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SUNLIGHT, DAYLIGHT AND SHADOW ASSESMENT

FOR

GOLF LANE DEVELOPMENT,
CARRICKMINES,
DUBLIN 18

FOR

BOWBECK DAC

Project Reference:	J587
Revision Ref:	A
Date Prepared:	4 th August 2020
Date Issued:	16th December 2020
Prepared By:	Jonathan Kirwan & Martin Obst

CONTENTS

1. INTRODUCTION

The purpose of this report is to demonstrate that the proposed development, would satisfy the criteria of the local council as outlined below.

The proposed development comprises 489 no. residential units (all apartments), along with ancillary residential amenities, and provision of a childcare facility, gym, and local shop. The proposed development is set out in 7 no. blocks with heights ranging from four to twenty-two storeys.

Two basement levels are proposed, providing car parking spaces, bin stores, bicycle parking ancillary service plantrooms and circulation areas. The proposed development includes landscaping, public, private and communal open space, a new pedestrian and cycle bridge over the stream at the western side of the site with a new pedestrian cycle crossing of Glenamuck Road South, cycle and pedestrian facilities, bicycle parking, play facilities, and lighting. The proposed buildings include the provision of private open space in the form of balconies and winter gardens to all elevations.

The development also includes vehicular, pedestrian, and cycle accesses, drop off areas, boundary treatments, services, and all associated ancillary and site development works.

The report is measuring the daylight impact to the surrounding dwellings when compared to the existing situation. The focus of the study considers the following items with respect to the proposed new development:

- Shadow Analysis - a visual representation analysing any potential changes that may arise from the proposed development to neighbouring existing developments.
- Sunlight Proposed Amenity Spaces – via an annual sunlight hour's analysis.
- Average Daylight Factors – via average daylight factor calculations carried for floor plans across the site of the proposed development.

2. EXECUTIVE SUMMARY

Bowbeck DAC, seek planning permission for a strategic housing development on a site at Golf Lane, Carrickmines, Dublin 18. The site has an area of c. 2.56 hectares and is bound to the north by the M50 motorway, to the east by Golf Lane, to the west by Glenamuck Road, and to the south by existing residential development.

The proposed development comprises a residential development of 482 no. units (all apartments), along with ancillary residential amenities, and provision of a childcare facility, gym, and local shop. The proposed residential units comprise 31 no. studio units, 183 no. 1-bedroom units, 229 no. 2-bedroom units, and 39 no. 3-bedroom units (including 2 no. duplex type units).

The proposed development is set out in 7 no. blocks which comprise the following:

- Block A1 comprises 62. no, apartments within a part four, part six storey building, including 10 no. studio units, 7 no. 1-bedroom units, 41 no. 2 bedroom units, and 4 no. 3-bedroom units. An ESB substation is provided at ground floor level.
- Block A2 comprises 85 no. apartments within a part four, part eight storey building, including 25 no. 1-bedroom units, 45 no. 2-bedroom units, and 15 no. 3-bedroom units.
- Block A3 comprises 79 no. apartments within a part four, part twelve storey building, including 21 no. studio units, 19 no. 1-bedroom units, 28 no. 2-bedroom units, and 11 no. 3-bedroom units.
- Block B0 comprises 150 no. apartments and resident's amenities within a part four, part eighteen, part twenty-one and part twenty-two storey building. The apartments include 76 no. 1-bedroom units, 68 no. 2-bedroom units, and 6 no. 3-bedroom units (including 2 no. duplex type units). An ESB substation, resident's concierge area and amenity space (171 sq.m sq.m) are provided at ground floor level. A further resident's amenity / event space is provided at the twentieth and twenty-first floor levels (83 sq.m).
- Block B1 comprises 8 no. apartments and is four storeys in height, directly abutting Block B. The apartments include 4 no. 1-bedroom units, and 4 no. 2-bedroom units.
- Block C comprises 42 no. apartments and a local shop within a part five, part seven storey building. The apartments include 30 no. 1-bedroom units, 9 no. 2-bedroom units, and 3 no. 3-bedroom units. A local shop (154 sq.m) and an ESB substation are provided at ground floor level.
- Block D comprises 56 no. apartments, a commercial gym, resident's concierge area, resident's lounge, and a childcare facility in a part four, part seven storey building. The apartments include 22 no. 1-bedroom units, and 34 no. 2-bedroom units. The resident's concierge area (99 sq.m), commercial gym (340 sq.m), and childcare facility (300 sq.m) units are located at ground floor level. The resident's lounge (292 sq.m) is located at first floor level.

Two basement levels are proposed, providing car parking spaces (299 no.), bin stores, plant rooms, bicycle parking (1,000 no. spaces), and circulation areas. A further 240 no. bicycle parking spaces and 4 no. car parking spaces are provided at ground level. The proposed development includes landscaping, boundary treatments, public, private and communal open space (including roof terraces), two cycle / pedestrian crossings over the stream at the western side of the site, along with a new pedestrian and cycle crossing of Glenamuck Road South at the west of the site, cycle and pedestrian facilities, play facilities, and lighting. The proposed buildings include the provision of private open space in the form of balconies and winter gardens to all elevations of the proposed buildings. The development also includes vehicular, pedestrian, and cycle accesses, drop off areas, boundary treatments, services, and all associated ancillary and site development works.

3. STATEMENT OF EXPERIENCE

The simulation and reporting is carried out by Martin Obst (Principal Modelling & Sustainability Engineer) and Jonathan Kirwan (Senior Consulting Engineer/ Managing Director). Martin has 5 years of experience using all modules of IES VE software and completed number of bespoke training sessions with IES VE focusing on areas covered in this report. Jonathan has 25 years of experience in building services consultancy.

JAK have vast experience of using the IES VE software and have In-depth knowledge & experience in understanding the significance of true modelling & its affects. As an experienced design & consultancy practice, we utilize & work with dedicated support to fully utilize functionality of the modelling programs we work with. We set our standards High & have a very good record in providing detailed reports for many state bodies, (inc. DOES, SEAI) and numerous successful planning applications for projects throughout Ireland & abroad.

4. DAYLIGHTING ANALISYS

Daylight should be a significant source of illumination for all spaces with daylight opening(s). daylight is strongly favoured by building occupants as a way to adequately illuminate the indoor surfaces, and to save energy for electrical lighting.

For the purpose of demonstrating clear analysis we have reviewed in detail number of apartments facing NW, NE & SW which are identified in Table 2. The selected apartments are the ones deemed to potentially have the poorest daylight due to development layout, orientation, and obstructions externally to the apartment. Daylighting calculations were calculated using 'IES Virtual Environment' software.

To assess the quality of daylight enjoyed within the proposed development an Average Daylight Factor (ADF) calculation was used. The Average Daylight Factor is a ratio between indoor illuminance and outdoor illuminance expressed as a percentage and provides a measure of the overall amount of daylight in a space taken from the work plane level. Additional guidance also taken into consideration in our analysis in conjunction with the interior daylighting recommendations in CIBSE publication Lighting guide: daylighting and window design.

IS EN 17037 (2018): Daylight in buildings sets out daylight factor for Dublin to achieve 1.6 % for target minimum illuminance of 300lx.

BS 8206-2 Code of practice for daylighting gives minimum values of ADF for residential units:

- ADF=1.5% for living rooms
- ADF=1% for bedrooms.

Where possible internal galley-type kitchens are avoided, and side windows are provided. The kitchen areas in some apartments are located in the space away from the window wall. In this case we have followed the BRE guidelines for this instance and the analysis clearly demonstrates that all kitchens are a part of a well day-lit living room. The BRE requirements are satisfied & exceeded in these cases.

Methodology

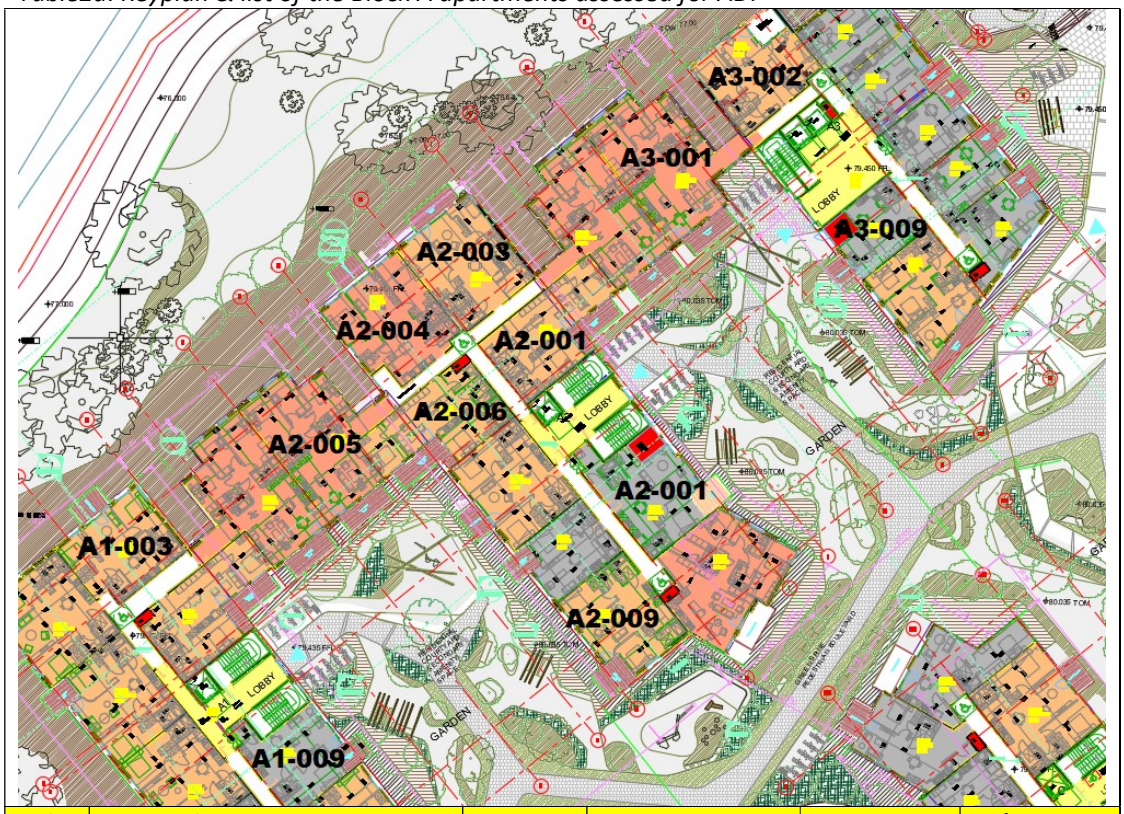
Sky Conditions
The sky conditions used in this simulation study was an unobstructed CIE standard overcast sky. The CIE Overcast Sky is used to give the worst-case scenario (in design terms) for illuminance and therefore is the most suitable design sky for Daylight Factor simulations.

Light from the sky
For new rooms the BRE guidelines recommend Daylight provision to new rooms may be checked using the Average Daylight Factor (ADF). "The ADF is a measure of the overall amount of daylight in a space. BS 8206-2 Code of practice for daylighting, recommends an ADF of 5% for a well daylit space and 2% for partly daylit space. Below 2% the room will look dull and electric lighting is likely to be turned on. In housing BS 8206-2 gives minimum values of ADF 1.5% for living rooms and 1% for bedrooms."

Analysis results

The results below reflect the site conditions as per the IES model and satisfy BS 8206-2 and the BRE guidelines.

Table2a. Keyplan & list of the Block A apartments assessed for ADF

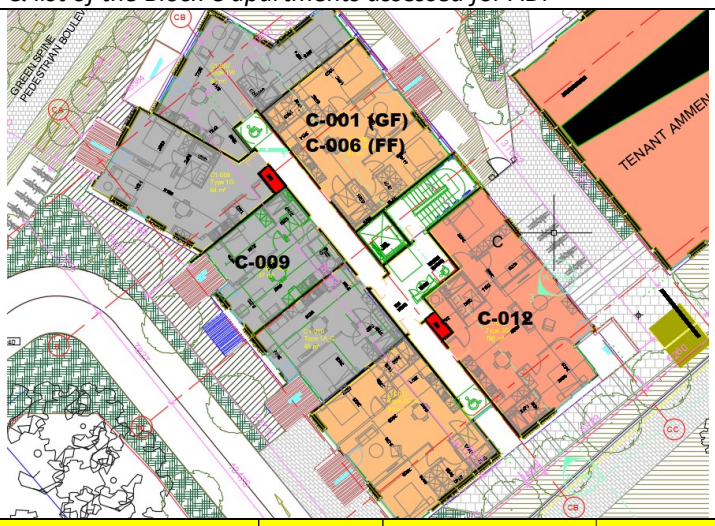


Ref.	Room reference	Window opening (m^2)	Average Daylight Factor (%)	Orientation	IS / BRE Compliance
1	A1-003 Living room/Kitchen	7.56	2.8	NW	**Yes**
2	A1-003 Bedroom	4.86	3.2	NW	**Yes**
3	A1-009 Living room/Kitchen	7.83	3.2	NE	**Yes**
4	A1-009 Bedroom	4.86	4.7	NE	**Yes**
5	A2-001 Living room/Kitchen	7.56	1.7	SE	**Yes**
6	A2-001 Bedroom	4.86	2.5	NE	**Yes**
7	A2-003 Living room/Kitchen	7.83	2.5	NW	**Yes**
8	A2-003 Bedroom	4.59	2.5	NW	**Yes**
9	A2-004 Living room/Kitchen	10.8	2.3	NW	**Yes**
10	A2-004 Bedroom	4.59	2.9	NW	**Yes**
11	A2-005 Living room/Kitchen	10.44	4.1	SE	**Yes**
12	A2-005 Bedroom	5.22	5.1	SE	**Yes**
13	A2-006 Living room/Kitchen	7.56	3.4	SE	**Yes**
14	A2-006 Bedroom	4.86	3.6	SW	**Yes**
15	A2-009 Living room/Kitchen	7.56	2.7	SW	**Yes**
16	A2-009 Bedroom	4.86	3.2	SW	**Yes**
17	A2-011 Living room/Kitchen	7.56	3.0	NW	**Yes**
18	A2-011 Bedroom	4.86	4.2	NW	**Yes**
19	A3-001 Living room/Kitchen	9.72	4.1	SE	**Yes**
20	A3-001 Bedroom	4.86	5.1	SE	**Yes**
21	A3-002 Living room/Kitchen	12.69	3.0	NW	**Yes**
22	A3-002 Bedroom	4.86	3.3	NW	**Yes**
23	A3-001 Studio	5.94	1.9	SW	**Yes**

