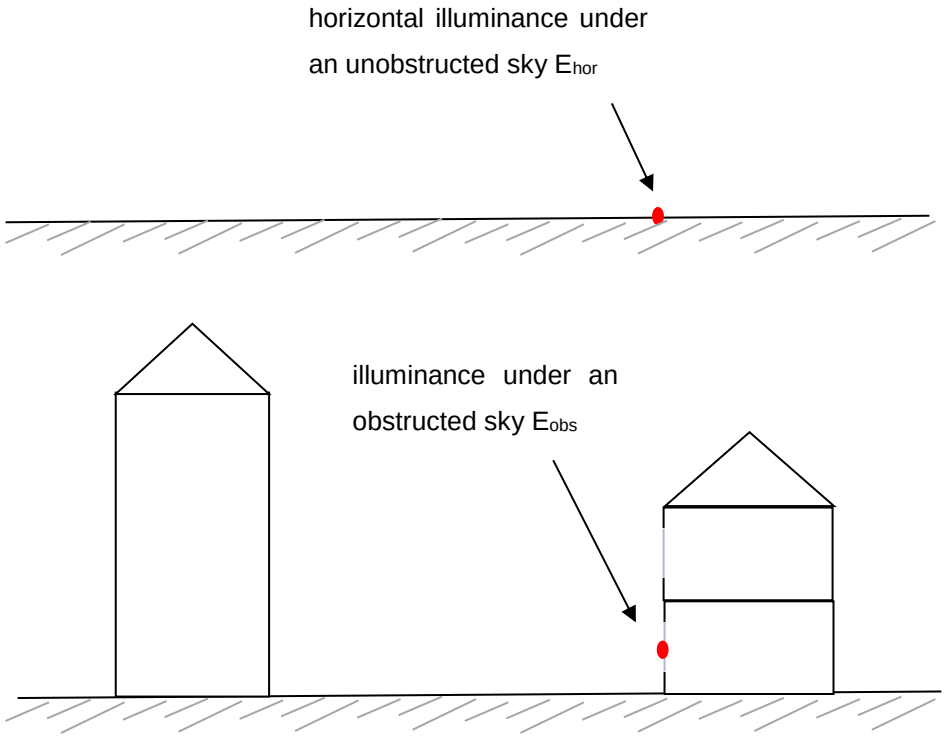
The quantitative assessment has been carried out using state-of-the-art daylight analysis software. Three dimensional computer models of the existing site, the existing buildings, and the proposed new development have all been generated and analysed under appropriate sky conditions in order to obtain accurate daylight predictions.

The set of overshadowing diagrams included at the end of this report are discretionary and are not an integral part of the recommended assessment procedure. They have been included simply to provide the reader with some context regarding the orientation of the site with respect to the sun. As recommended in the BRE guide, the shadow casting illustration have been generated for the 21st of March; the spring equinox.

More detailed information regarding the specific assessment methods is provided in the following sections.

Study A1: Skylight Impact on Neighbouring Buildings

According to the BRE guide, the potential for good daylighting can be assessed with respect to the Vertical Sky Component, (VSC).The Vertical Sky Component (VSC) is described as *the ratio of the direct sky illuminance falling on the vertical wall at a reference point, to the simultaneous horizontal illuminance under an unobstructed sky;* see below. This reference point is located centrally on the window and is aligned with the external plane of the window wall.

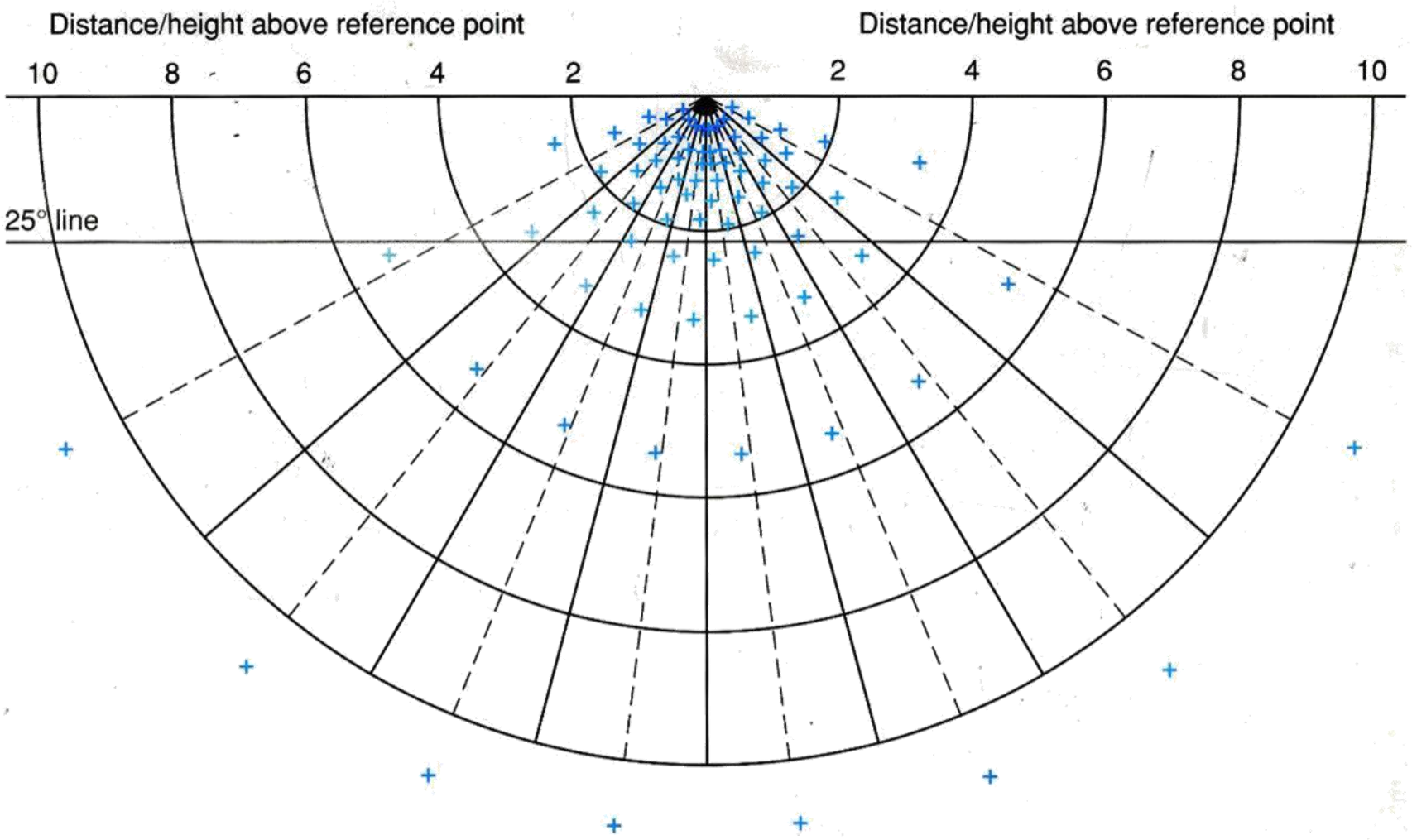


$$VSC = \frac{E_{obs}}{E_{hor}} \times 100\%$$ equation 1.

