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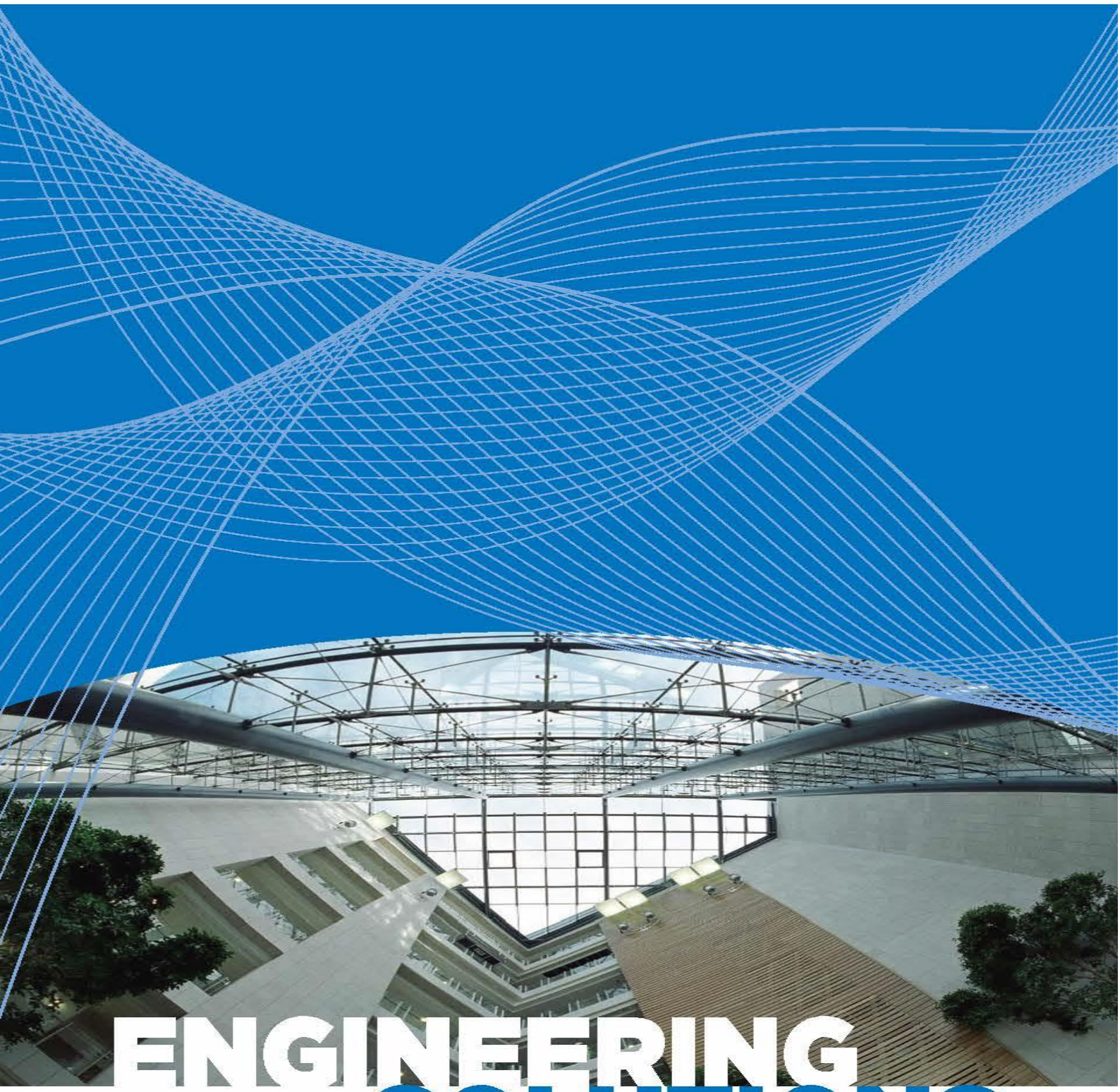

ENGINEERING SOLUTIONS

BELGARD GARDENS
DAYLIGHTING & SUNCAST REPORT

Completed By: Brian Wylie

Description	Rev. No.	Date	Done By:	Checked by:
FINAL	9	19.12.2018	BW	RB

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Executive Summary

J.V.Tierney & Co. were commissioned to undertake a daylight and suncast shadow study for the proposed Phase 1 development by Atlas GP Ltd. at Belgard Gardens.

In general, the design meets with the principles of the BRE guide - "*Site Layout Planning for Daylight and Sunlight*" [i] 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.

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, *"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"*.

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.

Glossary

CIE - The standard CIE (Commission Internationale de L'Eclairage – International Commission on Illumination) overcast sky. 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.

ADF - Average Daylight Factor. 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.

Introduction

Atlas GP Limited intend to apply for a 10-year Planning Permission for development at Belgard Gardens, Belgard Square North, Tallaght, Dublin 24 all on a site measuring c. 7.2ha. The development will consist of a mixed use residential development (total GFA 55,180 sqm) comprising a new urban quarter and streets with 5 no. blocks to provide 438 no. apartment units (including live/work units) and associated amenity facilities, a 403 no. bedspace student accommodation scheme and associated amenity facilities, childcare facility (c.380 sqm), 6 no. retail / commercial units (c.632 sqm in total) and a security room (c.52 sqm). This will comprise Phase I of the overall development of the c.7.2 ha. site and will be located on a net site area of 3.45 ha. (excluding proposed temporary car park at grade).

The development will consist of the demolition of all existing buildings on the site ranging from one to three storeys in height and the removal of hardstanding throughout. Proposed buildings for demolition include 2 – 3 storey Belgard Square (c.11,362 sqm) and associated single storey security hut (c.9 sqm); 3 storey Belgard House (c.9,706 sqm) and associated single storey security hut (c.14 sqm); 2 storey former Uniphar factory (c.7,780 sqm), associated 2 storey office building (c.1,033 sqm) and associated single storey security hut (c.14 sqm).