Table2b. Keyplan & list of the Block B apartments assessed for ADF

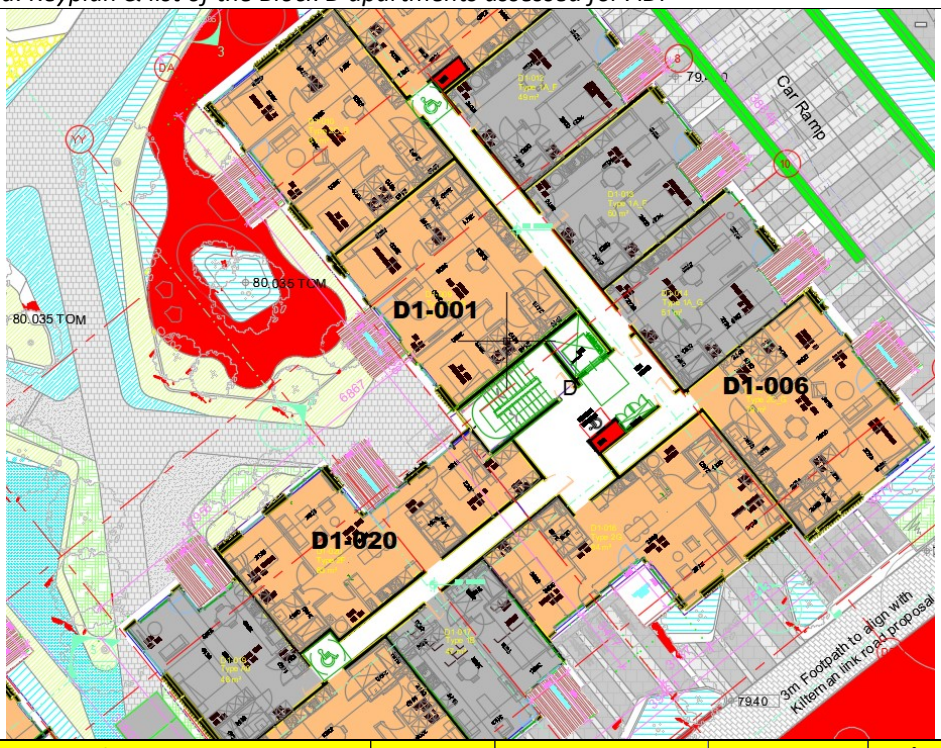
Ref.	Room reference	Window opening (m^2)	Average Daylight Factor (%)	Orientation	IS / BRE Compliance
1	B0-154 Living room/Kitchen	7.56	3.9	NE	**Yes**
2	B0-154 Bedroom	4.86	2.9	NE	**Yes**
3	B0-155 Living room/Kitchen	7.56	3.4	NW	**Yes**
4	B0-155 Bedroom	4.86	6.3	NW	**Yes**

Table2c. Keyplan & list of the Block C apartments assessed for ADF



Ref.	Room reference	Window opening (m^2)	Average Daylight Factor (%)	Orientation	IS / BRE Compliance
1	C1-001 Living room/Kitchen	7.56	2.0	NE	**Yes**
2	C1-001 Bedroom	4.86	2.9	NE	**Yes**
3	C1-006 Living room/Kitchen	7.56	2.0	NE	**Yes**
4	C1-006 Bedroom	4.86	2.9	NE	**Yes**
5	C1-009 Living Room	9.99	6.2	SE	**Yes**
6	C1-009 Bedroom	4.86	3.3	NW	**Yes**
7	C1-012 Living room/Kitchen	13.2	3.1	NE	**Yes**
8	C1-012 Bedroom	5.4	4.3	SE	**Yes**

Table2d. Keyplan & list of the Block D apartments assessed for ADF



Ref.	Room reference	Window opening (m^2)	Average Daylight Factor (%)	Orientation	IS / BRE Compliance
1	D1-001 Living room/Kitchen	9.99	3.3	SE	**Yes**
2	D1-001 Bedroom	4.86	4.5	SE	**Yes**
3	D1-006 Living room	7.83	3.2	NE	**Yes**
4	D1-006 Bedroom	4.86	4.7	NE	**Yes**
5	D1-020 Living room	13.5	4.4	NW/NE	**Yes**
6	D1-020 Bedroom	4.86	3.5	NW	**Yes**

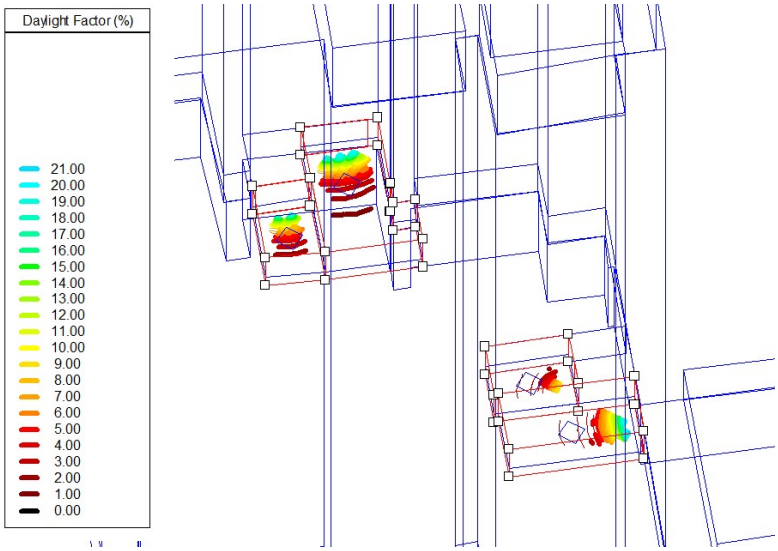


Fig 1. IES Model view – Apartments in block B1 (IESVE axonometric view) indicating daylighting percentage on working plane level. Colour chart indicates daylight levels contours in the figure.

Room LL00001C (A2-011 BED)
Analysis calculation for room -
Summary results for working planes and floor

Surface	Quantity	Values			Uniformity (Min./Ave.)	Diversity (Min./Max.)
		Min.	Ave.	Max.		
Working plane 1 Reflectance=0% Transmittance=100% Grid size=0.50 m Area=8.000m² Margin=0.50 m	Daylight factor	0.6 %	4.2 %	17.8 %	0.14	0.03
	Daylight illuminance	74.92 lux	518.99 lux	2176.94 lux	0.14	0.03
	Sky view	1.00	1.00	1.00	1.00	1.00

Room LL00001D (A2-011 LIVING)
Analysis calculation for room -
Summary results for working planes and floor

Surface	Quantity	Values			Uniformity (Min./Ave.)	Diversity (Min./Max.)
		Min.	Ave.	Max.		
Working plane 1 Reflectance=0% Transmittance=100% Grid size=0.50 m Area=29.622m² Margin=0.50 m	Daylight factor	0.0 %	3.0 %	19.5 %	0.00	0.00
	Daylight illuminance	0.00 lux	365.27 lux	2379.48 lux	0.00	0.00
	Sky view	0.00	0.98	1.00	0.00	0.00

Room BL000032 (C-001 BED)
Analysis calculation for room -
Summary results for working planes and floor

Surface	Quantity	Values			Uniformity (Min./Ave.)	Diversity (Min./Max.)
		Min.	Ave.	Max.		
Working plane 1 Reflectance=0% Transmittance=100% Grid size=0.50 m Area=8.318m² Margin=0.50 m	Daylight factor	0.3 %	2.9 %	16.9 %	0.10	0.02
	Daylight illuminance	37.26 lux	358.68 lux	2067.03 lux	0.10	0.02
	Sky view	1.00	1.00	1.00	1.00	1.00

Room BL000034 (C-001 LIVING)
Analysis calculation for room -
Summary results for working planes and floor

Surface	Quantity	Values			Uniformity (Min./Ave.)	Diversity (Min./Max.)
		Min.	Ave.	Max.		
Working plane 1 Reflectance=0% Transmittance=100% Grid size=0.50 m Area=27.204m² Margin=0.50 m	Daylight factor	0.1 %	2.0 %	21.9 %	0.03	0.00
	Daylight illuminance	8.36 lux	245.98 lux	2678.69 lux	0.03	0.00
	Sky view	1.00	1.00	1.00	1.00	1.00

5. SHADOW DIAGRAMS

The statistics of Met Eireann, the Irish Meteorological Service, show the sunniest months in Ireland are May and June.

The following is also based on the Met Eireann statistics:
During December, Dublin receives a mean daily duration of 1.7 hours of sunlight out of a potential 7.4 hour sunlight each day, i.e. only 22% of potential sunlight hours.
During June, Dublin receives a mean daily duration of 6.4 hours of sunlight out of a potential 16.7 hour sunlight each day, i.e. only 38% of potential sunlight hours. Therefore, impact caused by overshadowing are generally most noticeable during the summer months and least noticeable during the winter months.

This section will consider the shadows cast for the proposed development for the following dates:
March 21st (Spring Equinox)
June 21st (Summer Solstice)
September 21st (Autumn Equinox)
December 21st (Winter Solstice)

The BRE guidelines recommend using the 21st March for plotting shadow diagrams. Pages overleaf contain the shadow diagram based on the sun position at the given date & time. IES VE software is working using flat plane as ground. To simulate the terrain slope ridge heights were adjusted as per the site survey levels indicated on the drawings.

These images will show shadows cast for clear conditions with no clouds, assuming the sun is visible for every hour shown.

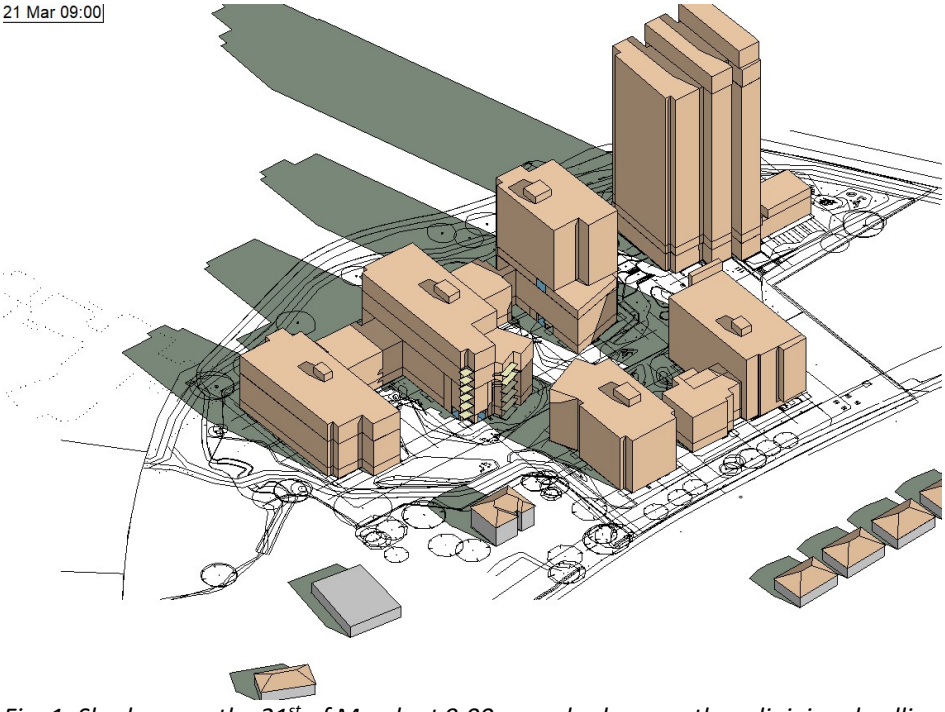


Fig. 1. Shadows on the 21st of March at 9:00 – no shadows on the adjoining dwellings

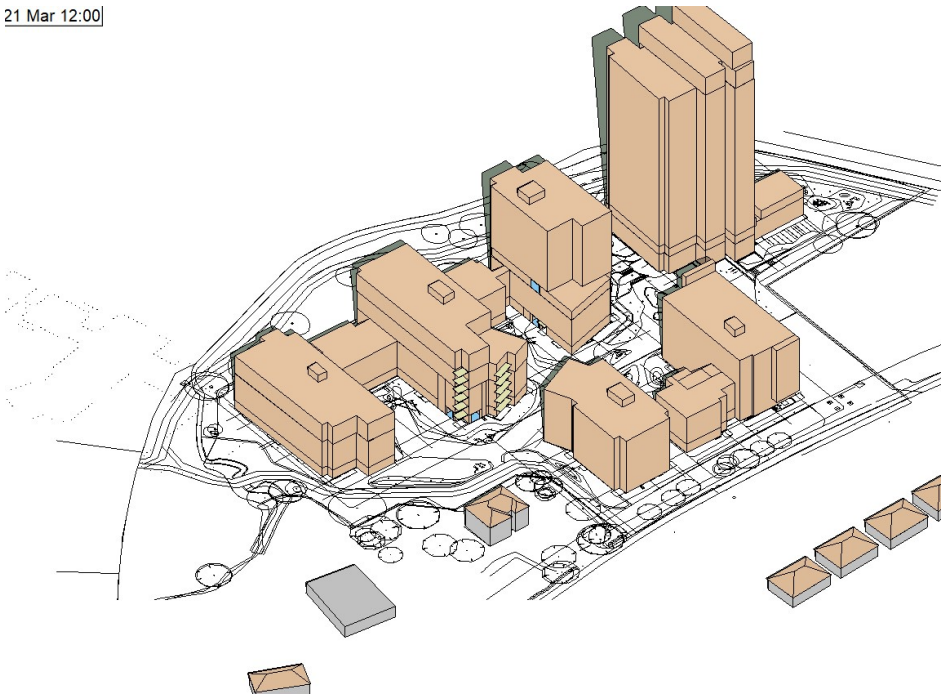


Fig. 2. Shadows on the 21st of March at 12:00 – no shadows on the adjoining dwellings