The VSC associated with the reference point is calculated using a Skylight Indicator; an example indicator is show on the next page. Each cross in the Skylight Indicator represents 0.5% vertical sky component. Obstructions such as walls and buildings surrounding the reference point are plotted on the indicator. The crosses unobstructed by surrounding buildings are then counted to ascertain the vertical sky component at the reference point.

The BRE suggests a minimum vertical sky component of 27% as a level which indicates the potential for good daylighting. The precise criteria reads as follows:

'*If the vertical sky component, with the new development in place, is both less than 27% and 0.8 times its former value, then the occupants of the existing building will notice a reduction in the amount of skylight.'*



Typical Skylight Indicator

Study A2: Sunlight Impact on Neighbouring Buildings

Sunlight impact is measured in relation to the Annual Probable Sunlight Hours (APSH). This measure relates to the total number of hours in the year that the sun is expected to shine on unobstructed ground, allowing for average levels of cloudiness for the location in question.

The percentage of APSH is calculated at the same points as the VSC assessment using a sunlight indicator, see below. Each dot on the sunlight indicator represents 1% of APSH. Obstructing buildings are mapped onto the indicator and points which are not covered are added to find the total percentage of APSH for each test point.

The Manchester sunlight indicator has been used for this study as it is considered to be the most representative of the examples given in the BRE guide, in terms of climatic conditions, and in particular the potential sunlight hours.

The assessment of sun-lighting conditions is carried out with reference to BS 8206-2 and the recommendations of the BRE Guide.

According to BS 8206-2, interiors where occupants expect sunlight should receive at least one quarter (25%) of the APSH, including in winter months, between 21st of September and the 21st of March, at least 5% of Winter Probable Sunlight Hours (WPSH).

In addition to this, the BRE Report recommends that the sun-lighting of existing buildings may be adversely affected if the test point receives less than 80% its former APSH during either the annual or winter periods and experiences an absolute reduction in APSH which is greater than 4%.

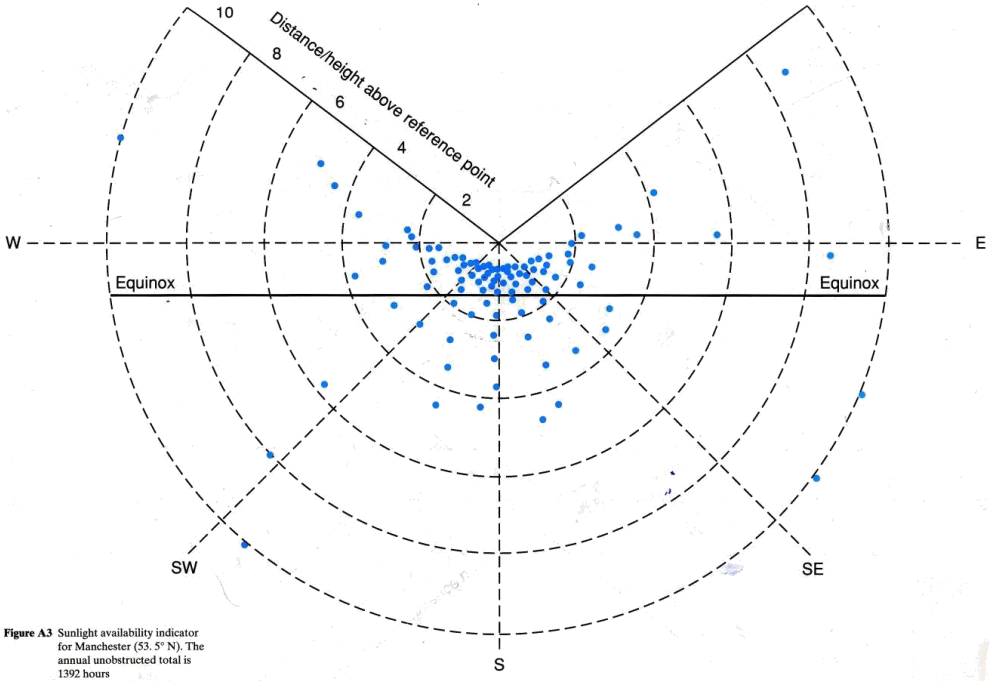


Figure A3 Sunlight availability indicator for Manchester (53. 5° N). The annual unobstructed total is 1392 hours

Typical Sunlight Indicator

Study B: Sunlight Impact on Neighbouring Recreation Areas

According to the BRE guide, a garden or amenity area will appear adequately sunlit throughout the year if at least half of it can receive at least two hours of sunlight on the 21st of March.

In situations where a new development is capable of impacting on the sunlight levels available to an existing outdoor amenity area, the guide recommends that the loss of sunlight will only be noticeable if more than half of the existing outdoor amenity space receives less than two hours of sunlight on the 21st of March and if the area of space which receives two hours of sunlight is less than 80% of its former value.

In order to assess a particular amenity space an analysis grid is specified across its area. At each point on this grid the cumulative number of sunlight hours which are calculated for the course of a specified day (21st of March). The percentage area of the analysed area which receives more than 2 hours of sunlight on that day is then obtained.

This procedure is carried out for both the 'Before' and 'After' scenarios and the results are compared.