The proposed development will consist of:

• 5 no. blocks ranging from 4 – 10 storeys comprising a new urban quarter and streets to provide 438 no. apartment units consisting of 158 no. 1 beds, 230 no. 2 beds and 50 no. 3 beds (total apartment units include 8 no. live/work units with a total c.509 sqm work areas at ground floor) and c.732 sqm of tenant/resident service amenities, all within Blocks A1, A2, A3 and B1;

• Balconies / winter gardens / terraces to be provided on all elevations at all levels for each residential block;

• Block B2 to comprise a 403 no. bed space student accommodation scheme and associated student amenity and staff facilities (c.815 sqm);

• Childcare facility (c.380 sqm) and external playing area (c.242sqm);

• 6 no. retail/commercial units (c.632 sqm in total);

• Security room (c.52 sqm);

• 107 no. car parking spaces below podium (a temporary car park at grade will be provided until such time as the completion of the permanent below podium car park);

• 22 no. car parking spaces at surface level;

• 1,227 no. bicycle parking spaces below podium and at surface level;

• 4 no. semi-private courtyards of c.5,516sqm;

• Public plaza (c.2,366 sqm);

• Public realm & landscaping (c.7,442sqm).

The proposed development will include the provision of a new north – south street bisecting the site (to later connect to the planned Airton Road Extension) with 2 no. East – West internal streets proceeding east towards Belgard Road (pedestrian access only onto Belgard Road) and proceeding west (to later connect to lands in ownership of SDCC if required). Works to public roads to include

replacement of roundabout with a signalised junction and provision of cycle lanes on Belgard Square North and provision of a pedestrian crossing at Belgard Road.

The proposed development will also include boundary treatments, public lighting, green roofs, solar panels, ESB substations and switch rooms, CHP plant, commercial and residential waste facilities and all ancillary works and services necessary to facilitate construction and operation. The proposed development will also include provision of site boundary protection where required to facilitate development phasing.

J.V.Tierney & Co. have undertaken the Daylight and Suncast Shadow study in support of the planning application for the proposed development at Belgard Gardens by Atlas using the guidance set out in "*Site Layout Planning for Daylight and Sunlight*" [(i)] by "Paul Littlefair". This guide is a comprehensive revision of the 1991 edition of "*Site Layout Planning for Daylight and Sunlight: A guide to good practice"* [(ii)].

A 3D geometric model of the site was created using software IES-VE 2017 and using AutoCAD drawings issued by O' Mahony Pike Architects. Their drawings show plans, sections and elevations of the proposed Phase 1 Development buildings. The analysis procedure takes into account the following daylighting and sun lighting calculation methodologies; (A) Suncast Shadow Analysis, (B) Average Daylight Factor (ADF) and (C) Garden and Open Spaces Sunlight.

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"* [(i)].

The guidance from *"Site Layout Planning for Daylight and Sunlight"* [(i)] 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, 2009"* [(iii)] states that it may not always be possible to meet the criteria within *"Site Layout Planning for Daylight and Sunlight"* [(i)] 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"* [(iii)].

The *"Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities, March 2018"* [(iv)], also reiterates the point mentioned above and states that, *"High density apartment schemes in urban locations should include shadow analysis diagrams at application stage. While overshadowing is clearly not generally desirable, it must be accepted that there may inevitably be some element of overshadowing at certain times of the day and/or year, subject to orientation, layout etc., in order to achieve urban development. In assessing development proposals, planning authorities must weigh up the overall quality of the design and layout of the scheme and measures undertaken to avoid overshadowing, with the location of the site and the need to ensure an appropriate scale or urban residential development"* [(iv)]

The draft *Height Guidelines* [(v)] have been prepared in response to the publication of "*Project Ireland 2040"* and the "*National Planning Framework"*. The draft *Height Guidelines* [(v)] state that *appropriate and reasonable* regard should be taken of quantitative performance approaches to daylight provision

outlined in guides like the Building Research Establishment's '*Site Layout Planning for Daylight and Sunlight' (2nd edition)*[(i)] or *BS 8206-2: 2008 – 'Lighting for Buildings – Part 2: Code of Practice for Daylighting'*[(vi)].

In line with the provisions of the Apartment Guidelines as discussed above, the draft *Height Guidelines* [(v)] make allowances for where a proposal may not fully meet all requirements of daylight provisions. This 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.

Comments in relation to overshadowing from the *"Site Layout Planning for Daylight and Sunlight"* [(i)] guide also state that some degree of overshadowing is to be expected. The guide states that, *"It must be borne in mind that nearly all structures will create areas of new shadow, and some degree of transient overshadowing of a space is to be expected"* [(i)].

In general, the design meets with the principles of the BRE guide and BS 8206-2 2008 [(vi)] 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.

References

(i) Site Layout Planning for Daylight and Sunlight 2011: A Guide to Good Practice, Second Edition by Paul Littlefair

(ii) Site Layout Planning for Daylight and Sunlight 1991: A Guide to Good Practice by Paul Littlefair

(iii) Urban Design Manual, A Best Practice Guide, May 2009 as issued by Environment, Heritage and Local Government

(iv) Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities, March 2018

(v) Urban Development and Building Heights: Guidelines for Planning Authorities (Consultation Draft August 2018)

(vi) BS 8206-2 2008 Code of Practice for Daylighting

Figure 1 - Site Plan of Phase 1 Buildings

(A) Suncast Shadow Analysis

The following diagrams are outlined for the development based on the date, time and location of the buildings and are based on Suncast images taken on March 21st and June 21st at 08.00, 12.00 and 16.00 hours.