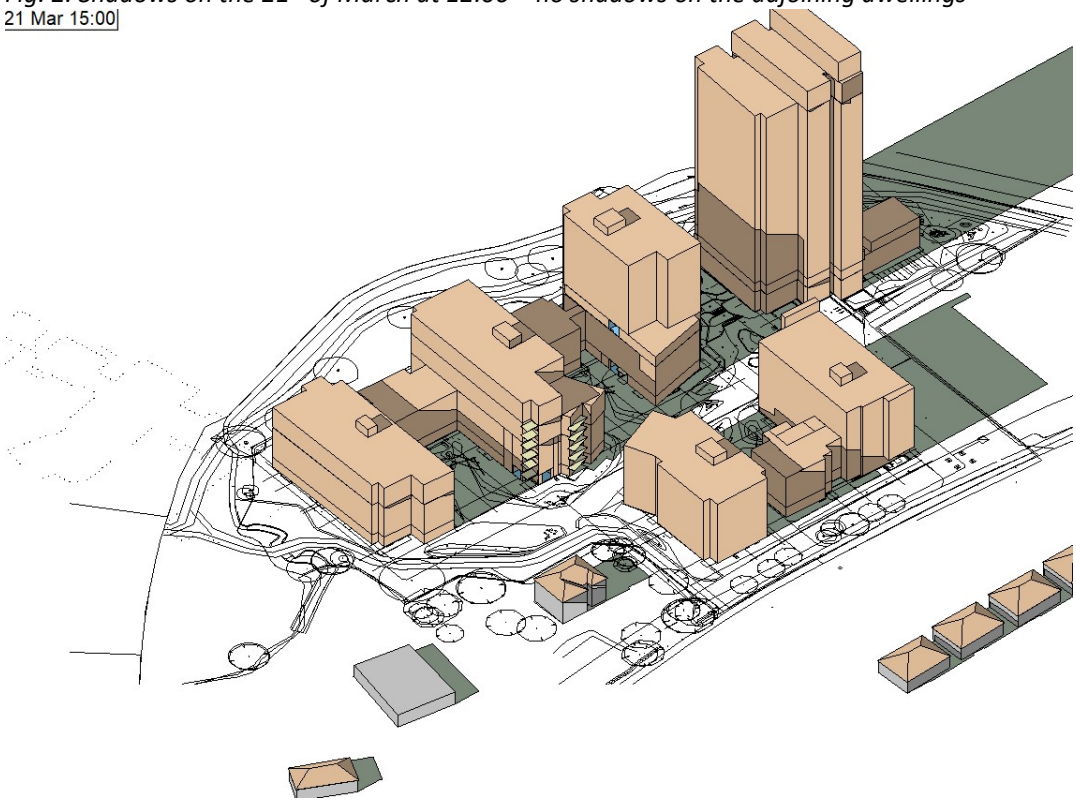


Fig. 3. Shadows on the 21st of March at 15:00 – no shadows on the adjoining dwellings