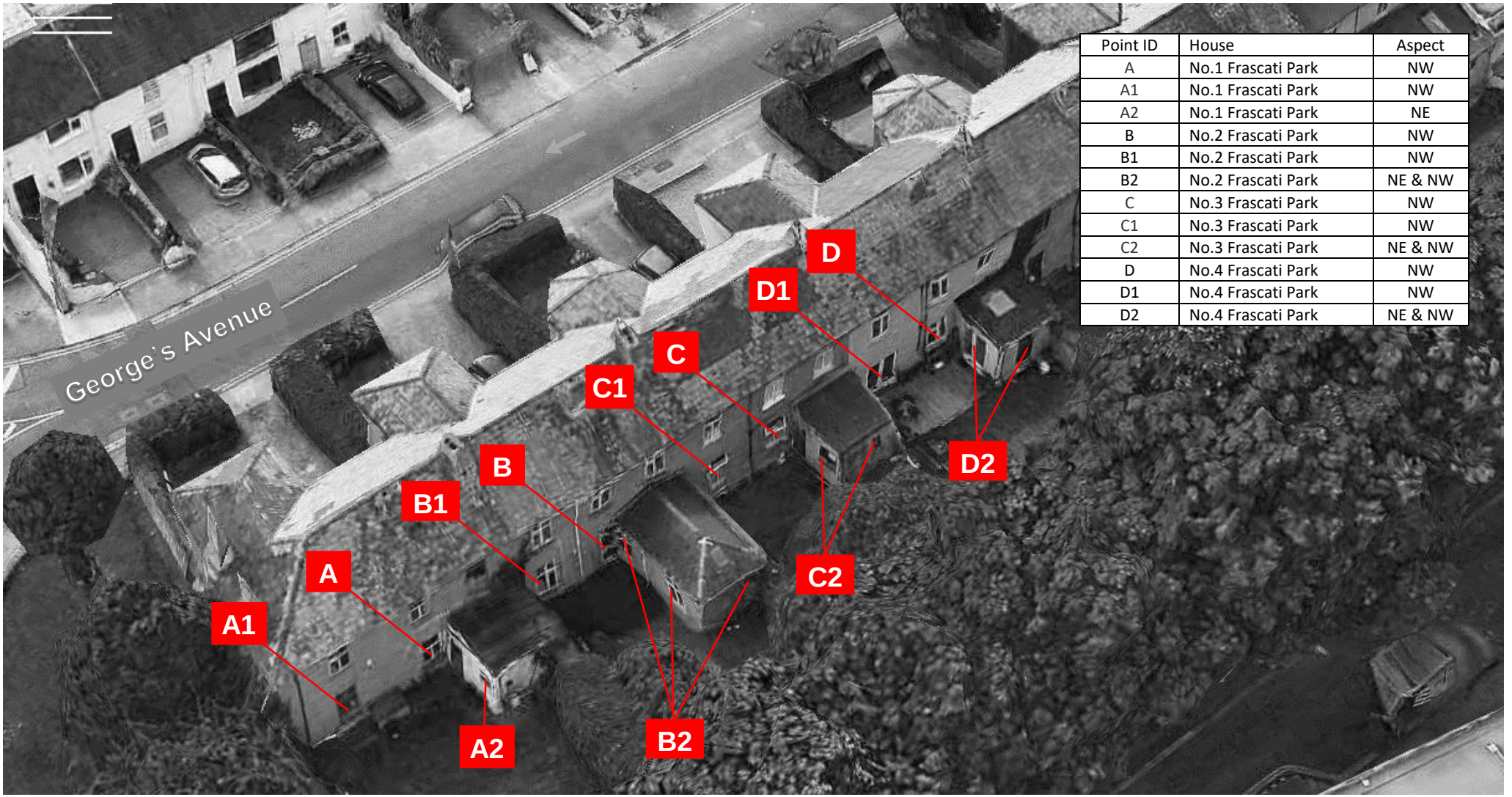
Analysis Points

A careful appraisal of the neighbouring environment identified a number of residential buildings which could potentially experience some form of impact as a result of the proposed development. These buildings included a number of terraced residences located on George's Avenue, Frascati Park and Mount Merrion Avenue.

Study A - Impact on Neighbouring Buildings

The analysis points used in Study A are illustrated on the following pages. A total of 32 points have been specified to capture the worst case impacts which could register on the surrounding residences. More details regarding each of the analysis points are provided on the following pages.

In each case the analysis point refers to a discrete point, located at the centre of the selected window. The point is aligned with the external plane of the attendant wall. In instances where more than one window serves a particular room, the average daylight levels registering on these windows is calculated and assessed.

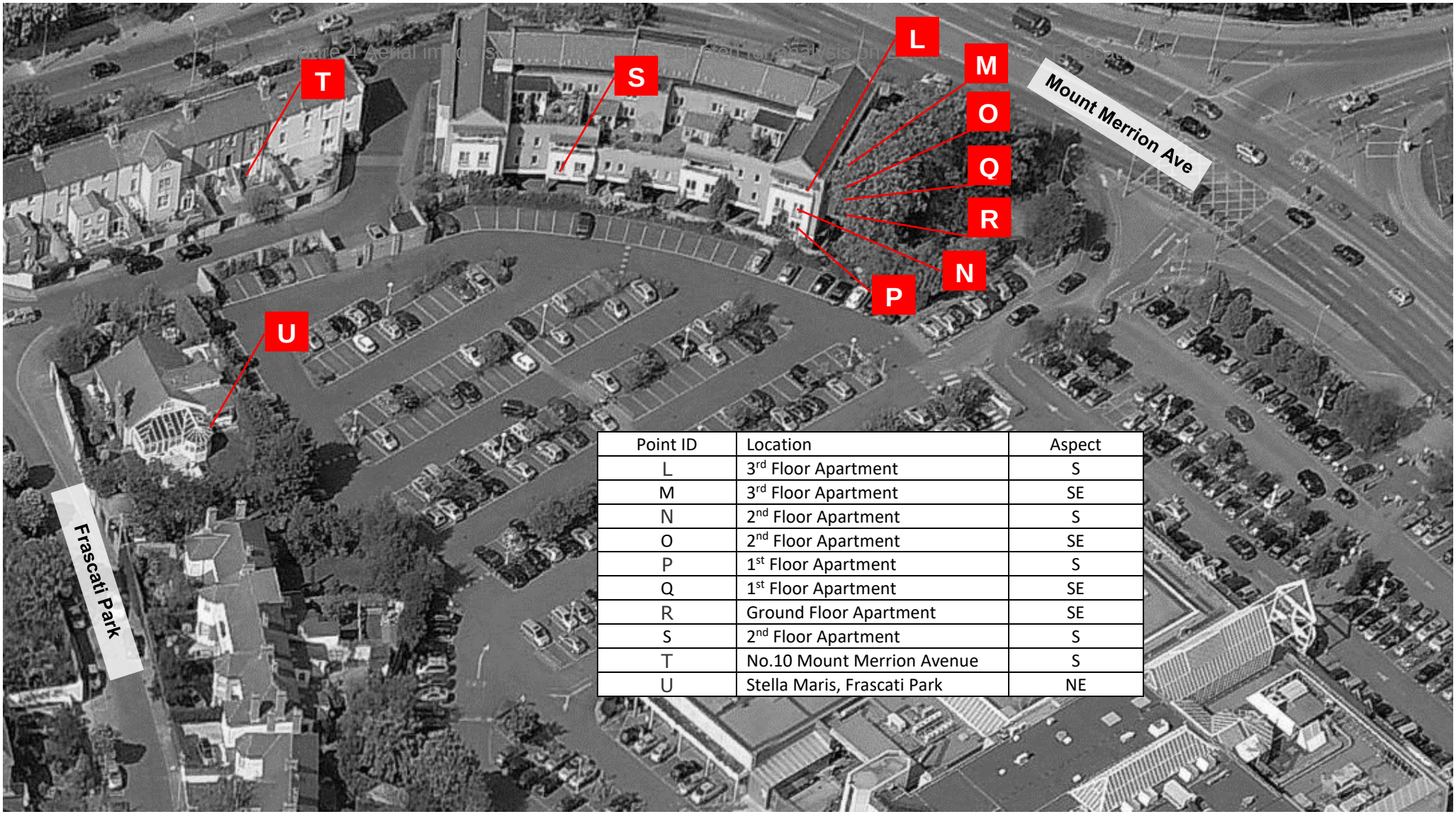


Point ID	House	Aspect
A	No.1 Frascati Park	NW
A1	No.1 Frascati Park	NW
A2	No.1 Frascati Park	NE
B	No.2 Frascati Park	NW
B1	No.2 Frascati Park	NW
B2	No.2 Frascati Park	NE & NW
C	No.3 Frascati Park	NW
C1	No.3 Frascati Park	NW
C2	No.3 Frascati Park	NE & NW
D	No.4 Frascati Park	NW
D1	No.4 Frascati Park	NW
D2	No.4 Frascati Park	NE & NW

Figure 1 Aerial view showing points selected for analysis on No. 1 to No. 4 George's Avenue

Point ID	House	Aspect
A	No.1 Frascati Park	NW
B	No.2 Frascati Park	NW
C	No.3 Frascati Park	NW
D	No.4 Frascati Park	NW
E	No.5 Frascati Park	NW
F	No.6 Frascati Park	NW
G	No.7 Frascati Park	NW
H	No.8 Frascati Park	NW
I	No.9 Frascati Park	NW
J	No.10 Frascati Park	NW
K	No.11 Frascati Park	NW
V	No.20 Frascati Park	NE
W	No.23 Frascati Park	NE
X	No.34 Frascati Park	E

Figure 2 Aerial view showing points selected for analysis on residences located on George's Avenue and Frascati Park, (BLOM 2017).