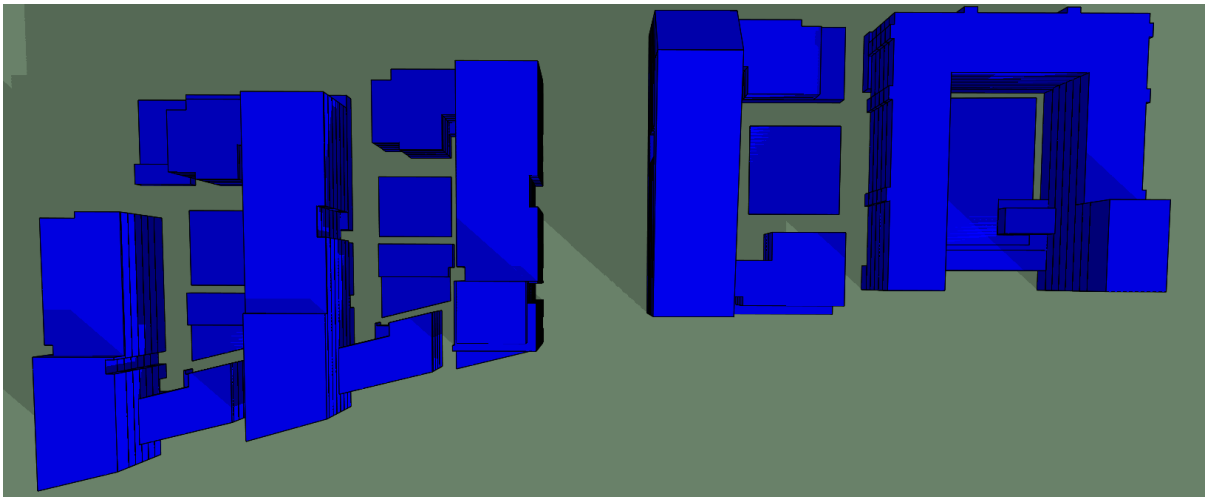

Figure 2 - March 21st 08.00am

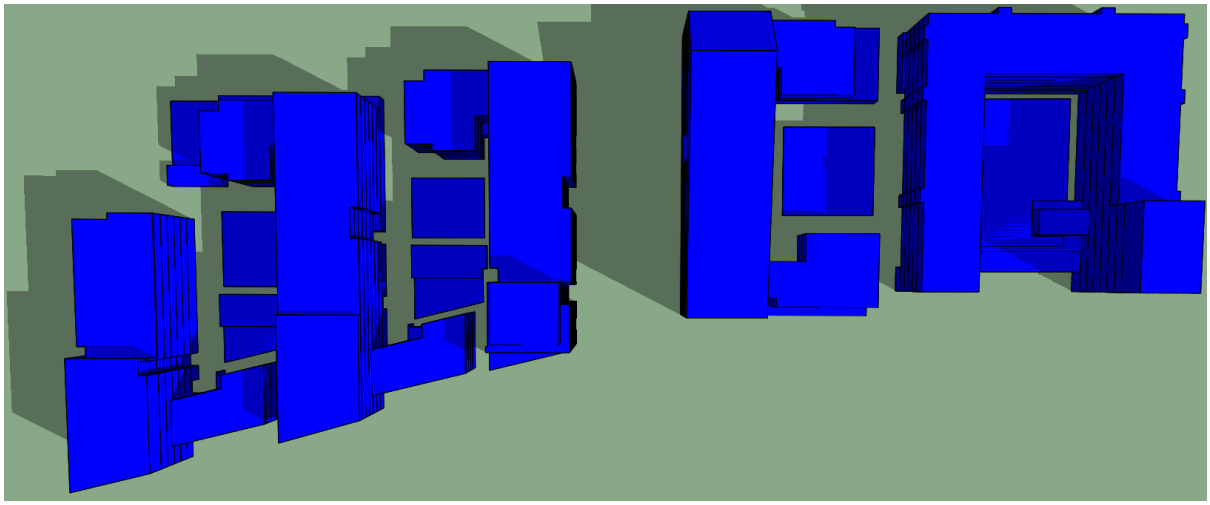

Figure 3 - June 21st 08.00am

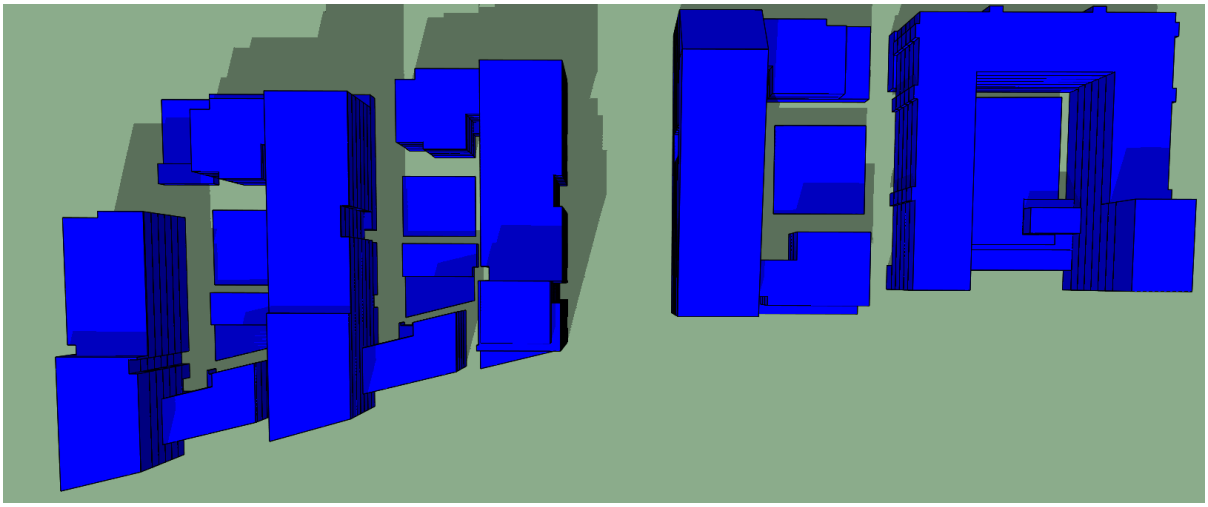

Figure 4 - March 21st 12.00 Noon

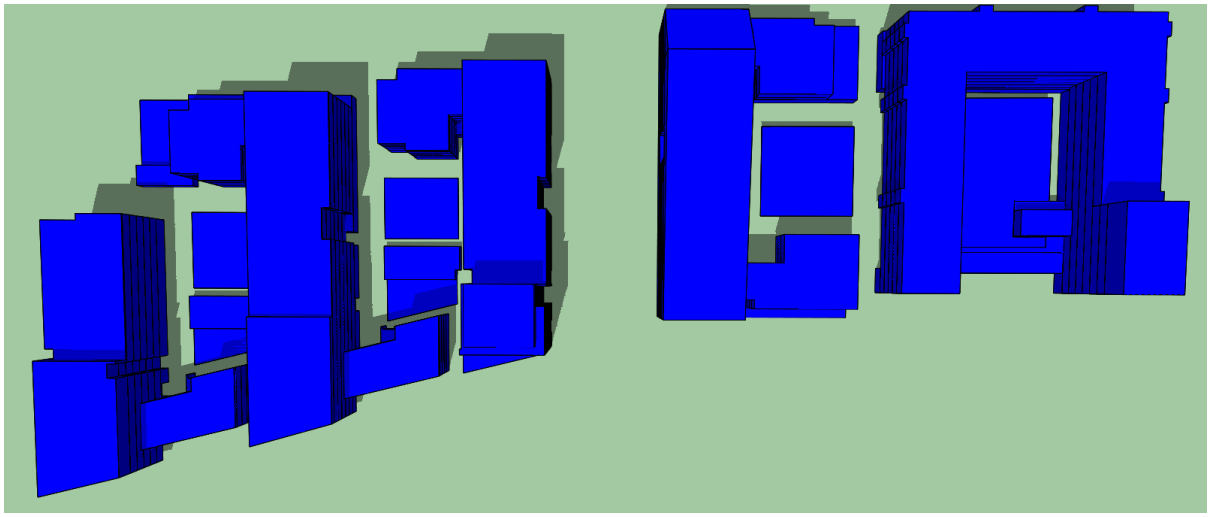

Figure 5 - June 21st 12.00 Noon

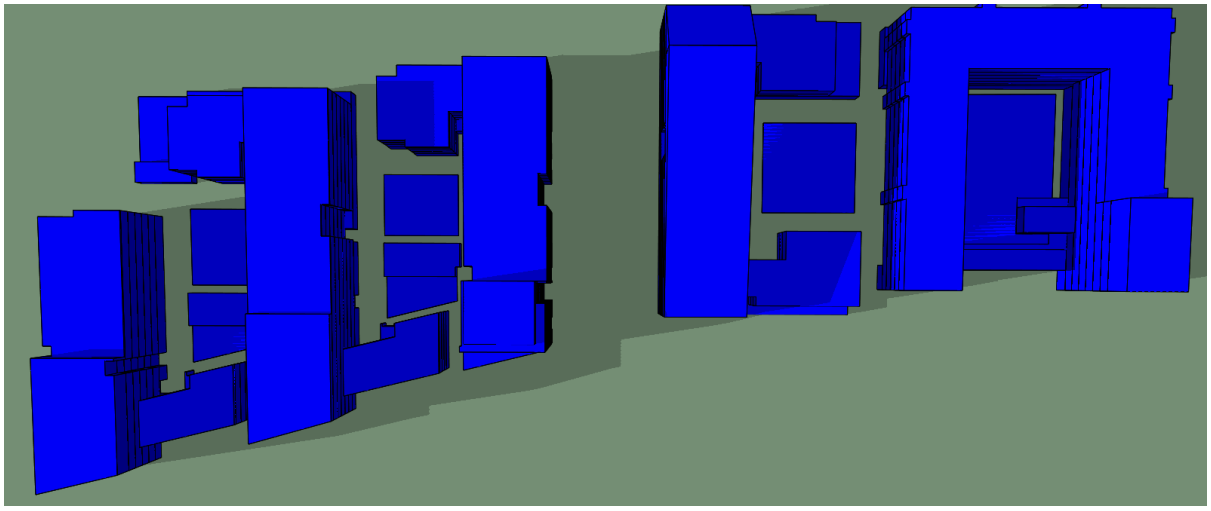

Figure 6 - March 21st 16.00

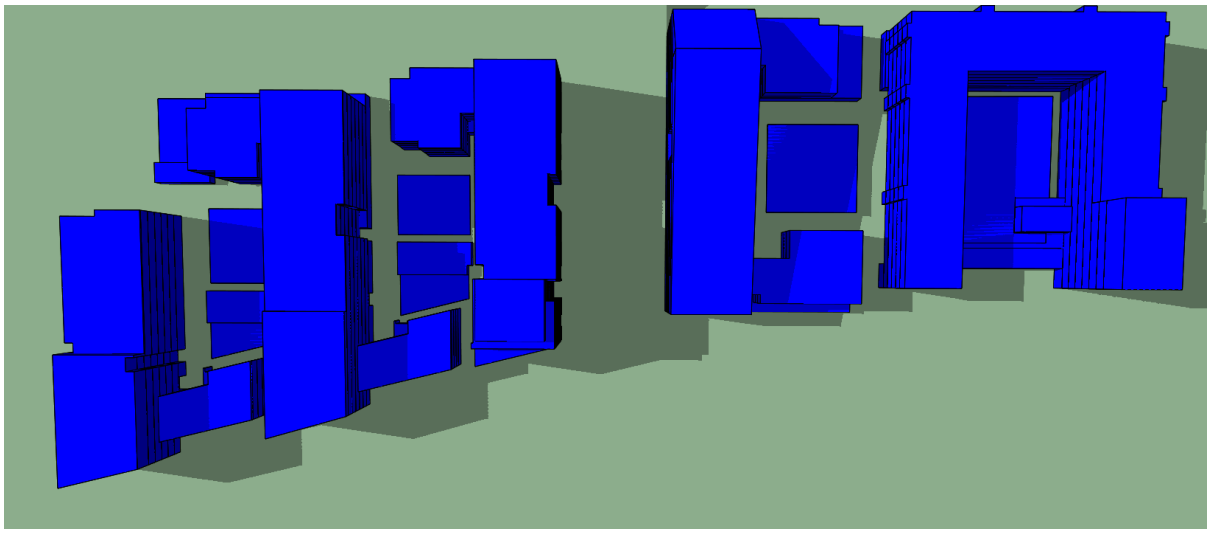

Figure 7 - June 21st 16.00

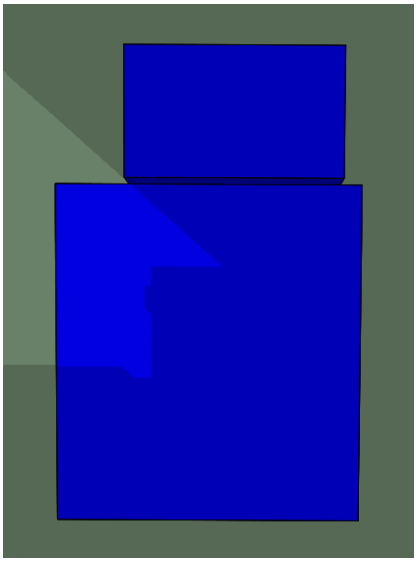

Figure 8 - Civic Plaza March 21st 08.00am

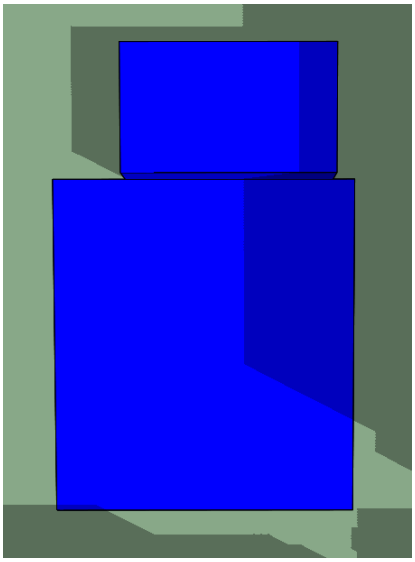

Figure 9 - Civic Plaza June 21st 08.00am

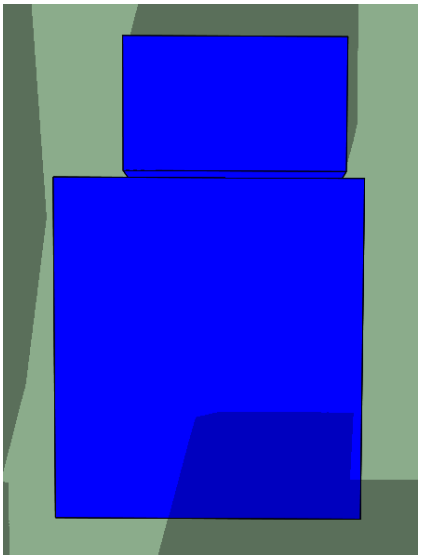

Figure 10 - Civic Plaza March 21st 12.00 Noon

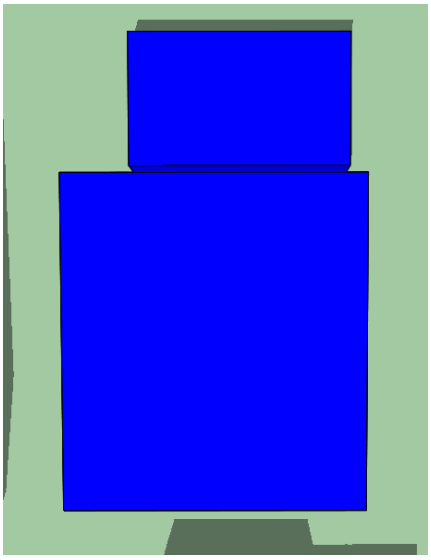

Figure 11 - Civic Plaza June 21st 12.00 Noon

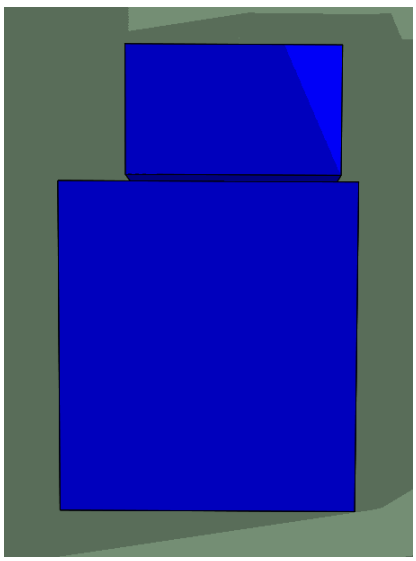

Figure 12 - Civic Plaza March 21st 16.00

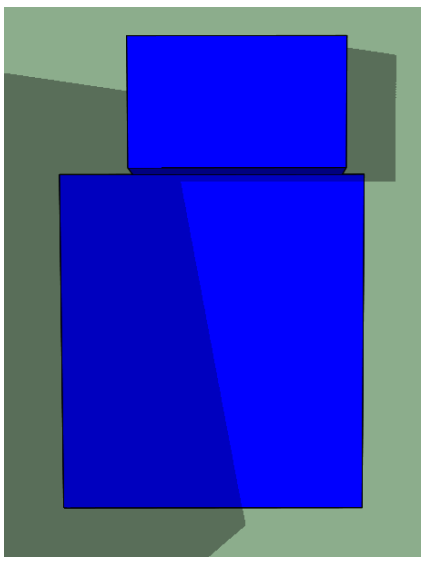

Figure 13 - Civic Plaza June 21st 16.00

Summary

In summary, as can be seen from the results above, the courtyard areas will receive adequate levels of sunlight for the 21st of March. The level of sunlight received in the courtyard areas will then increase as the month's progress and the weather conditions become more favourable for outside activities.