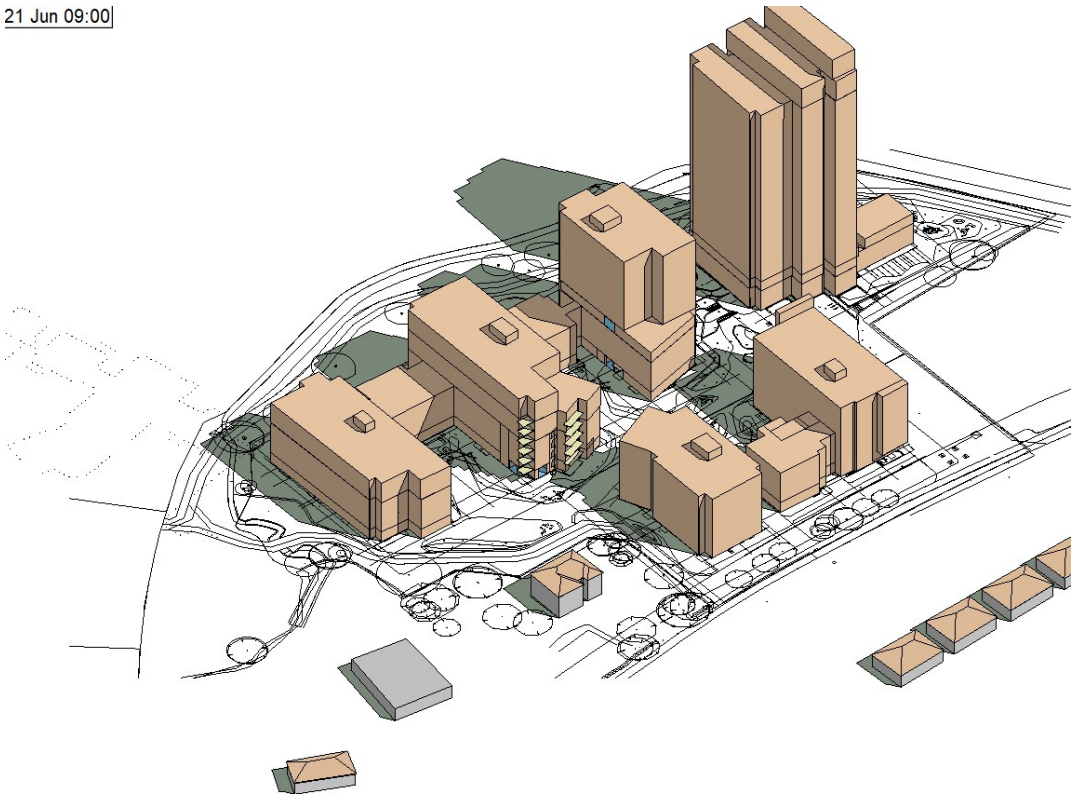


Fig. 4. Shadows on 21st June at 9:00 – no shadows on the adjoining dwellings

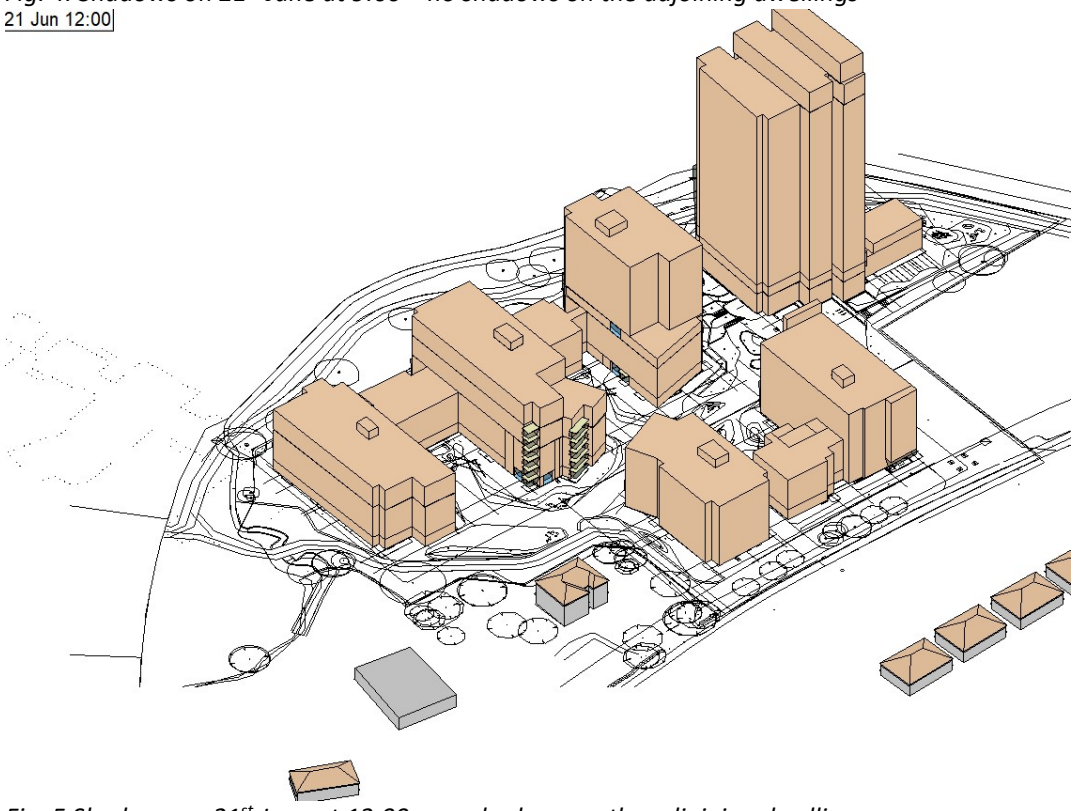


Fig. 5 Shadows on 21st June at 12:00 – no shadows on the adjoining dwellings

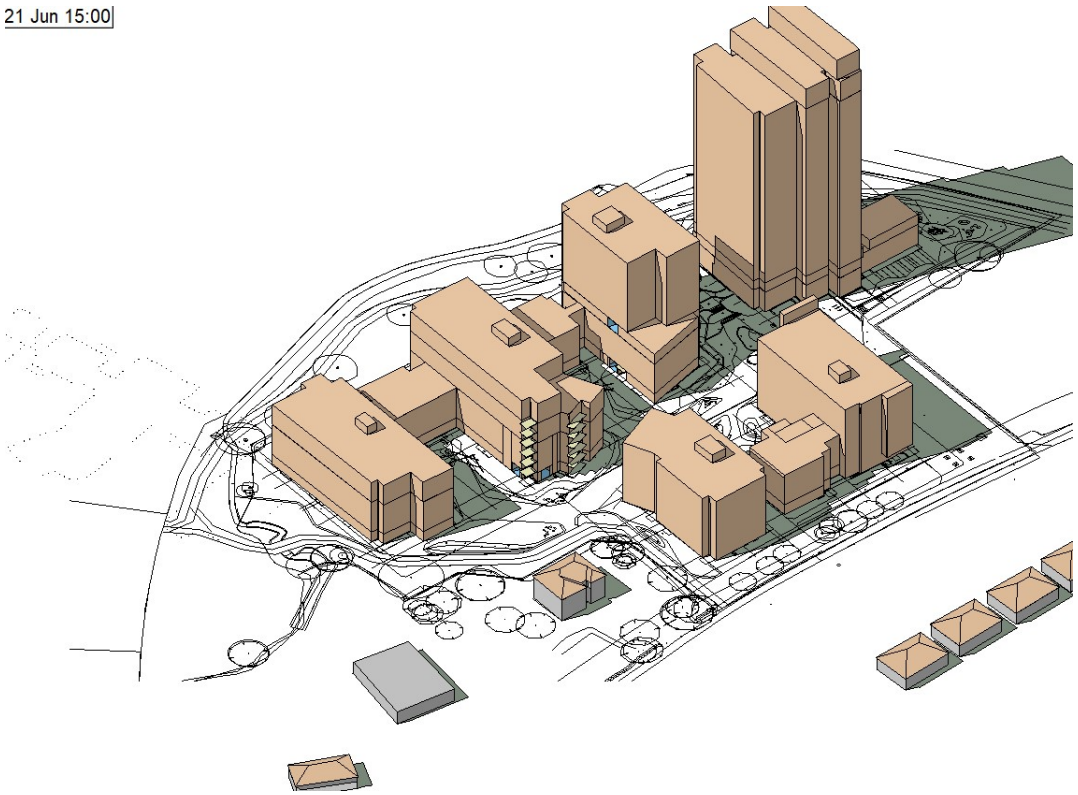


Fig. 6 Shadows on 21st June at 15:00 – no shadows on the adjoining dwellings

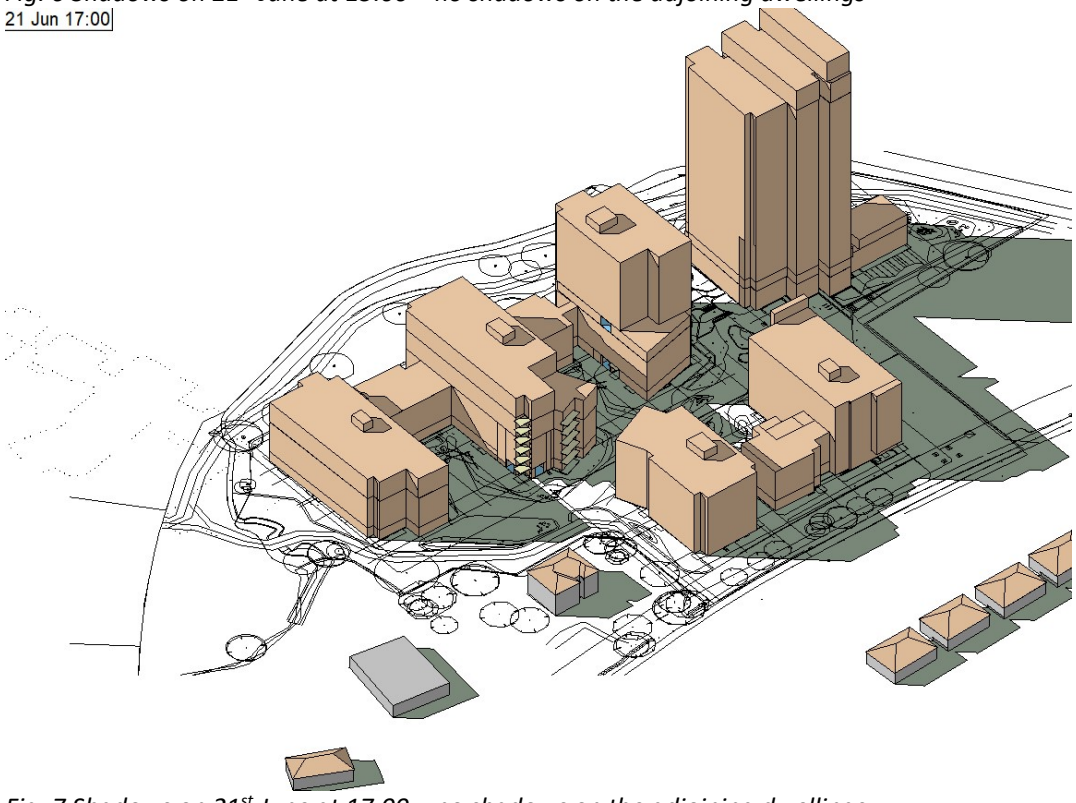


Fig. 7 Shadows on 21st June at 17:00 – no shadows on the adjoining dwellings

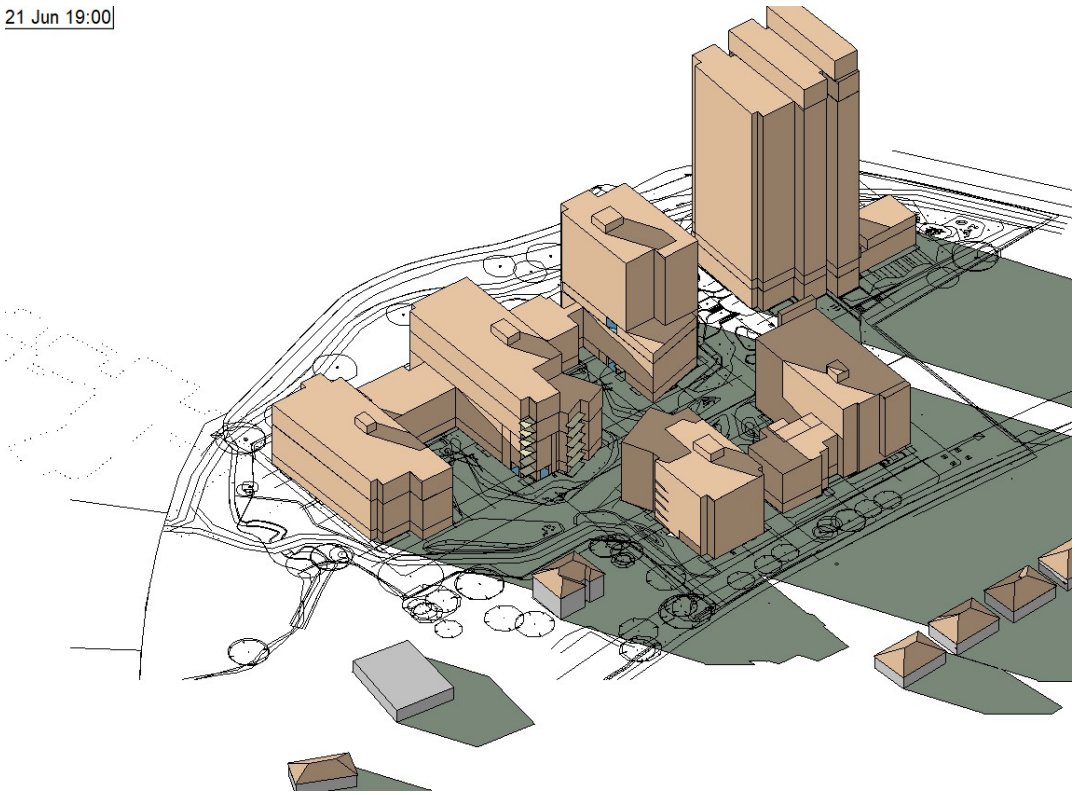


Fig. 8 Shadows on 21st June at 19:00 – slight overshadowing of the adjoining dwellings (sunset is at 18:41). Note that low summer sun can cause overheating in habitable rooms and therefore should not be looks at as negative.

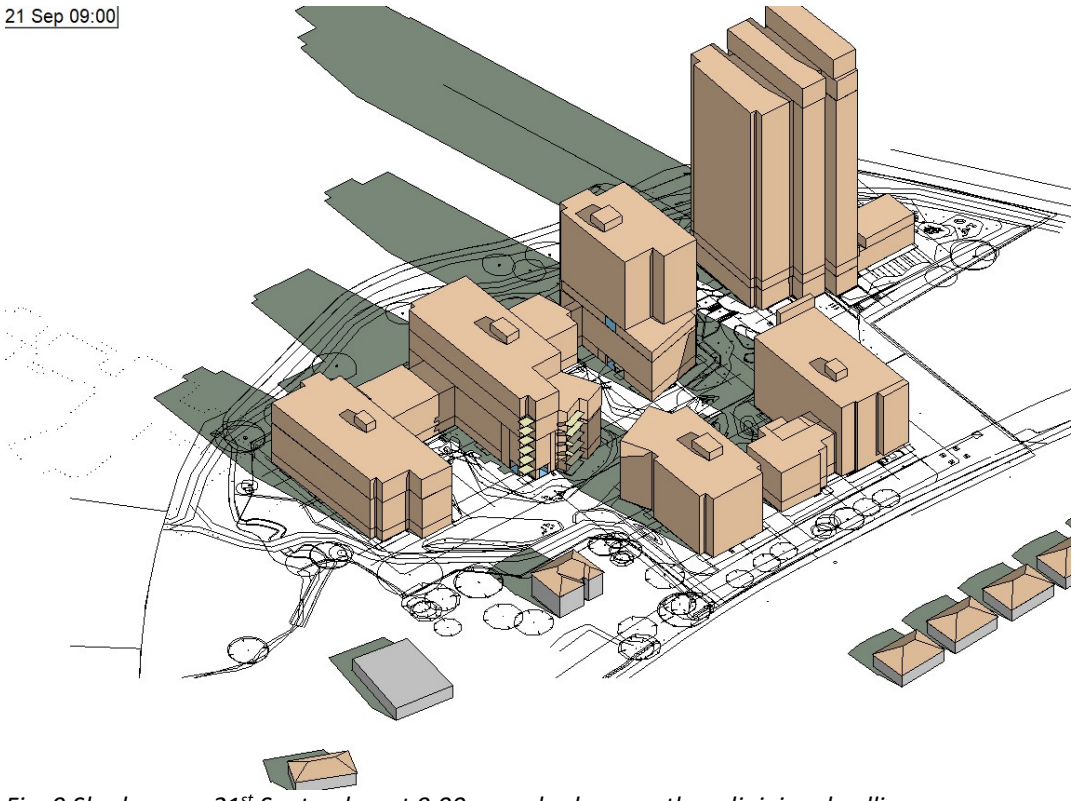


Fig. 9 Shadows on 21st September at 9:00 – no shadows on the adjoining dwellings

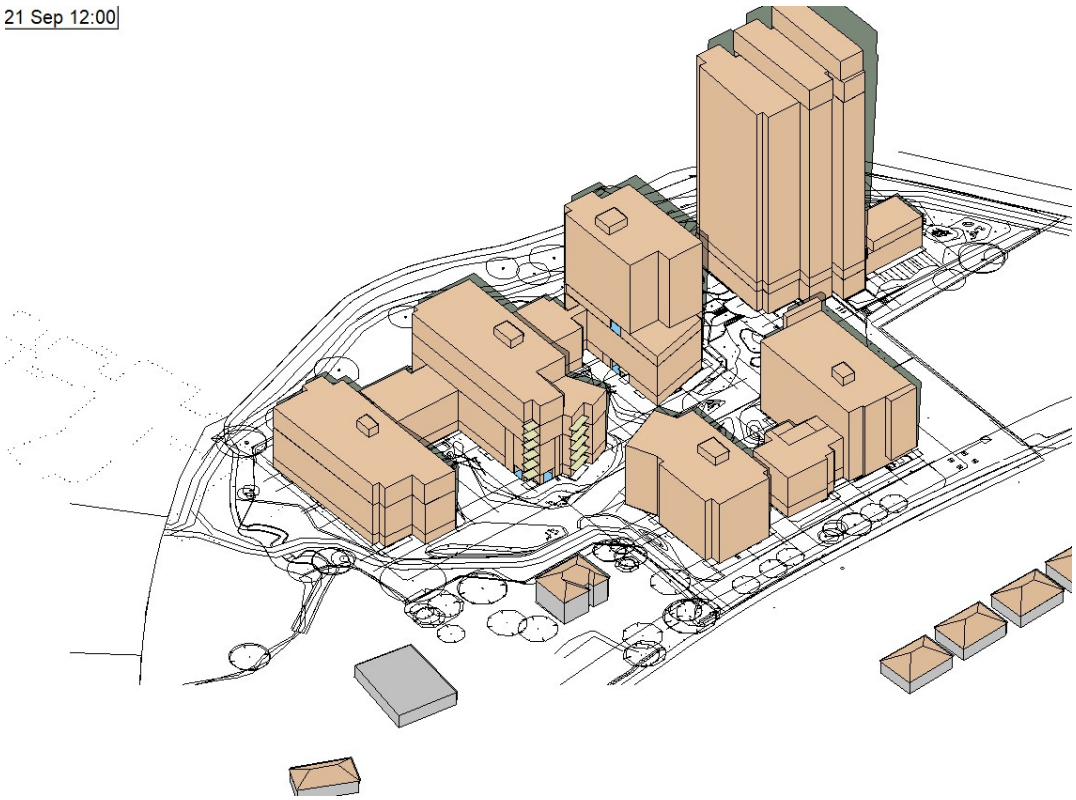


Fig. 11 Shadows on 21st September at 12:00 – no shadows on the adjoining dwellings

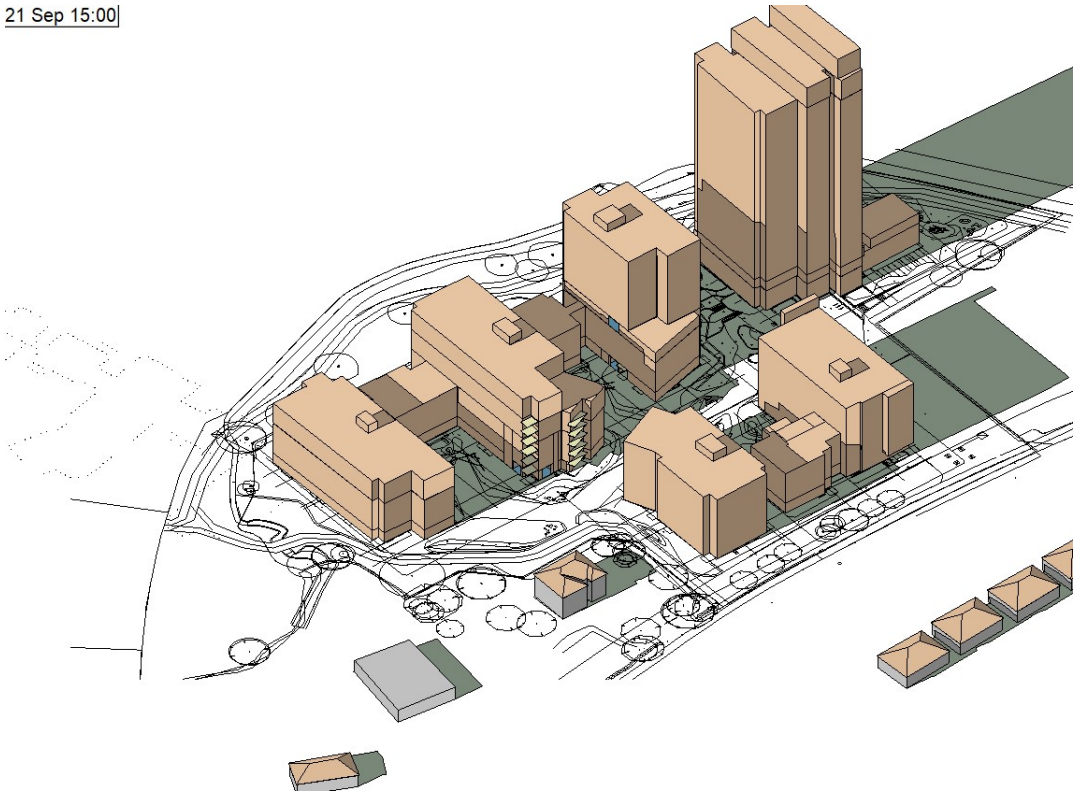


Fig. 12. Shadows on 21st September at 15:00 – no shadows on the adjoining dwellings