Point ID	Location	Aspect
L	3rd Floor Apartment	S
M	3rd Floor Apartment	SE
N	2nd Floor Apartment	S
O	2nd Floor Apartment	SE
P	1st Floor Apartment	S
Q	1st Floor Apartment	SE
R	Ground Floor Apartment	SE
S	2nd Floor Apartment	S
T	No.10 Mount Merrion Avenue	S
U	Stella Maris, Frascati Park	NE

Figure 3 Aerial view showing points selected for analysis on residences located on

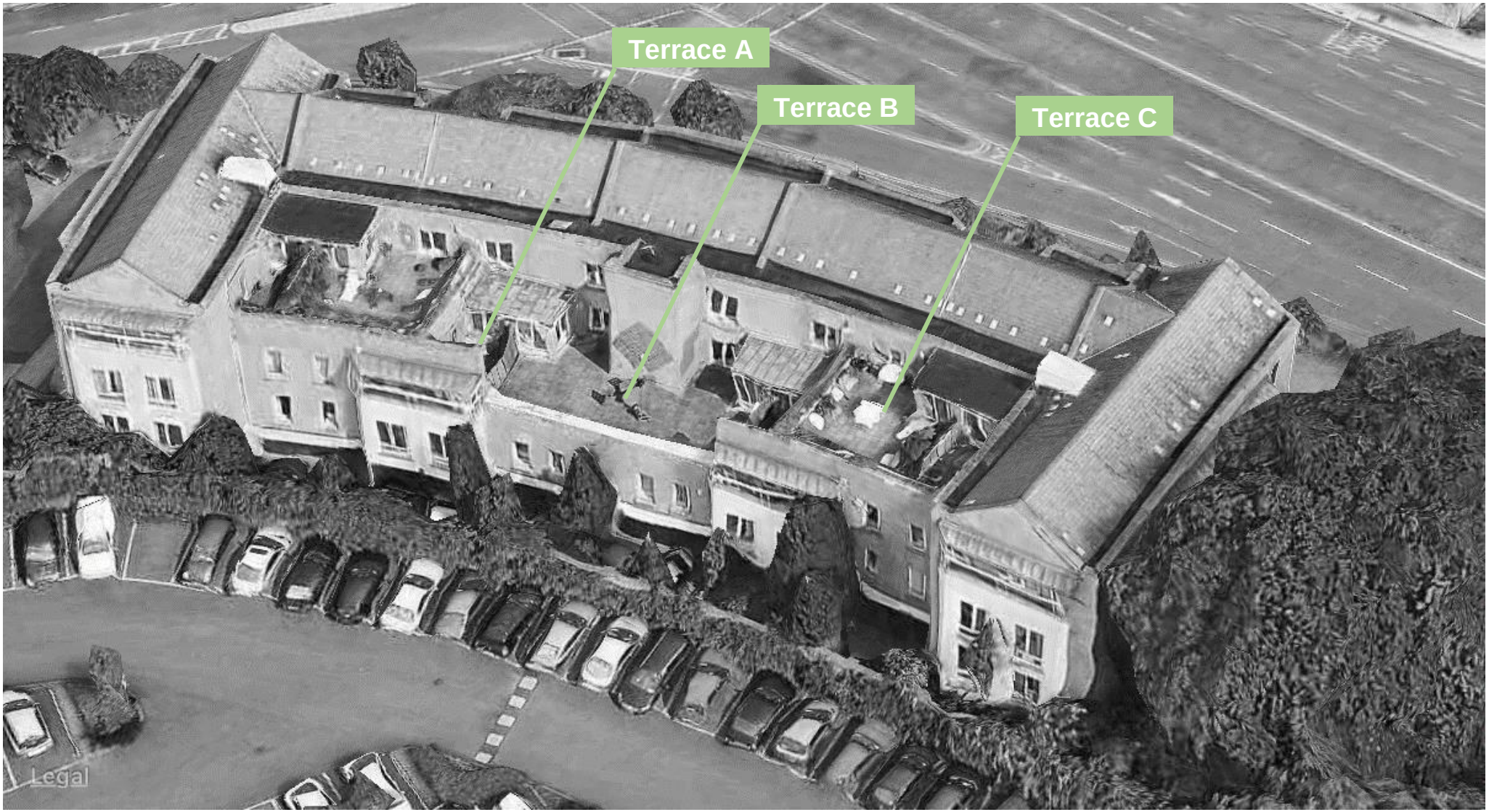


Figure 5 Aerial view of the Lisalea Apartment Complex showing the terraced areas assessed for sunlight in this study.

Results

Study A Results - Impact on neighbouring premises

This study has assessed the impact which the proposed development will have on the skylight & sunlight conditions experienced by a number of buildings in the immediate neighbourhood. The results of the analysis are presented in the table below.