This is due to the low massing development towards the south end of the site accompanied with a "light well" which allows year round sunlight to penetrate through.

Uninterrupted light paths surrounding the Civic Plaza also provide generous amounts of direct sunlight to be enjoyed by all users.

(B) Average Daylight Factor (ADF)

In order to assess the quality of daylight enjoyed within the proposed Phase 1 development an Average Daylight Factor (ADF) calculation was carried out on the habitable rooms in Sector A1, A2, A3, B1 and B2. The Average Daylight Factor (ADF) is a ratio between indoor illuminance and outdoor illuminance expressed as a percentage. In housing, the following figures should be used to assess if there is a good level of natural light in a space;

Bedrooms = 1%

Living Spaces = 1.5%

As can be seen from the results in the tables below a significant portion of the room's meet the criteria set out in the BRE guidelines and BS-8206-2 2008 and are also in line with the development standards for new apartments as set out by the Department of Housing.

When looked at as a total (See Figure 9), the quantum of spaces meeting the daylight factor targets is greater than 80% which exceeds international environmental assessment standards such as BREEAM, which targets a figure of 80% and LEED, which targets a figure of 75% to award a credit under the daylighting criteria and demonstrates that the development has 'maximised the daylight' for the occupied spaces.

A1, A2 & A3		
Floor	Criteria	
	Above	Below
0	42	40
1	110	45
2	110	45
3	110	45
4	102	13
5	102	13
6	84	12
7	7	0
8	7	0
9	5	0
Total	679	213

B1 & B2		
Floor	Criteria	
	Above	Below
0	12	4
1	113	33
2	118	28
3	118	28
4	114	9
5	114	9
6	36	3
7	23	1
8	7	1
Total	655	116

Figure 14 - Average Daylight Factor (ADF) Results for Blocks A1 to A3 and B1 to B2

Blocks A1, A2, A3, B1 & B2		
Floor	Criteria	
	Above	Below
0	54	44
1	223	78
2	228	73
3	228	73
4	216	22
5	216	22
6	120	15
7	30	1
8	14	1
9	5	0
Total	1334	329

Figure 9 - Average Daylight Factor (ADF) Results for all Phase 1 Blocks

(C) Garden and Open Spaces Results

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 garden or open space creates a rich ambience that any occupant would find appealing. A well-lit garden/open space will add value to a property, so it is essential that careful consideration is taken when assessing these spaces.

The basis of this calculation is to assess if 50% of the open space will achieve more than two hours' worth of sunlight during the equinox (21st March).