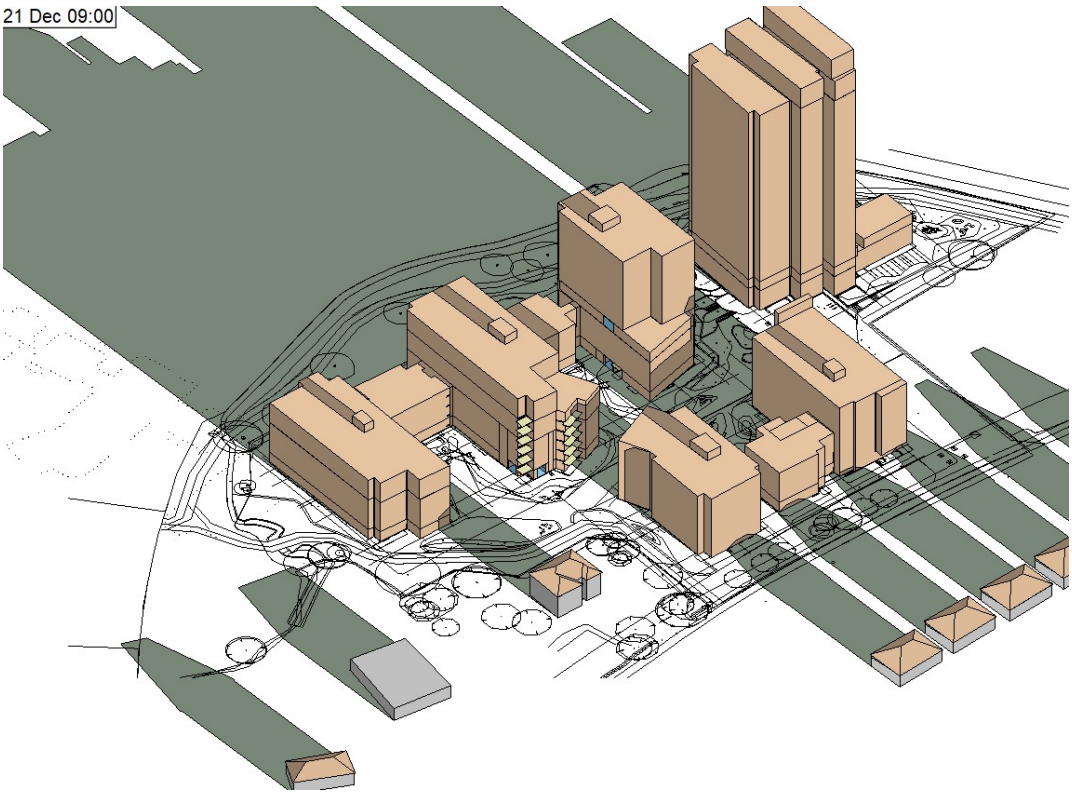


Fig. 13. Shadows on 21st December at 9:00 – no shadows on the adjoining dwellings

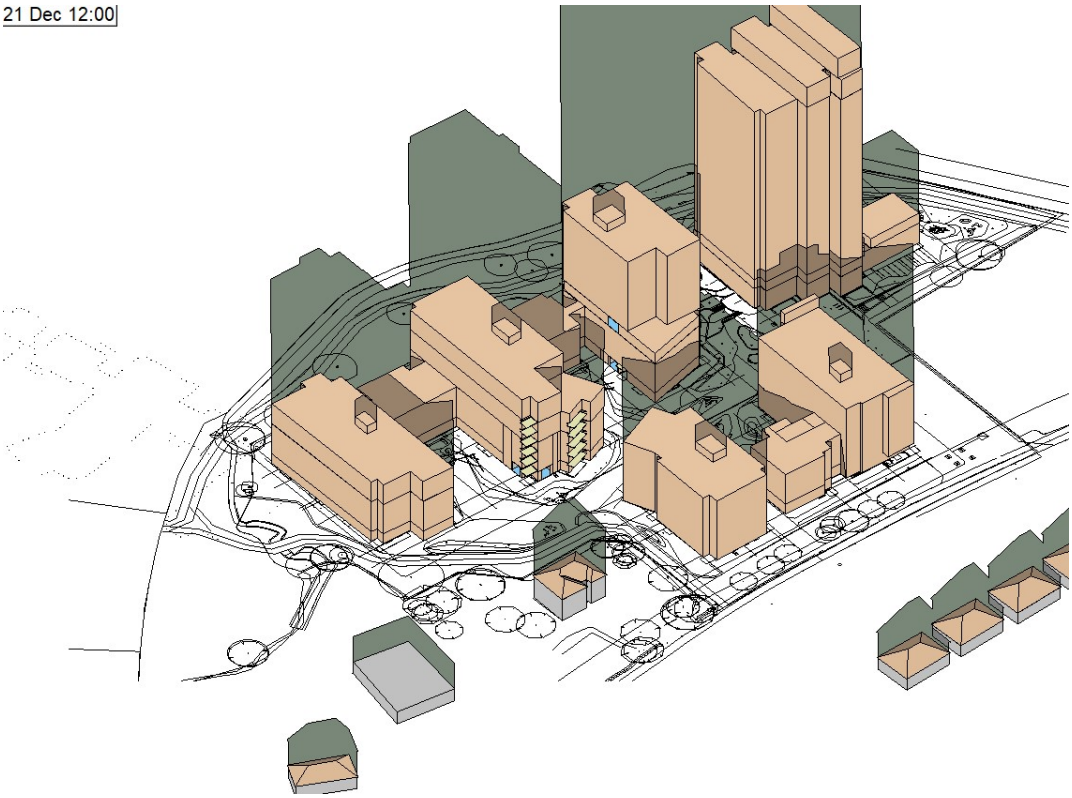


Fig. 14 Shadows on 21st December at 12:00

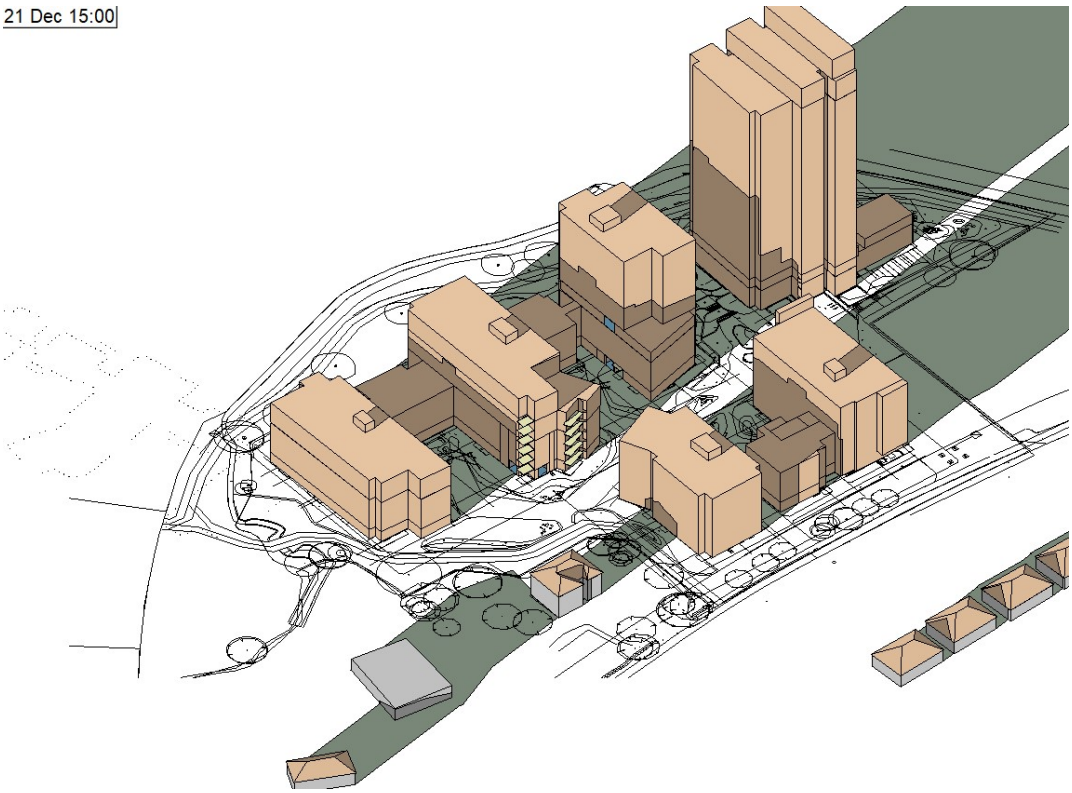


Fig. 15 Shadows on 21st December at 15:00 – no shadows on the adjoining dwellings

6. SUNLIGHT TO COURTYARDS AND PUBLIC SPACES

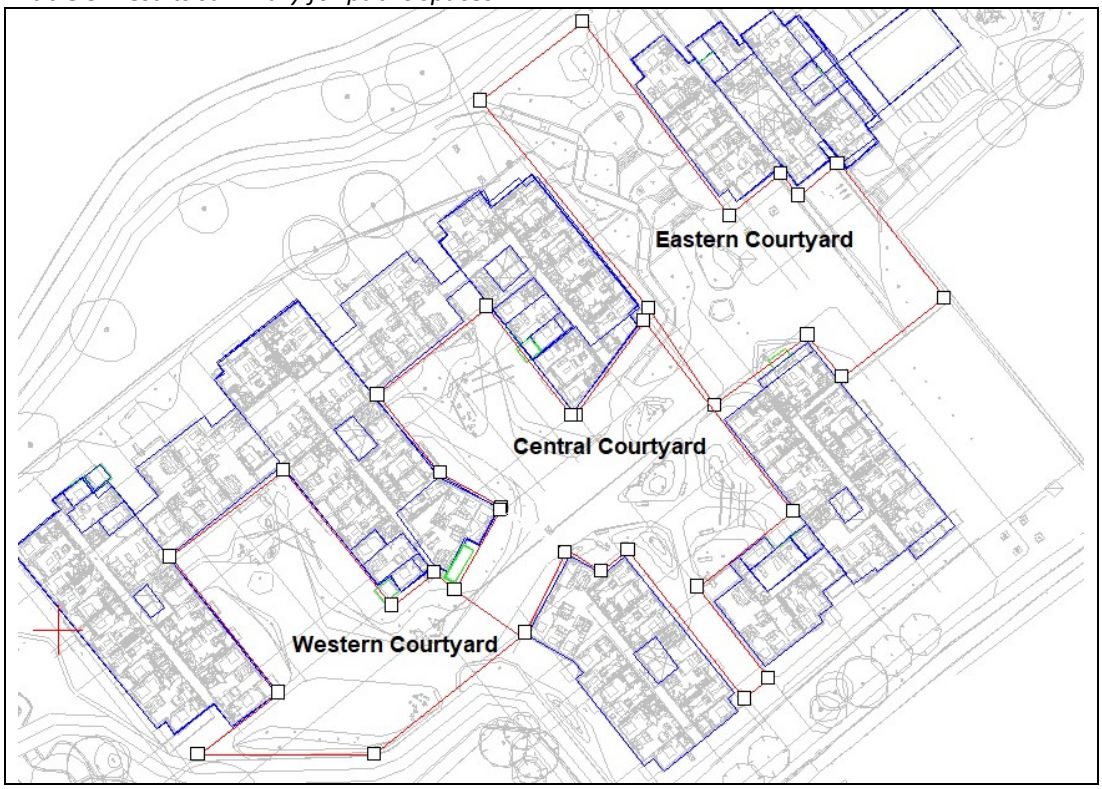
While providing good levels of daylight and sunlight in living spaces is important, it is also essential to apply the same mentality to outside spaces and amenity areas. An adequately lit open space creates a rich ambience that any occupant would find appealing. The basis of this calculation is to assess if 50% of the public areas will achieve more than two hours' worth of sunlight during the equinox (21st March).

The design approach of breaking down the massing and using orientation of the site allows sunlight and daylight to access the public spaces throughout the course of a day and throughout different times of the year.

The predicted sunlight to the public spaces within the proposed development has been assessed based on BRE guidelines to verify that the amenity for residents will fall within acceptable parameters. It is demonstrated below that the proposed amenity space, can be described as being adequately sunlit throughout the year. The BRE guidelines recommend that front gardens need not be assessed for sunlight. The communal spaces between the apartment blocks are assessed & keyplan below highlights in red the public areas assessed for sunlight hours.

Sunlight hours modelling
Using the IES VE Suncast module an accurate shadow casting analysis was produced. This program replicates the azimuth and altitude of the sun for any specified time and date of the year, orientation, site latitude and site longitude at any given location. The assessment results in table 3 show the proposed development meets the recommendations of the BRE 209 and can be described as being adequately sunlit throughout the year.

Table 3. Results summary for public spaces



Public Space	Area that receives 2 or more hours of sunlight on the 21st March	Minimum BRE requirement
Western Courtyard	100 %	50 %
Central Courtyard	66 %	50 %
Eastern Courtyard	95 %	50 %

Figures below illustrates the results of the modelling. The coloured squares indicate areas receiving more than 2 hours of daylight. White squares indicate area which receives less than 2 hours of sunlight. Coloured chart at each figure indicate number of hours with sunlight exposure.

The percentage of area of the proposed courtyard spaces that receives 2 or more hours of sunlight on the 21st March (Figure 16) is between 61 & 99%. These results exceed the recommendations of the BRE 209 guidelines and should be pleasant spaces.

In addition to 21st of march we have included diagrams showing daylight hours for every month of the year within the public open spaces to allow for a in depth understanding of the year round level of overshadowing of the residents recreational areas.

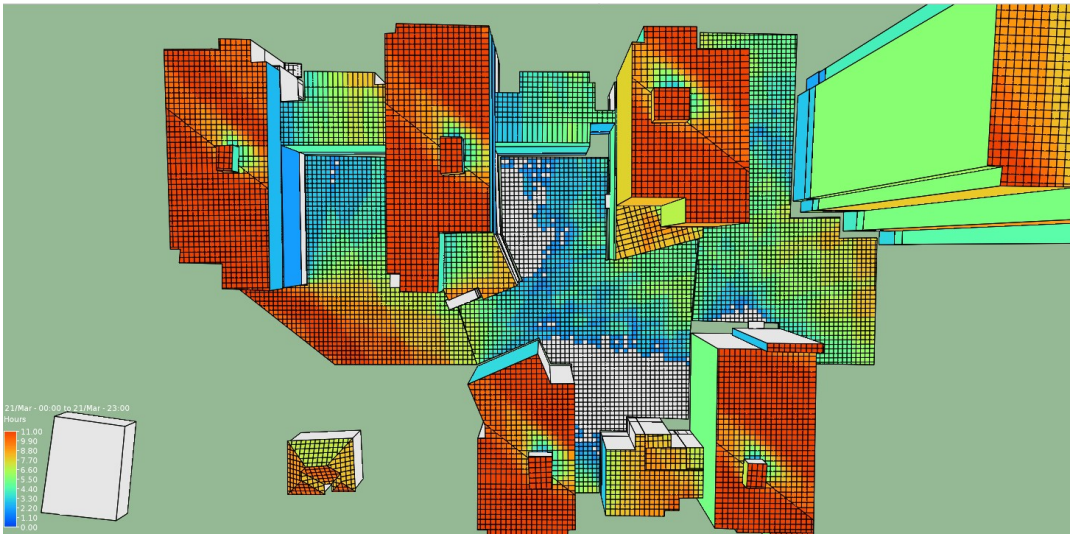


Fig.16 Sunlight hours for courtyards and roofs on 21st of March.