Point ID	Existing Levels			BRE Recommended Targets			Proposed Levels			Predicted Impact		
	VSC (Skylight) (%)	APSH (Annual Sunlight) (%)	WPSH (Winter Sunlight) (%)	VSC (Skylight) (%)	APSH (Annual Sunlight) (%)	WPSH (Winter Sunlight) (%)	VSC (Skylight) (%)	APSH (Annual Sunlight) (%)	WPSH (Winter Sunlight) (%)	VSC (Skylight)	APSH (Annual Sunlight)	WPSH (Winter Sunlight)
A	33	21	0	26	17	0	26	19	0	Negligible	Negligible	Negligible
A1	35	29	4	27	23	3	28	26	4	Negligible	Negligible	Negligible
A2	25	0	0	20	0	0	24	0	0	Negligible	Negligible	Negligible
B	25	1	0	20	1	0	20	1	0	Negligible	Negligible	Negligible
B1	32	29	4	25	23	3	26	27	4	Negligible	Negligible	Negligible
B2	25	12	0	20	9	0	22	12	0	Negligible	Negligible	Negligible
C	25	0	0	20	0	0	20	0	0	Negligible	Negligible	Negligible
C1	31	28	4	25	22	3	26	27	4	Negligible	Negligible	Negligible
C2	26	16	0	21	13	0	22	16	0	Negligible	Negligible	Negligible
D	20	0	0	16	0	0	16	0	0	Negligible	Negligible	Negligible
D1	30	28	3	24	23	3	26	28	3	Negligible	Negligible	Negligible
D2	25	21	0	20	17	0	22	21	0	Negligible	Negligible	Negligible
E	28	27	4	22	21	3	25	27	4	Negligible	Negligible	Negligible
F	24	1	0	19	1	0	23	1	0	Negligible	Negligible	Negligible
G	28	27	4	22	22	3	27	27	4	Negligible	Negligible	Negligible
H	29	27	3	23	22	2	28	27	3	Negligible	Negligible	Negligible
I	29	28	4	23	23	3	29	28	4	Negligible	Negligible	Negligible
J	28	16	0	22	13	0	28	16	0	Negligible	Negligible	Negligible
K	30	32	5	24	25	4	30	32	5	Negligible	Negligible	Negligible
L	39	86	29	27	25	5	38	83	26	Negligible	Negligible	Negligible
M	36	55	18	27	25	5	34	52	15	Negligible	Negligible	Negligible
N	39	85	29	27	25	5	36	81	25	Negligible	Negligible	Negligible
O	35	51	16	27	25	5	32	49	14	Negligible	Negligible	Negligible
P	38	83	28	27	25	5	32	76	21	Negligible	Negligible	Negligible
Q	33	49	16	26	25	5	30	46	14	Negligible	Negligible	Negligible
R	31	44	16	25	25	5	28	39	11	Negligible	Negligible	Negligible
S	37	79	29	27	25	5	35	76	26	Negligible	Negligible	Negligible
T	37	73	27	27	25	5	36	72	26	Negligible	Negligible	Negligible
U	34	31	5	27	25	4	32	29	5	Negligible	Negligible	Negligible
V	33	14	0	26	11	0	32	14	0	Negligible	Negligible	Negligible
W	34	16	1	27	13	1	33	16	1	Negligible	Negligible	Negligible
X	30	32	6	24	25	5	29	30	6	Negligible	Negligible	Negligible

Skylight Results

The Vertical Sky Component has been calculated for both the "Before" and "After" scenarios at a number of test points. The results indicate that the proposed development will not impact in any material way on the skylight conditions available to neighbouring residences.

Of the 32 test points analysed in this study, all 32 of them have been found to meet or exceed the minimum levels recommended by the BRE.

Sunlight Results

The results calculated for sunlight also indicate that the proposed new building will not impact in any material way on the sunlight conditions available to the neighbouring residences.

Of the 32 points assessed in this study, all 32 of them have been found to either meet or exceed the minimum levels recommended by the BRE for Annual and Winter Probable Sunlight Hours.

Study B Results - Impact on Neighbouring Outdoor Spaces

The impact which the proposed development will have on the sunlight levels available to a sample of three neighbouring gardens and three terrace areas has been assessed. The results of this study are presented in the table below.

Table 1 Sunlight impact registering on neighbouring gardens

	% Area which receives more than 2hrs of direct sunshine on the 21st of the March			
Garden	Existing Levels	Minimum Levels Recommended by the BRE	Proposed Levels	Loss of Light Noticeable?
Garden A	74%	50%	74%	No
Garden B	66%	50%	66%	No
Garden C	63%	50%	63%	No
Terrace A	17%	16%	17%	No
Terrace B	88%	50%	88%	No
Terrace C	84%	50%	84%	No

Full compliance with the BRE guidelines has been achieved at all three of the gardens and all three terrace areas; accordingly it is possible to conclude that no material loss of sunlight amenity can be anticipated.

Conclusions

This report has assessed the potential impact which a proposed development at the Frascati Shopping Centre, Blackrock, could have on the daylight levels available to residences in the immediate neighbourhood.

As mandated in Irish Planning Guidance (*'Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas'*, DoEHLG 2009), the assessment has been carried out in accordance with the methods outlined in the BRE guide *'Site Layout Planning for Daylight and Sunlight; A Guide to Good Practice'*, 2011, written by PJ Littlefair.

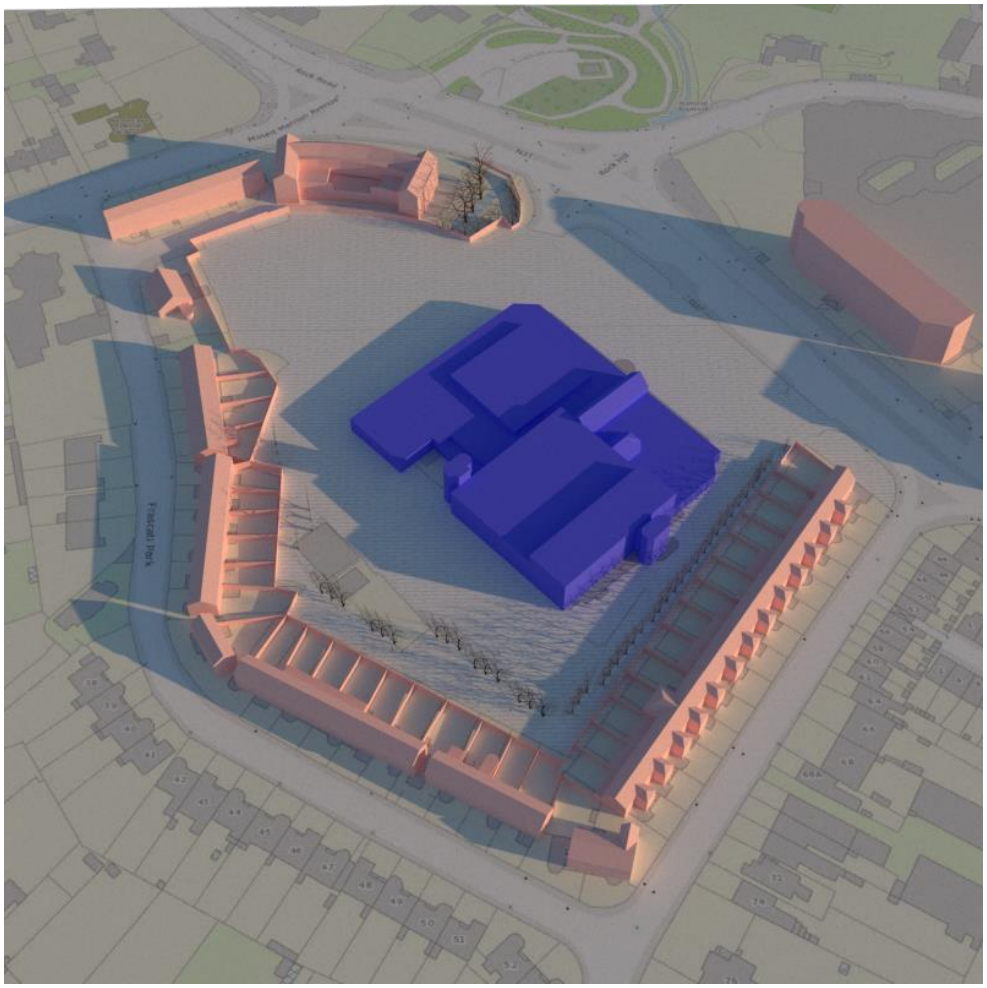
The results of this assessment demonstrate that the proposed new development is in full compliance with the BRE guidelines. It follows from this finding that no significant loss of daylight amenity can be expected to register at any of the neighbouring residences.