This calculation was carried out for the amenity areas associated with Blocks A1, A2, A3, B1 and B2 to demonstrate the design intent. Please see calculations below;

Amenity Area A

Total Amenity Area = 494m2

Total amenity area receiving more than 2 Hours' worth of sunlight during the equinox = 304m2

Percentage receiving 2 Hours' worth of sunlight during the equinox = 61%

Amenity Area B

Total Amenity Area = 437m2

Total amenity area receiving more than 2 Hours' worth of sunlight during the equinox = 231m2

Percentage receiving 2 Hours' worth of sunlight during the equinox = 53%

Amenity Area C

Total Amenity Area = 234m2

Total amenity area receiving more than 2 Hours' worth of sunlight during the equinox = 234m2

Percentage receiving 2 Hours' worth of sunlight during the equinox = 100%

Amenity Area D

Total Amenity Area = 508m2

Total amenity area receiving more than 2 Hours' worth of sunlight during the equinox = 283m2

Percentage receiving 2 Hours' worth of sunlight during the equinox = 56%

Amenity Area E

Total Amenity Area = 794m2

Total amenity area receiving more than 2 Hours' worth of sunlight during the equinox = 775m2

Percentage receiving 2 Hours' worth of sunlight during the equinox = 98%

Civic Plaza

Total Amenity Area = 2053m2

Total amenity area receiving more than 2 Hours' worth of sunlight during the equinox = 1909m2