In addition to the BRE requirement on the day of spring equinox we have modelled the communal areas throughout the year and the diagrams follow overleaf.

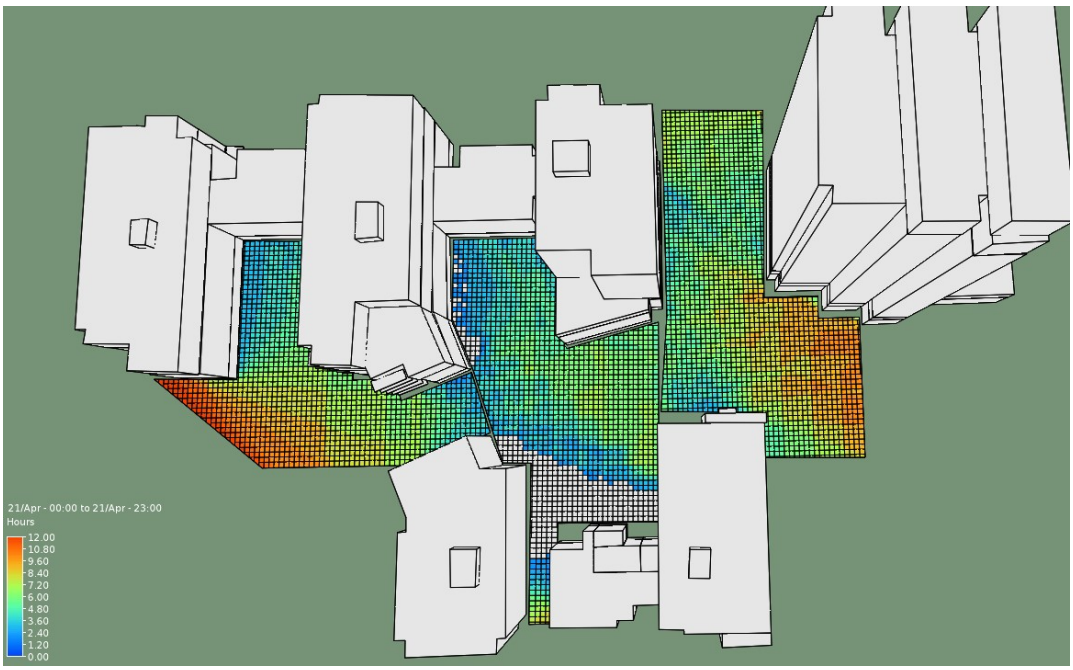


Fig.17 Sunlight hours on 21st of April.

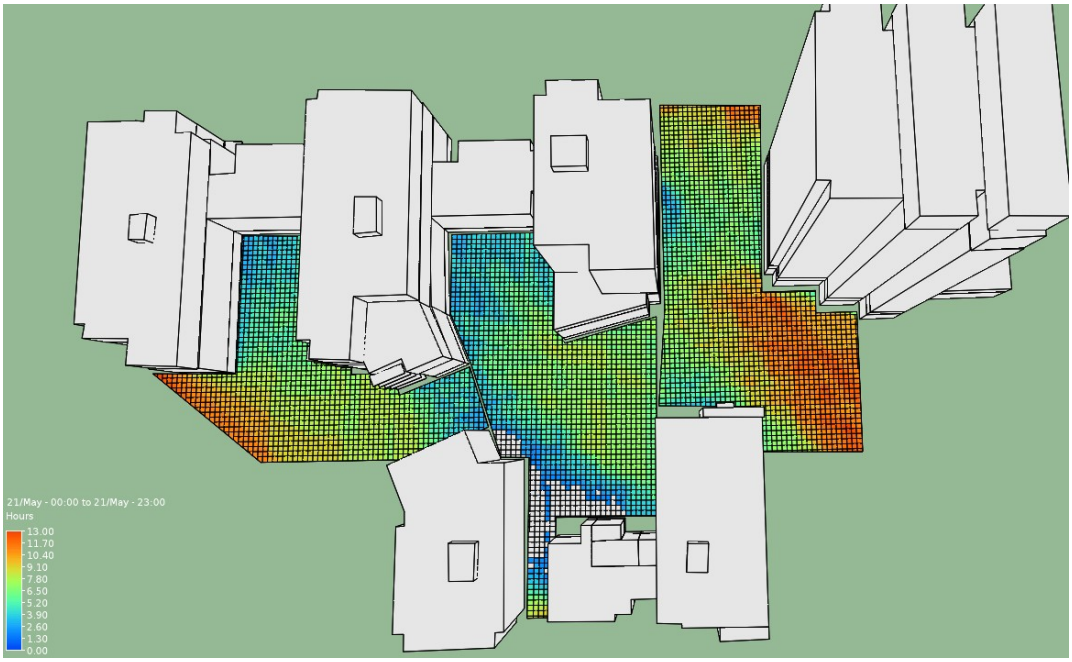


Fig.18 Sunlight hours on 21st of May.

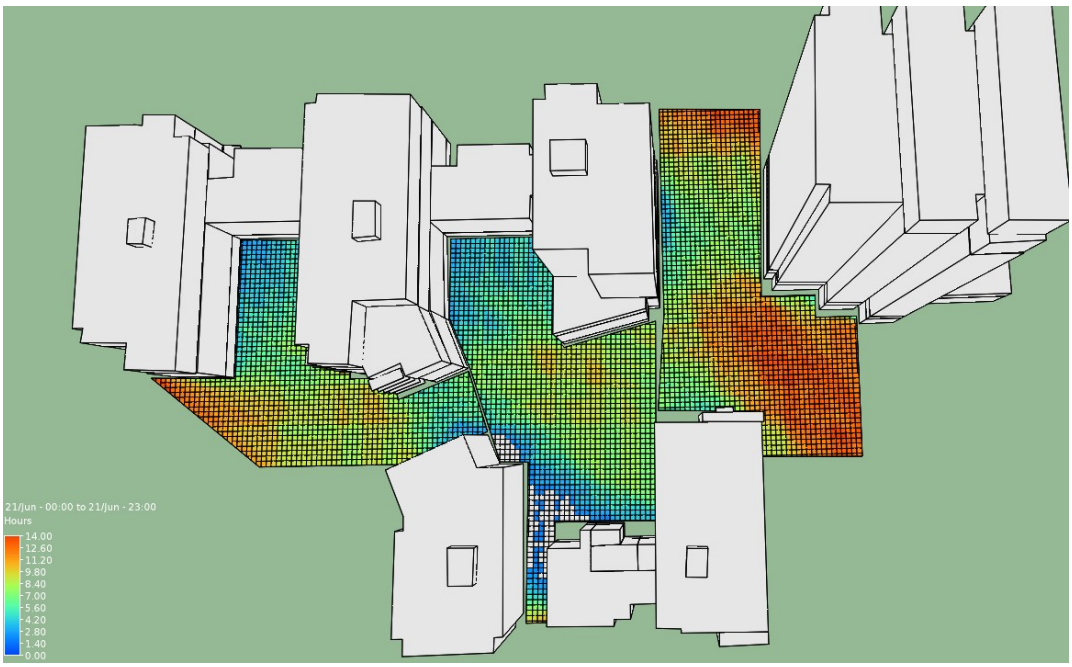


Fig.19 Sunlight hours on 21st of June.

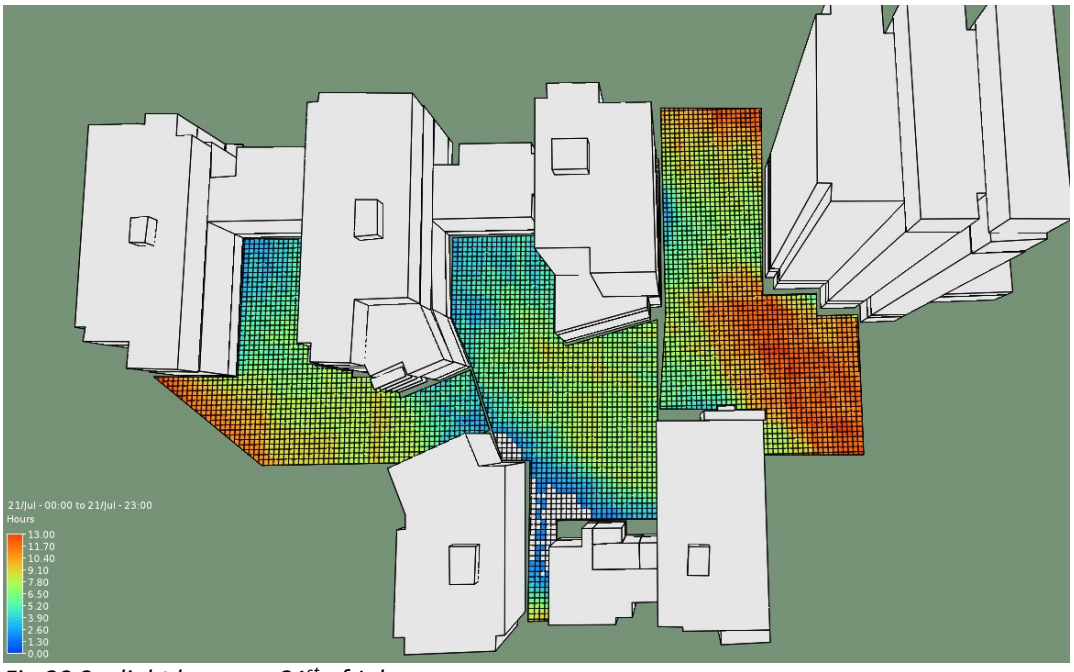


Fig.20 Sunlight hours on 21st of July.

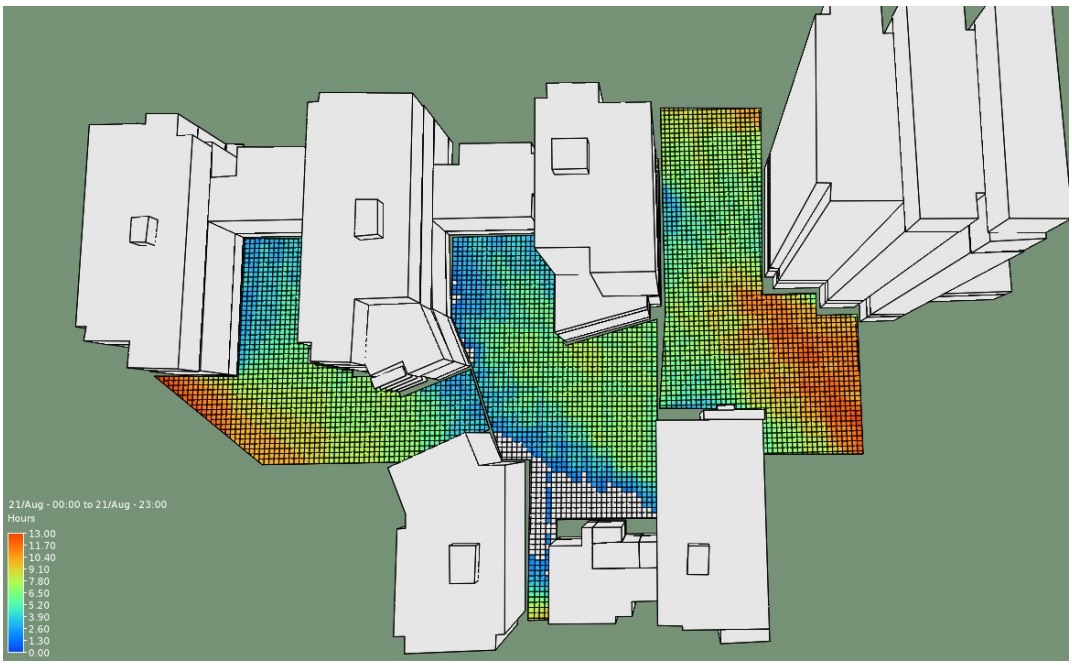


Fig.21 Sunlight hours on 21st of August.

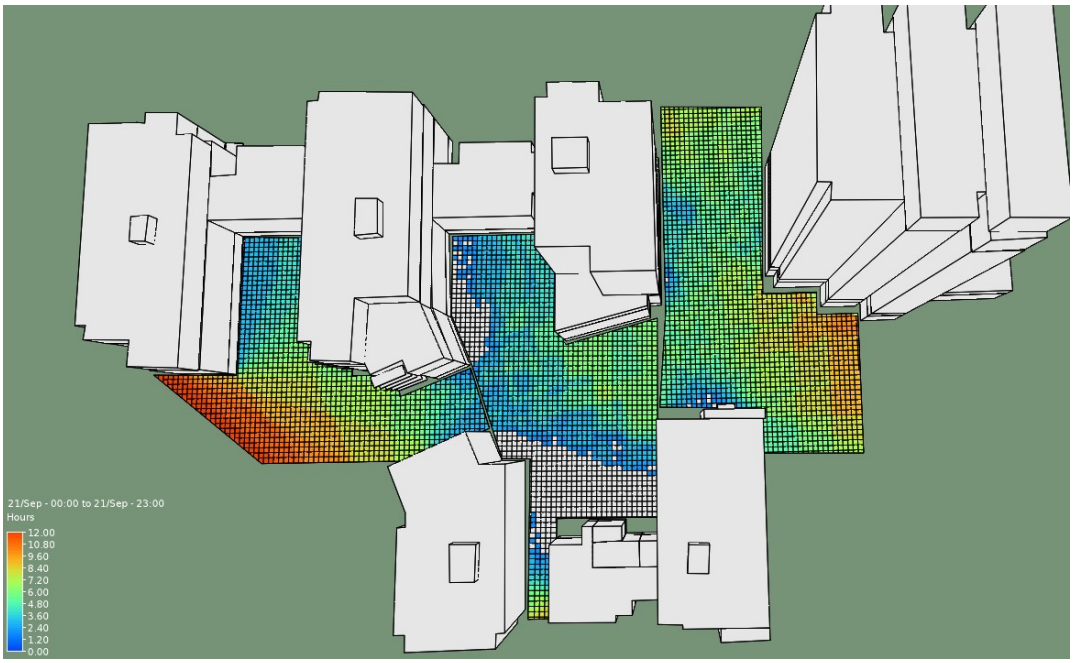


Fig.22 Sunlight hours on 21st of September.