Appendix A - Shadow Casting Imagery

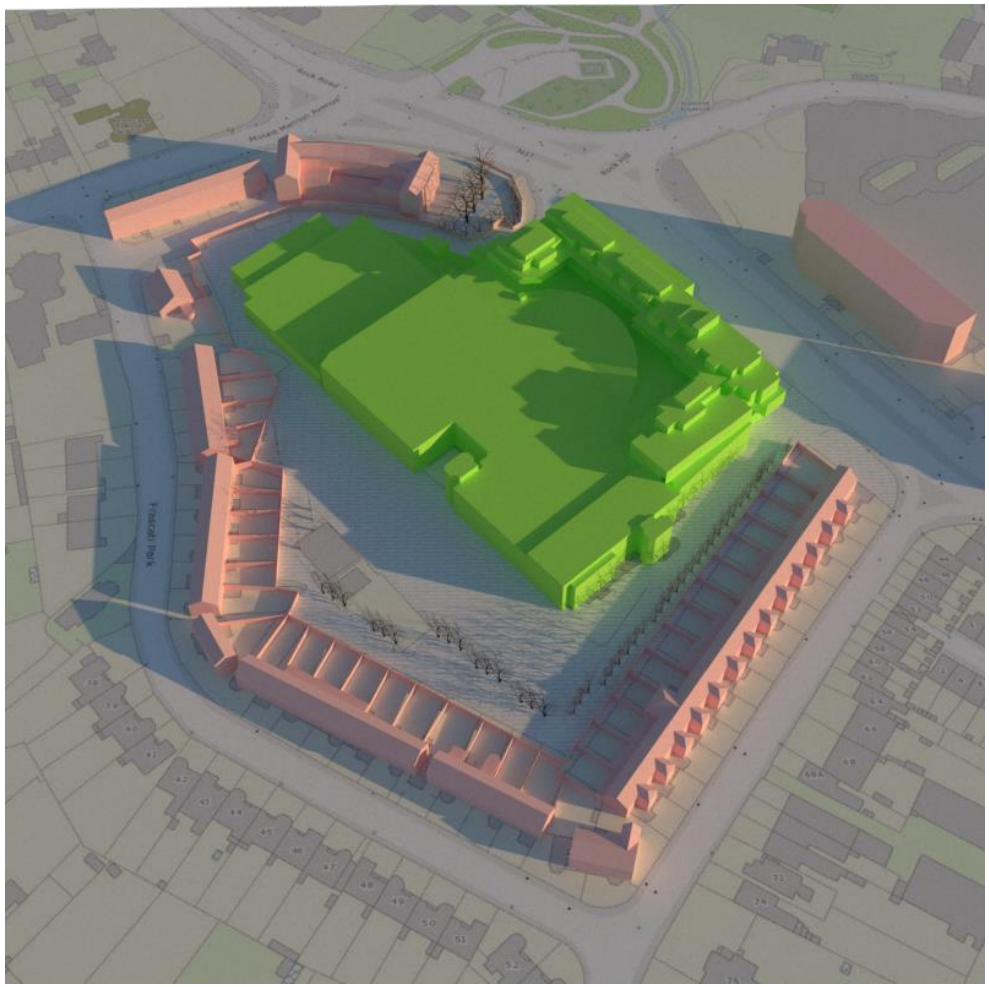
As recommended in the BRE Guide 'Site Layout Planning for Daylight and Sunlight, A Guide to Good Practice" a set of shadow-casting images have been generated for the 21st of March; the spring equinox. The BRE guide recommends that if a space is used all year round, that the spring equinox is the best date for which to prepare shadow plots as it gives an average level of overshadowing.

Shadow castings for salient times of the day, under both the "Before" and "After" circumstances are provided in the following pages.