Percentage receiving 2 Hours' worth of sunlight during the equinox = 93%

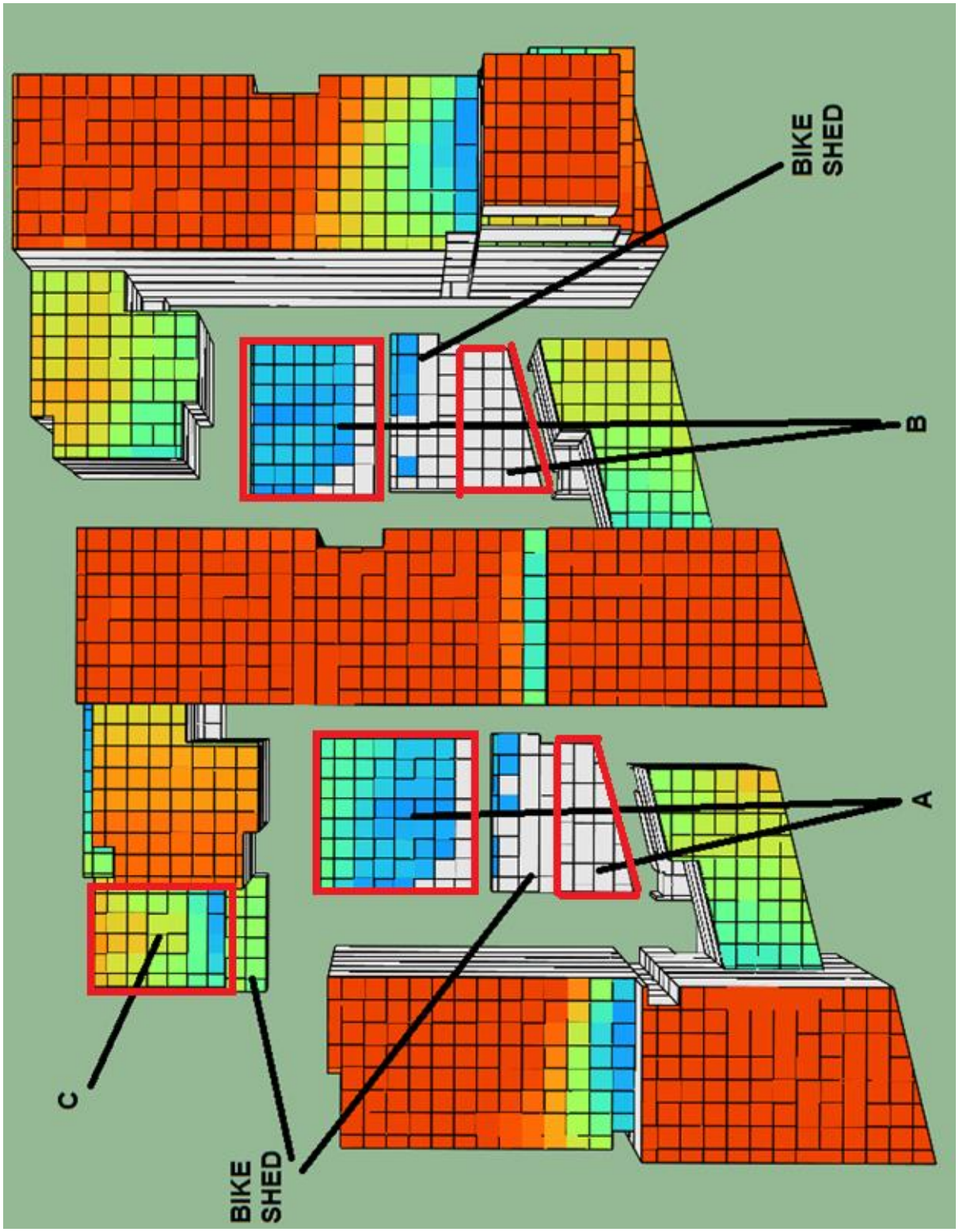

Figure 15 - Garden and Open Spaces Results A1, A2 & A3

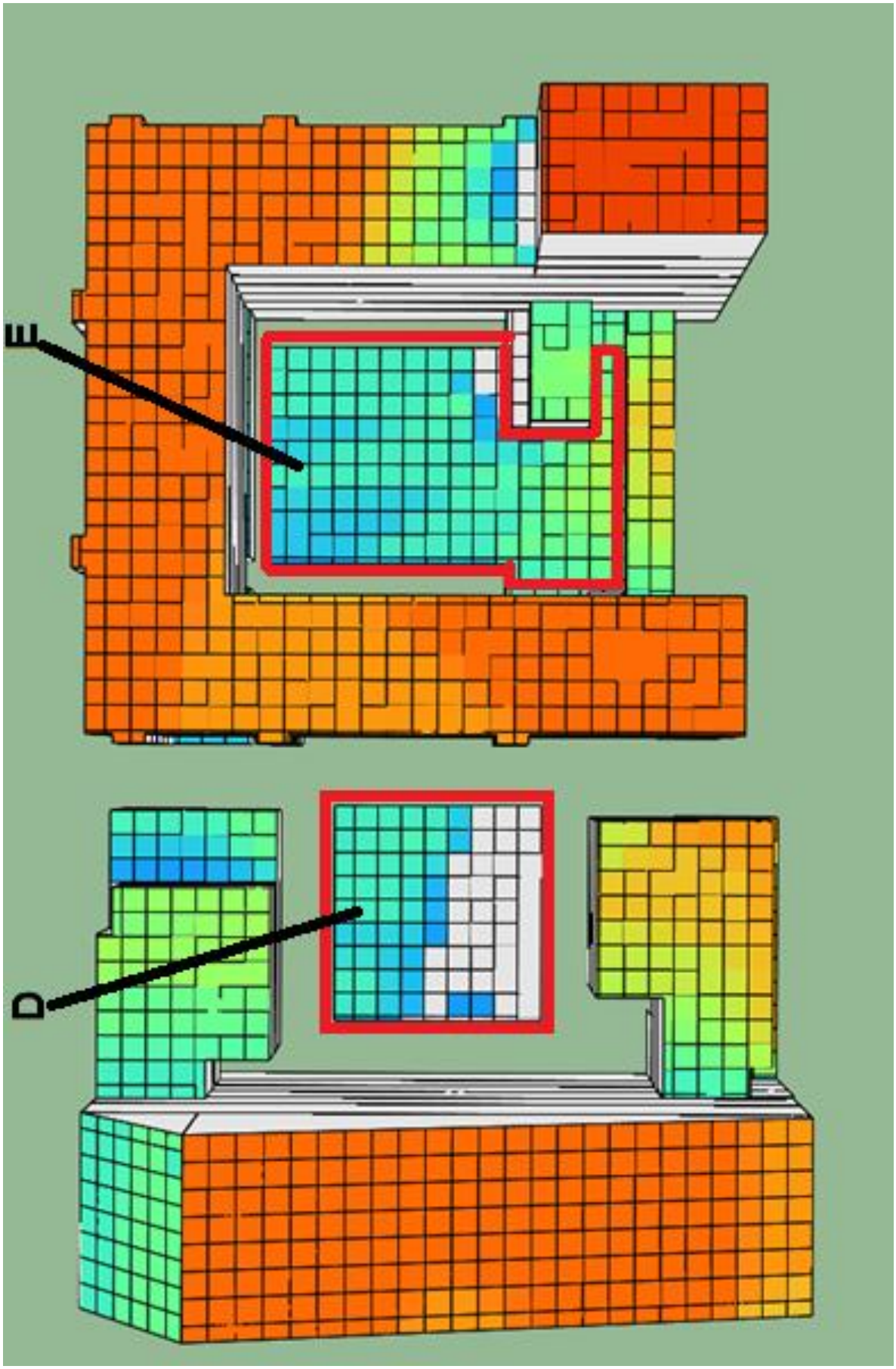

Figure 16 - Garden and Open Spaces Results B1 & B2

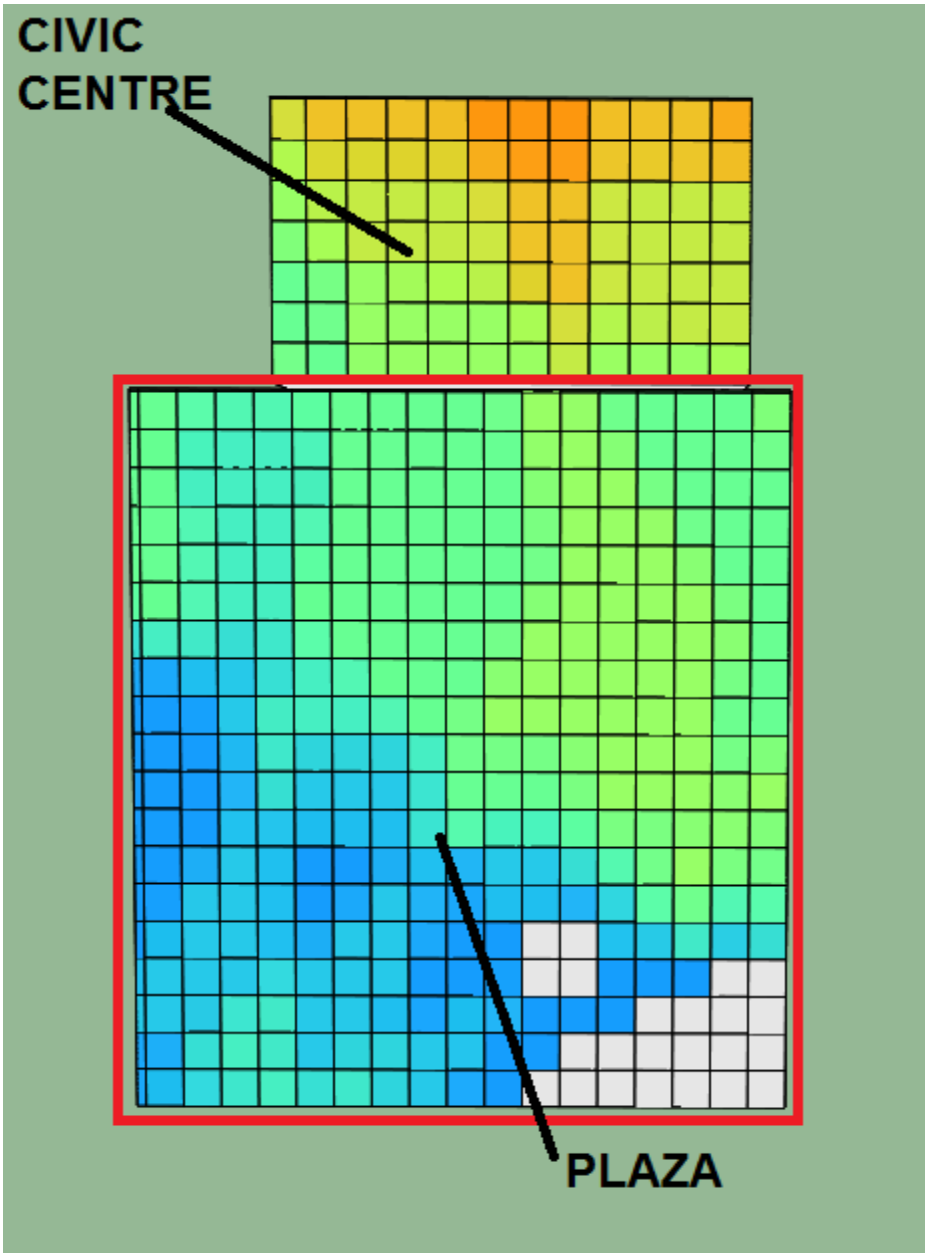

Figure 17 - Garden and Open Spaces Result Civic Plaza

Conclusion

In general, the design meets with the principles of the BRE guide - "*Site Layout Planning for Daylight and Sunlight*" [(i)] 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.

This is due to the low massing development towards the south end of the site accompanied with a "light well" which allows year round sunlight to penetrate through.

Uninterrupted light paths surrounding the Civic Plaza also provide generous amounts direct sunlight to be enjoyed by all building users.