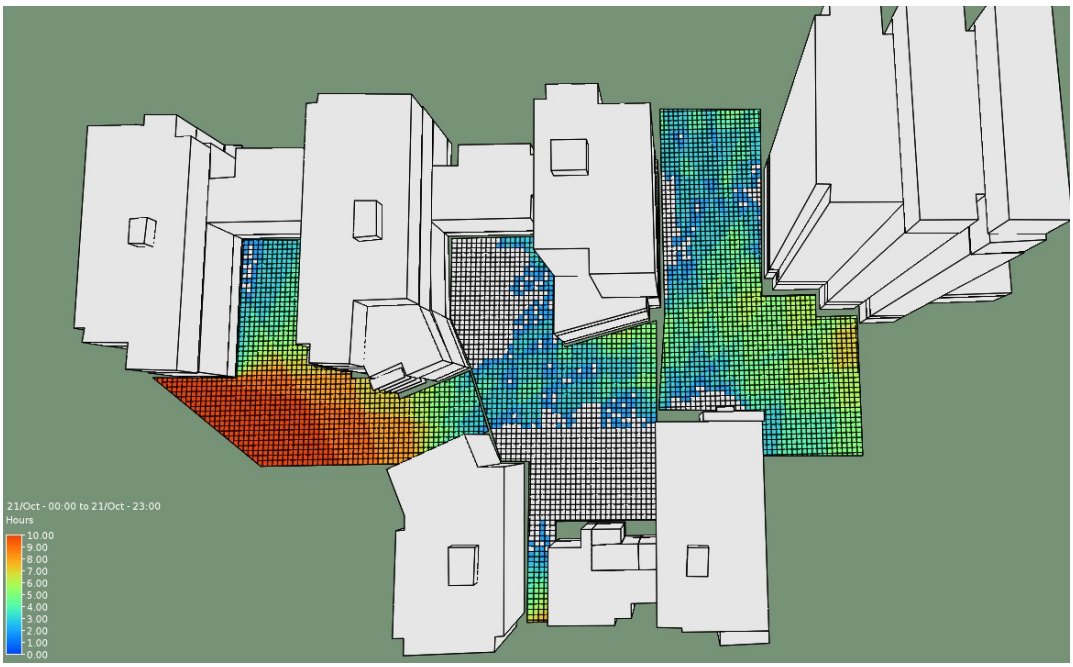


Fig.23 Sunlight hours on 21st of October.

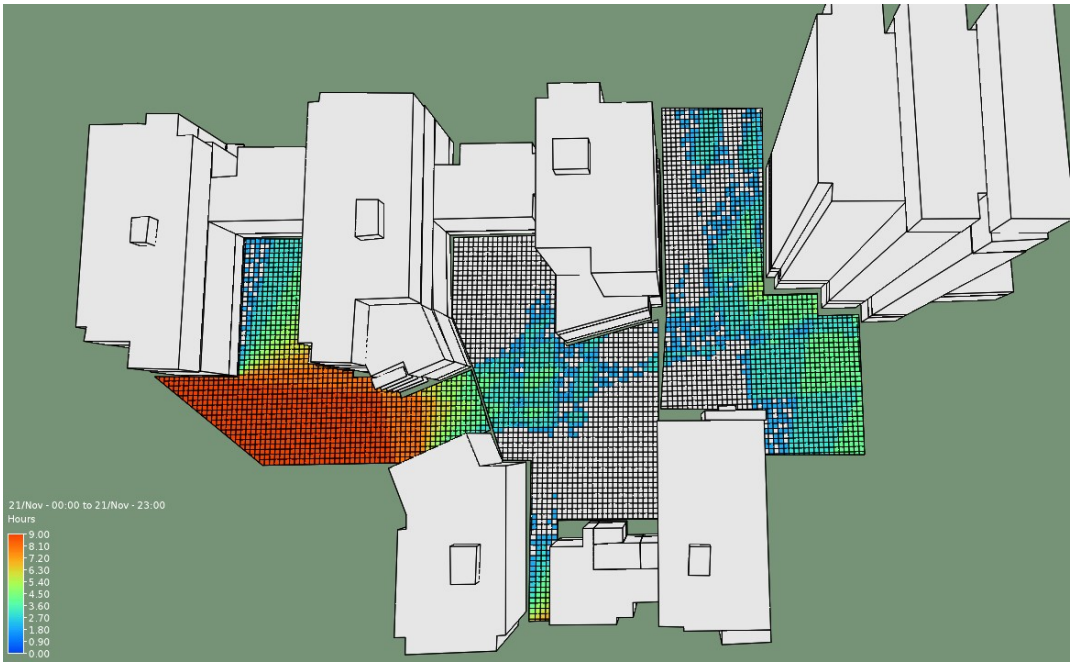


Fig.24 Sunlight hours on 21st of November.

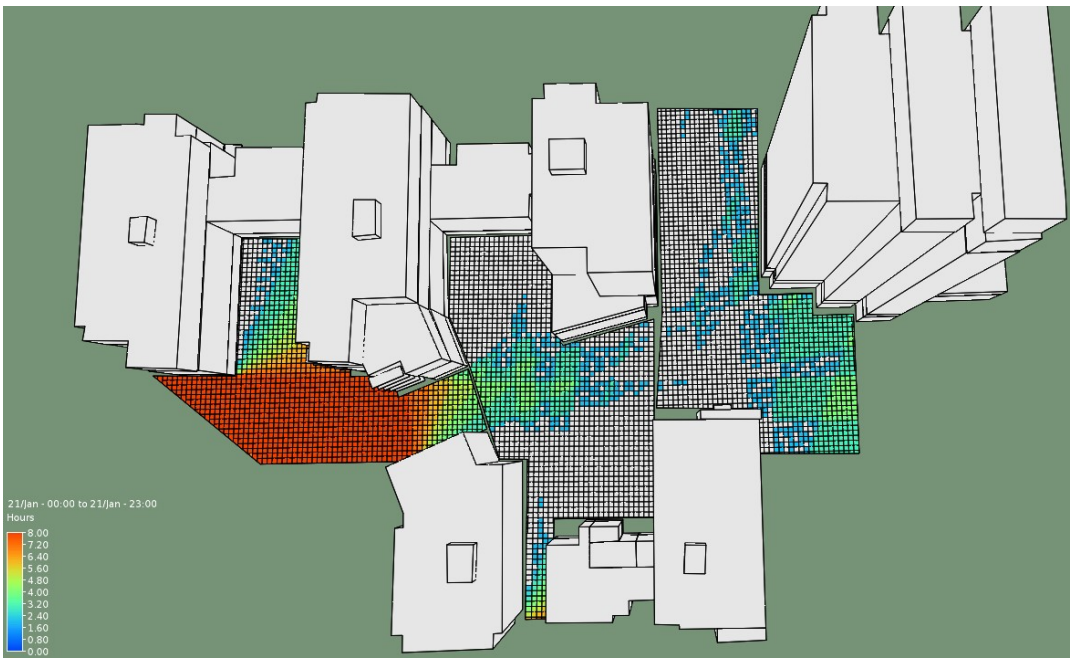


Fig.25 Sunlight hours on 21st of December.

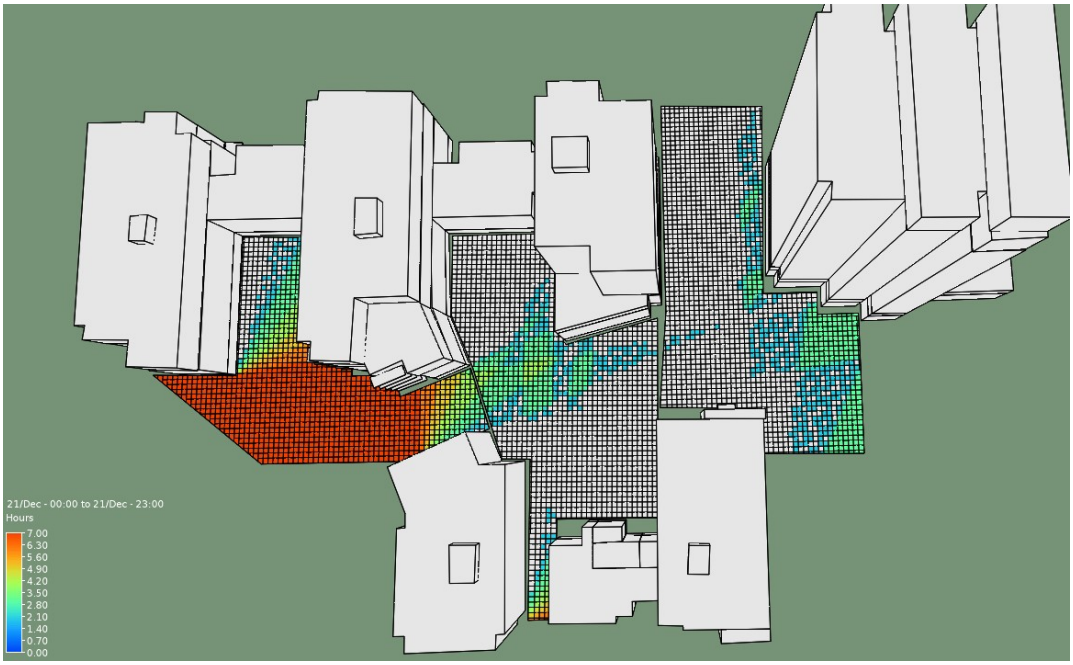


Fig.26 Sunlight hours on 21st of January.

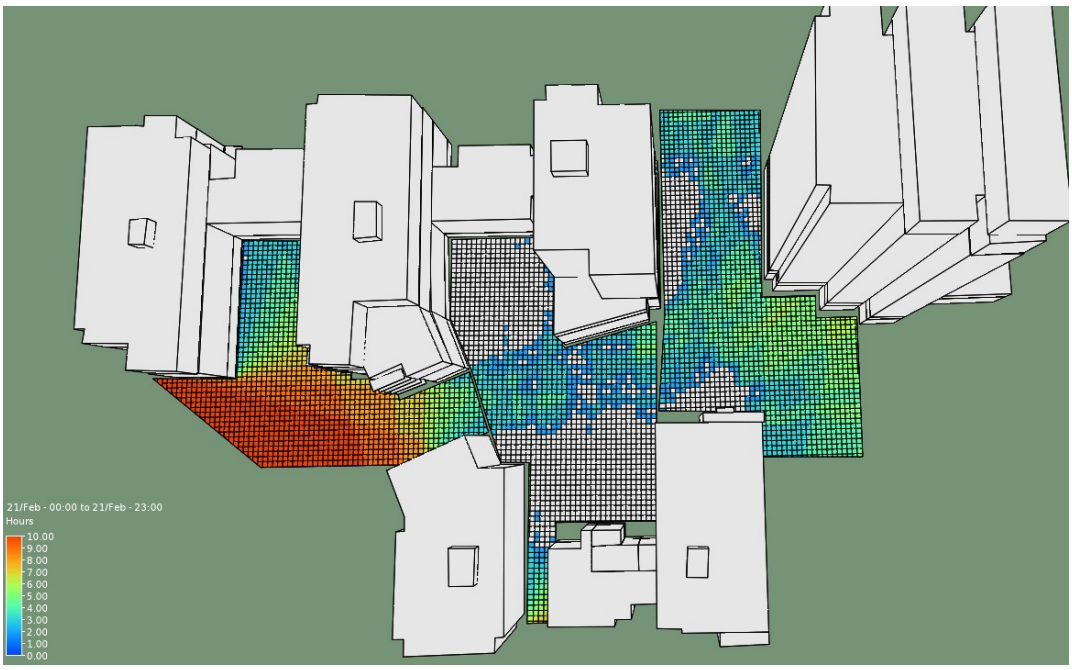


Fig.27 Sunlight hours on 21st of February.

In addition to the courtyards number of green roof are being provided for the residents. Figure below demonstrates that 100% the additional resident recreational areas receive more than 2 hours of sunlight on 21st of march which greatly exceeds the BRE requirement of 50%.