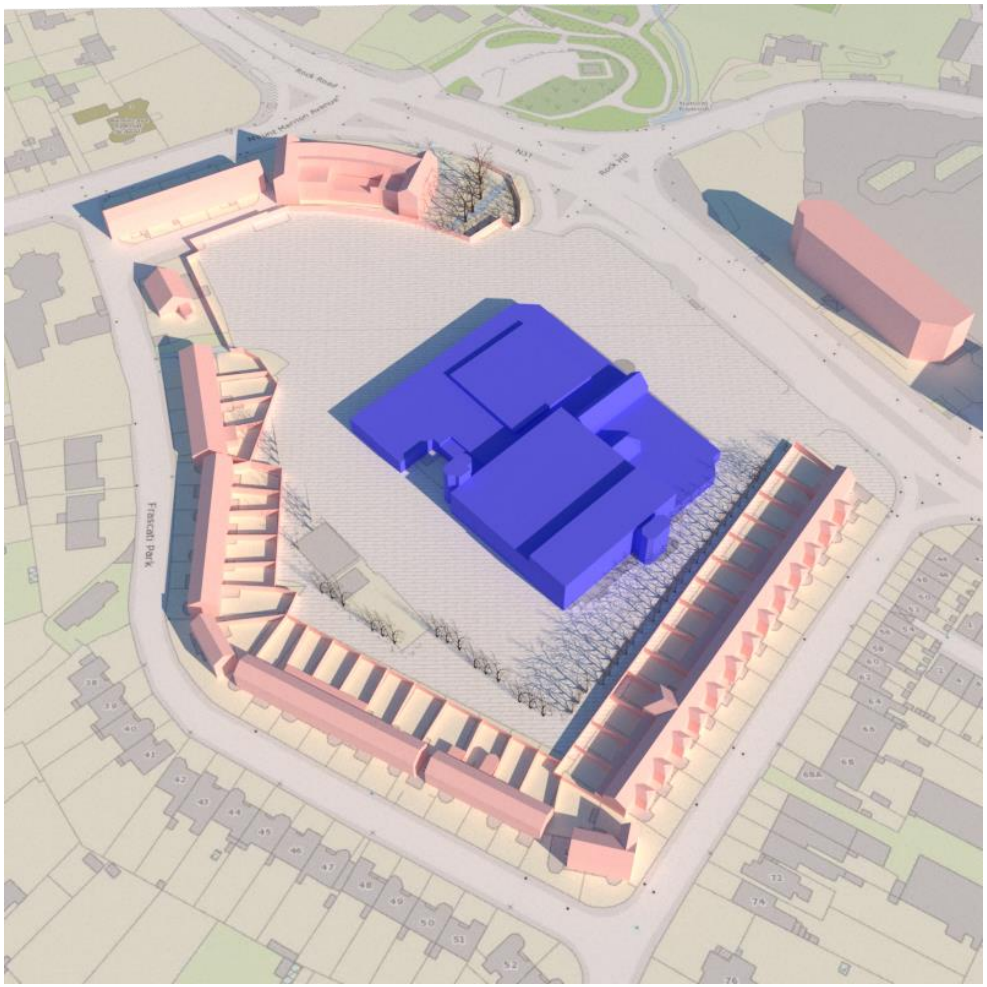
Shadows Cast in March



Shadows Cast at 8am (UTC+0) on the 21st March - Before Development Scenario



Shadows Cast at 8am (UTC+0) on the 21st March - After Development Scenario

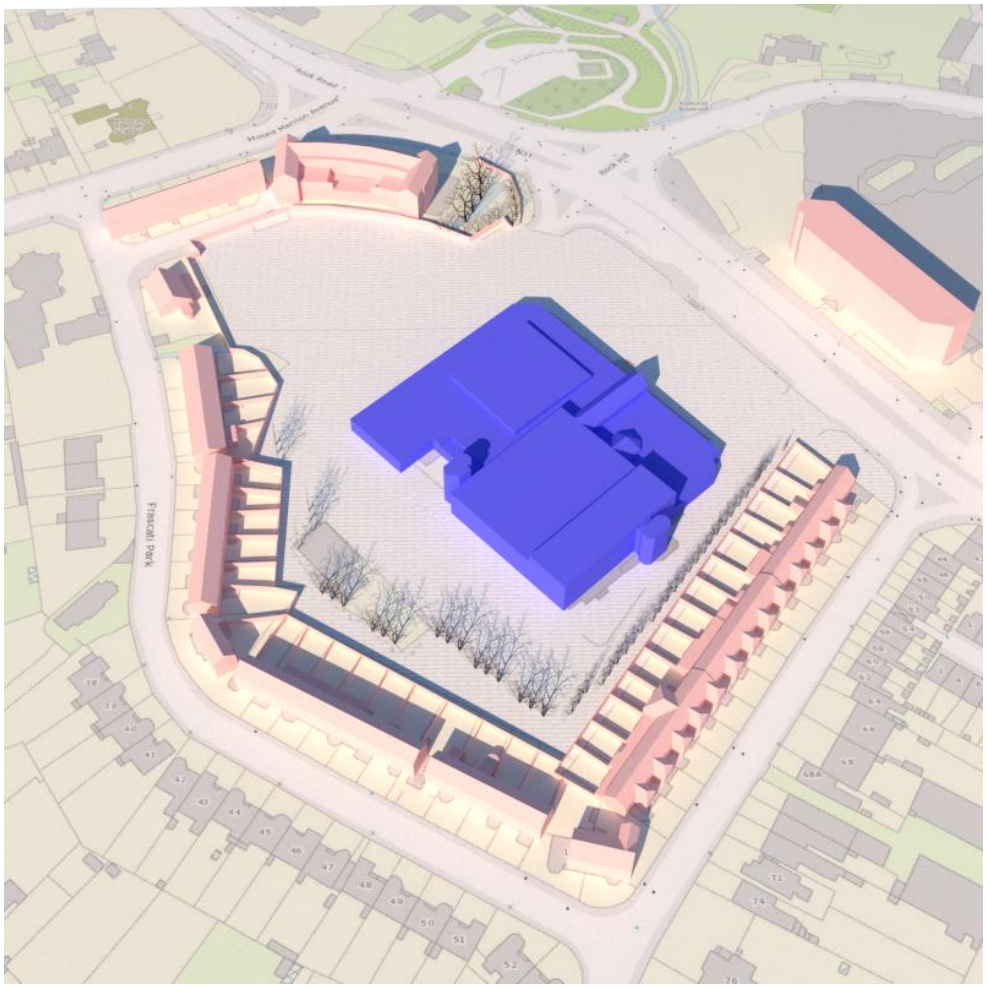


Shadows Cast at 10am (UTC+0) on the 21st March - Before Development Scenario

Shadows Cast at 10am (UTC+0) on the 21st March - After Development Scenario

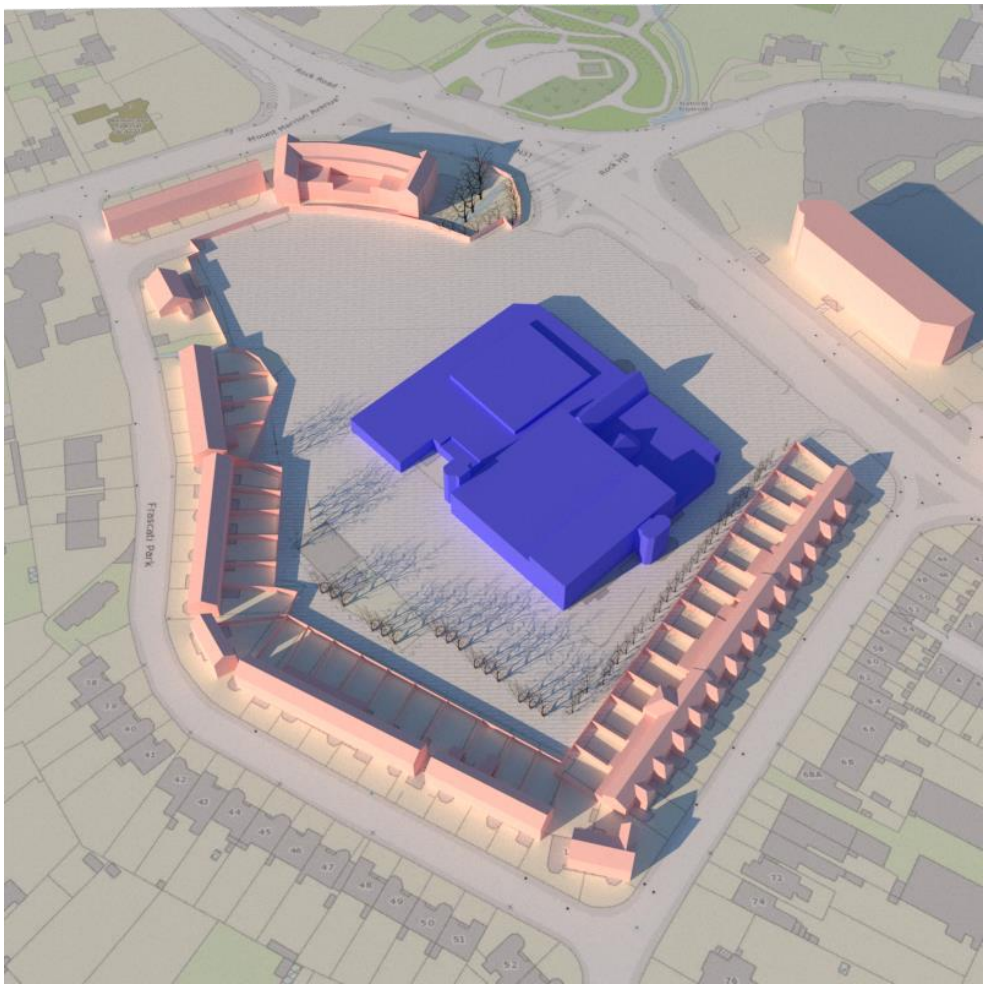
Shadows Cast at 12pm (UTC+0) on the 21st March - Before Development Scenario