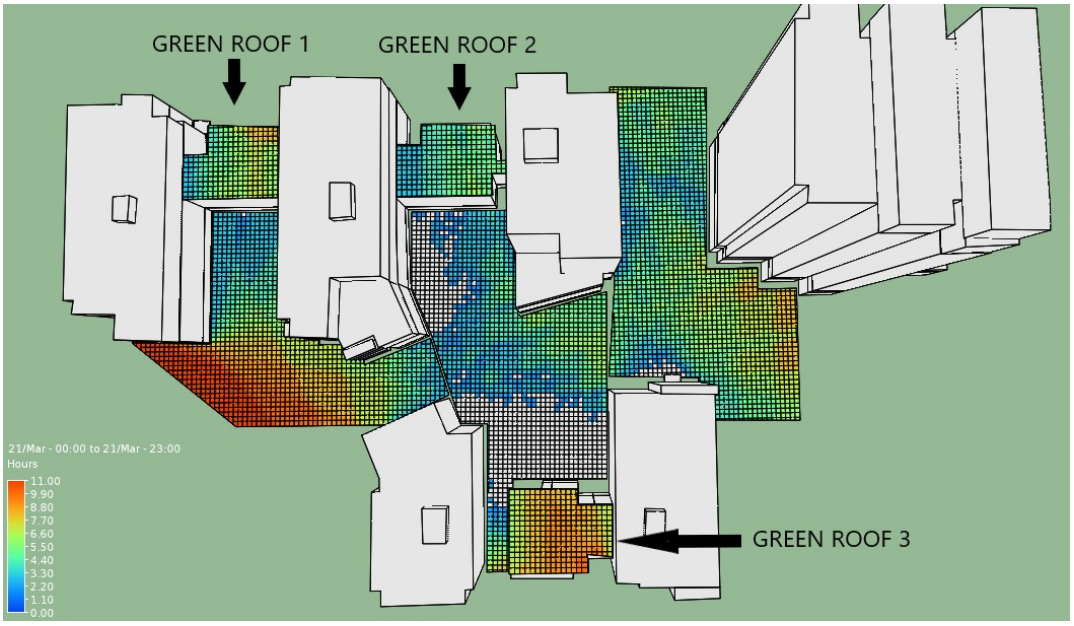


Fig.28 Sunlight hours for the green roofs and courtyards on 21st of March indicate that 100% of the roof terraces will receive more than 2 hour of daylight on given day.

7. SKYLIGHT TO THE ADJACENT DWELLINGS

This study has quantified the impact on skylight at a number of points related to residential premises around the development which would be affected by the proposed development. The assessment methodology used for the surrounding houses is called the "Vertical Sky Component (VSC)". This is the ratio of the direct sky illuminance falling on the vertical wall at a reference point (usually the centre of the window), to the simultaneous horizontal illuminance under an unobstructed sky. In assessing the loss of daylight, the VSC is generally recommended as the appropriate parameter to use. This is because the VSC depends only on obstruction and is therefore a measure of the daylit environment as a whole.

The standard CIE (Commission Internationale de L'Eclairage –International Commission on Illumination) overcast sky is used. The CIE Overcast sky is intended for two purposes; to be a universal basis for the classification of measured sky luminance distributions and to give a method for calculating sky luminance in daylighting design procedures.

DAYLIGHT TO THE EXISTING DWELLINGS
BRE guideline recommends that: "Loss of light to existing windows need not be analysed if the distance of each part of the new development from the existing window is three or more times its height above the centre of the existing window."

"To check for this if part of a new building measured in a vertical section perpendicular to the main window wall of an existing building, from the centre of the lowest window, subtends and angle of more than 25º to the horizontal, then the diffuse light of the existing building may be adversely affected."

To demonstrate the impact by the new development we have omitted the preliminary assessment and we have used IES VE software to analyse all surrounding dwellings which could be negatively impacted. Vertical Sky Component (VSC) analysis was carried out to quantify loss of sunlight as per BRE guidelines.

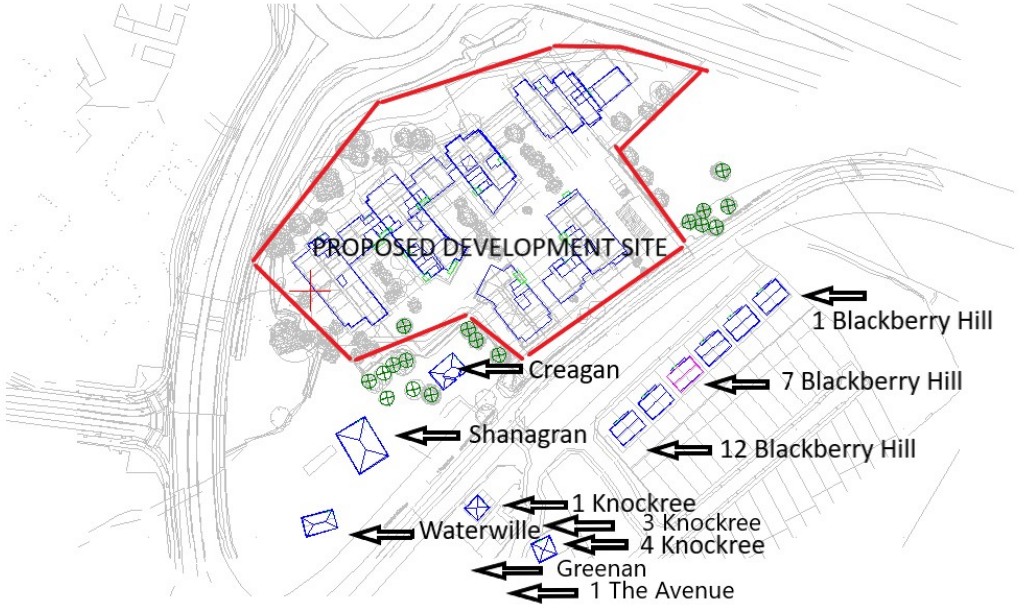


Fig.29 Keyplan of the assessed dwellings

Using the IES VE software we have analysed the amount of relevant Vertical Sky Component at window for each of the selected dwellings for existing and proposed scenario. This was carried out at the height of 1.6 above ground floor which represent the centre of the window.

To ensure houses in proximity of Golf lane are not adversely affected by the development, VSC reduction was assessed based on the BRE recommendation. Shadow study (section 5) is illustrating the impact of the new development throughout the year. The analysis indicates that one of the dwellings assessed does not satisfy the BRE recommendations of the Vertical Sky Component (VSC) criteria.

Table 5. Results summary for the existing dwellings

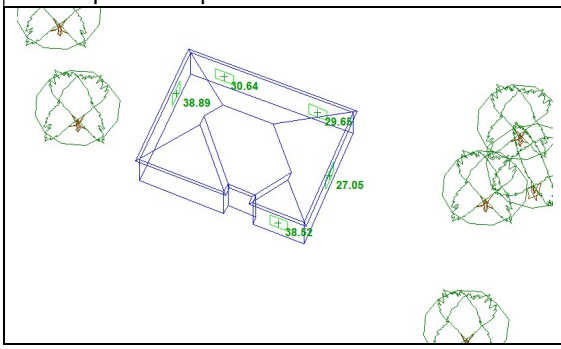
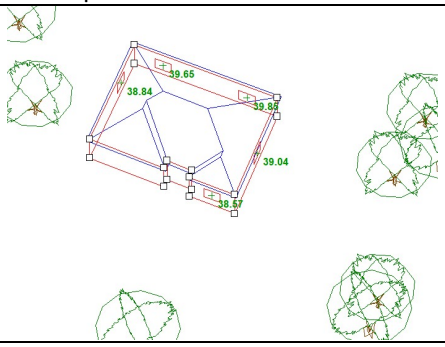
House Name	Proposed	Existing		
	Vertical Sky Component (%)	Vertical Sky Component (%)	VSC Reduction (%)	BRE recommended max VSC reduction
Shanagran D18 R1H3	34.59	39.08	**11.49%**	20%
Waterwille D18 C2X2	37.48	38.37	**3.55%**	20%
Creagan D18 C3V9 (front)	38.52	38.57	**0.13%**	20%
Creagan D18 C3V9 (rear)	29.65	39.88	**25.65%**	20%
Creagan D18 C3V9 (NE side)	27.05	39.04	**30.71%**	20%
Creagan D18 C3V9 (SW side)	38.84	38.89	**0.13%**	20%
1 Knockcree, D18 T443	36.71	39.34	**6.69%**	20%
3 Knockcree, D18 X0V3	36.71	39.34	**6.69%**	20%
4 Knockcree, D18 X169	36.07	38.55	**6.43%**	20%
1 Blackberry Hill, D18 K941	35.27	39.96	**11.74%**	20%
1 Blackberry Hill, D18 K941	35.27	39.96	**11.74%**	20%
7 Blackberry Hill, D18 D3P5	34.14	39.8	**14.22%**	20%
12 Blackberry Hill, D18 D6E2	34.38	39.78	**13.57%**	20%
Greenan D18 P3C2	38.46	39.33	**2.21%**	20%
1 The Avenue (Rear)	38.55	39.13	**1.48%**	20%

Based on the results indicated in table 5 we have determined that all but one house satisfy the BRE guide recommendation. The result is just marginally outside the recommendation.

Creagan, is the dwelling in question & on further detailed examination we can assess that two aspects of the dwelling are indicating minor impact with the new development in place. The level of impact when considering the whole house is within the BRE 209 guidelines. Average VSC reduction for the whole dwelling is 14.16%. Table 6. below is showing outputs of the simulation and VSC values are displayed. BRE 209 guide is recommending value of 15-27% for large window. All the assessed windows exceed these values, and this indicates good access to daylight. It should be noted that the aspect showing the highest reduction of VSC is not the main living space within the dwelling, it is the aspect where the bedroom is located. The dwellings main living spaces are in the front of the house which is not affected by the development.

We note the highest reduction of VSC occurs on the side of the property where the bedroom is located. The main living space is located in the front of the house which is not affected by the development.

Table 6. Detailed VSC results for Creagan house

VSC for the Creagan house with the development in place	VSC for the Creagan house prior to the development.
	

IMPACT ON EXISTING GARDENS

In addition to detailed VSC results for Creagan house we have looked at garden of this house and carried out and carried out modelling of sunlight hours for the garden. We found that with the development in place all of the garden receives more than 2 hours of sunlight and should be a pleasant space. The IES VE Suncast module does not take trees into consideration for the calculation.
In relation to trees he BR209 states:
'Normally trees and shrubs need not to be included, partly because their shapes are almost impossible to predict and partly because the dappled shade of a tree is more pleasant than deep shadow of a building'

It is evident from section 5 that position of the development against the existing gardens will not cause los of sunlight to the gardens.

8. CONCLUSION

The following can be concluded based on the studies undertaken:

Daylighting analysis
The proposed development will provide high quality living spaces with average daylight factor results exceeding the minimum requirements. The results satisfy requirements of BRE guide 'Site Layout Planning for Daylight and Sunlight; A Guide to Good Practice', 2011, IS EN 17037 (2018): Daylight in buildings and BS8208 Part 2:2008 Lighting for Buildings, Code of Practice for Daylighting.

Sunlight to Proposed Amenity Spaces
As mentioned above under Section 3.3.17 of BRE's Site Layout Planning for Daylight and Sunlight states that for a space to appear adequately sunlit throughout the year, at least half of the garden or amenity area should receive at least 2 hours of sunlight on the 21st of March.
The area of shared amenity provided exceeds the minimum required. Additional outdoor space with good quality daylighting is provided at the communal green roofs.

Shadow Analysis
The Shadow analysis shows different shadows being cast from the proposed scheme at particular periods throughout the year. During the months of March and June and December, taking all this information into consideration, there is minimal overshadowing to the properties situated adjacent to this development in the late evenings of the summer months.

Impact to existing dwellings
The orientation of the site to the north of the existing dwelling will show that the development does not cause significant loss of daylight. All but one dwelling are within BRE 209 guidance document recommended values, this is very marginal and does not impact in any way on the habitable living spaces within the dwelling. The analysis has indicated the Creagan house is slightly over the 20% reduction however the windows still have good access to daylight (demonstrated by VSC value in table 5)

Overall, the development creates a good quality public realm space and does not have major adverse impact to the dwellings in the proximity of the site. The massing of the blocks was designed with maximizing daylight to courtyards and minimizing impact to neighbouring dwellings in mind. The current configuration is imperative for achieving height and density on our site along the Golf Lane frontage.

9. IMPACT CLASSIFICATION

BRE guidance in Appendix I – Environmental Impact Assessment suggests impact classifications as minor, moderate and major adverse. It provides further classifications of these impacts with respect to criteria as follows;
Where the loss of skylight or sunlight fully meets the guidelines in the BRE guide, the impact is assessed as negligible or minor adverse. Where the loss of skylight or sunlight does not meet the BRE guidelines, the impact is assessed as minor, moderate or major adverse.

Negligible adverse impact	• *Loss of light well within guidelines,* ***or*** • *only a small number of windows losing light (within the guidelines)* ***or*** • *limited area of open space losing light (within the guidelines)*

Minor adverse impact (a)	• *Loss of light only just within guidelines* ***and***
	  ○ *a larger number of windows are affected* ***or***
	  ○ *larger area of open space is affected (within the guidelines)*

Minor adverse impact (b)	• *only a small number of windows or limited open space areas are affected* • *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	• *large number of windows or large open space areas 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 (living rooms / playground)*

10. NOTES ON THE USE OF BS 8026-2 2008 AND BRE GUIDANCE DOCUMENT (2011) "SITE LAYOUT PLANNING FOR DAYLIGHT AND SUNLIGHT".

To date, it is understood that no standards or guidance documents (statutory or otherwise) on the subject of sunlight access to buildings or open spaces or daylight access to buildings have been prepared or published in Ireland. In the absence of guidance on the matter of sunlight and daylight access tailored to Irish climatic conditions, Irish practitioners tend to refer to the relevant British Standard, BS 8206-2:2008: Lighting for buildings - Part 2: Code of practice for daylighting. The standards for daylight and sunlight access in buildings (and the methodologies for assessment of same) suggested in the British Standard have been referenced in this Sunlight and Daylight Access Analysis.

Neither the British Standard nor the BRE Guide set out rigid standards or limits. The BRE Guide section 1.6is preceded by the following very clear warning as to how the design advice contained therein should be used:

"The advice given here is not mandatory and the guide should not be seen as an instrument of planning policy; its aims 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. In special circumstances the developer or planning authority may wish to use different target values".

Specific guidance on how alternative targets can be identified is provided in Appendix F of the BRE guide. That the recommendations of the BRE Guide are not suitable for rigid application to all developments in all contexts is of particular importance in the context of national and local policies for the consolidation and densification of urban areas. Given that the British Standard and the BRE Guide were drafted in the UK in the context of UK strategic planning policy, recommendations or advices provided in either document that have the potential to conflict with Irish statutory planning policy have been disregarded for the purposes of this analysis.