Shadows Cast at 12pm (UTC+0) on the 21st March - After Development Scenario

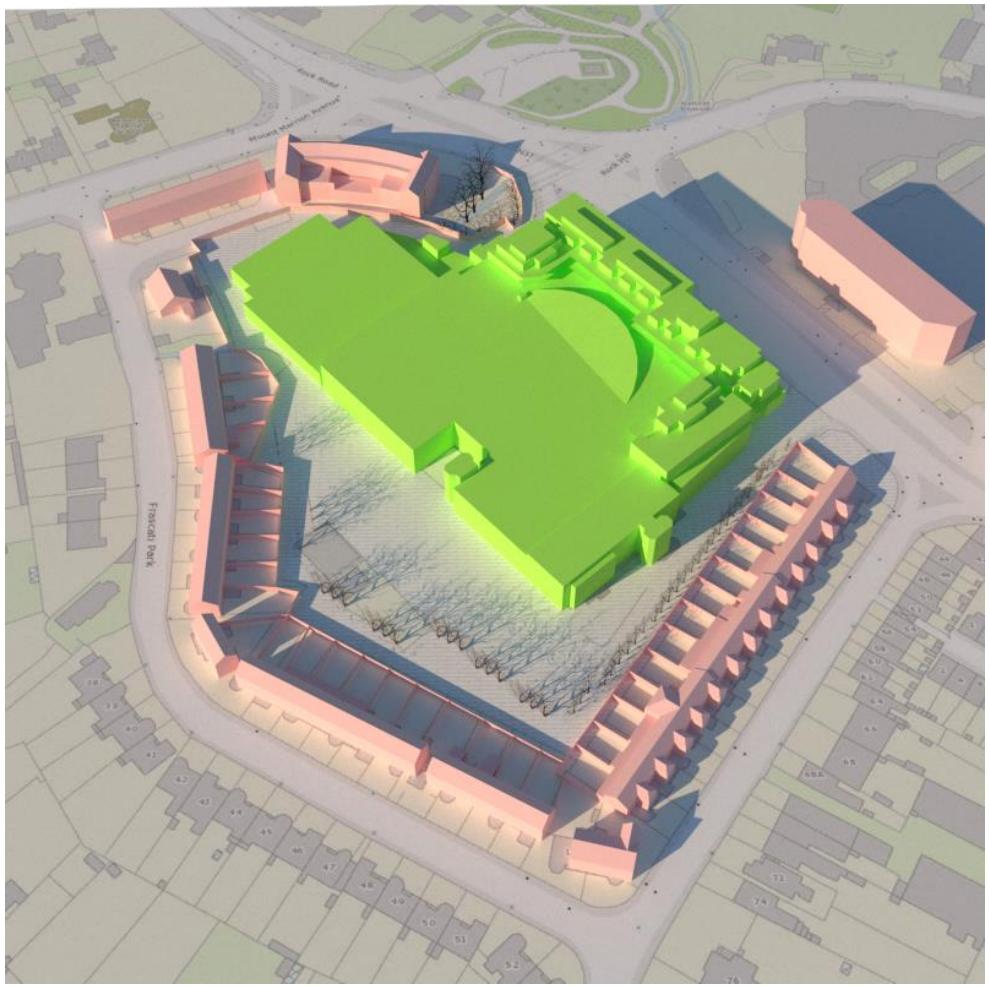


Shadows Cast at 2pm (UTC+0) on the 21st March - Before Development Scenario

Shadows Cast at 2pm (UTC+0) on the 21st March - After Development Scenario

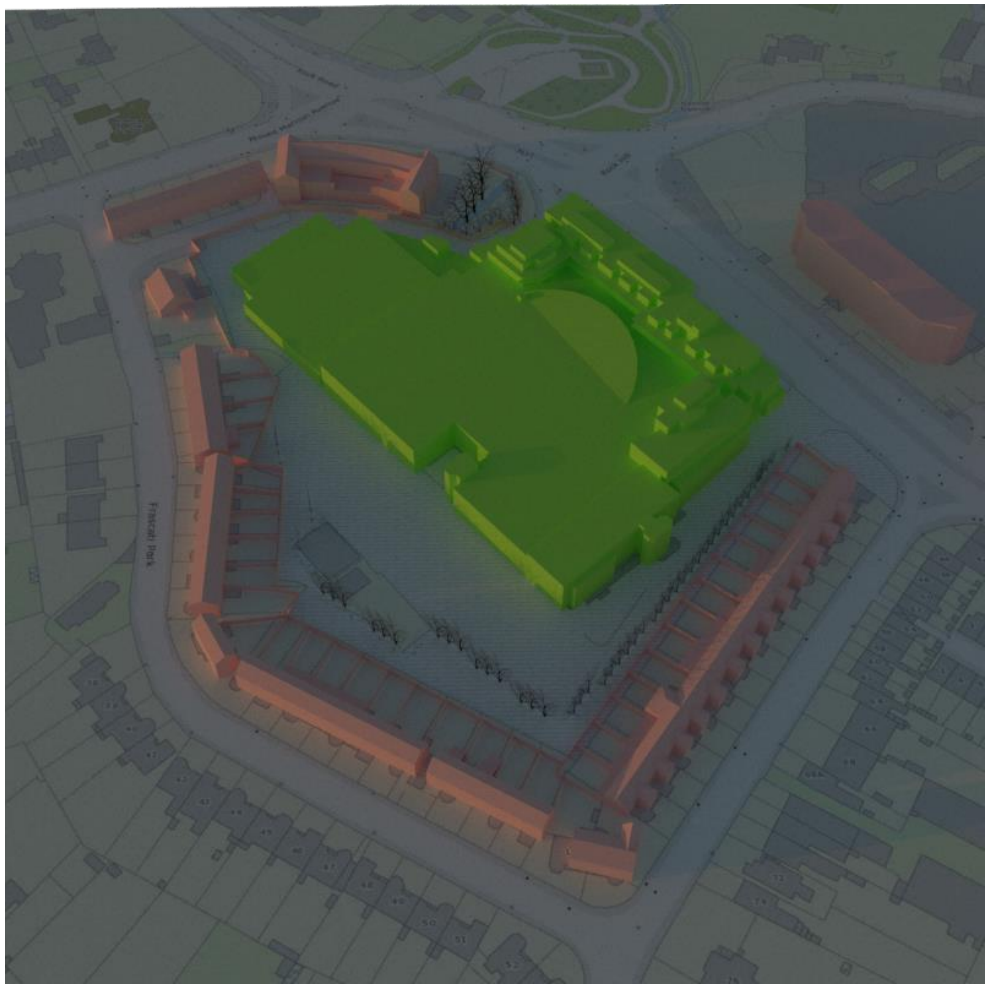


Shadows Cast at 4pm (UTC+0) on the 21st March - Before Development Scenario



Shadows Cast at 4pm (UTC+0) on the 21st March - After Development Scenario

Shadows Cast at 6pm (UTC+0) on the 21st March - Before Development Scenario



Shadows Cast at 6pm (UTC+0) on the 21st March - After Development Scenario