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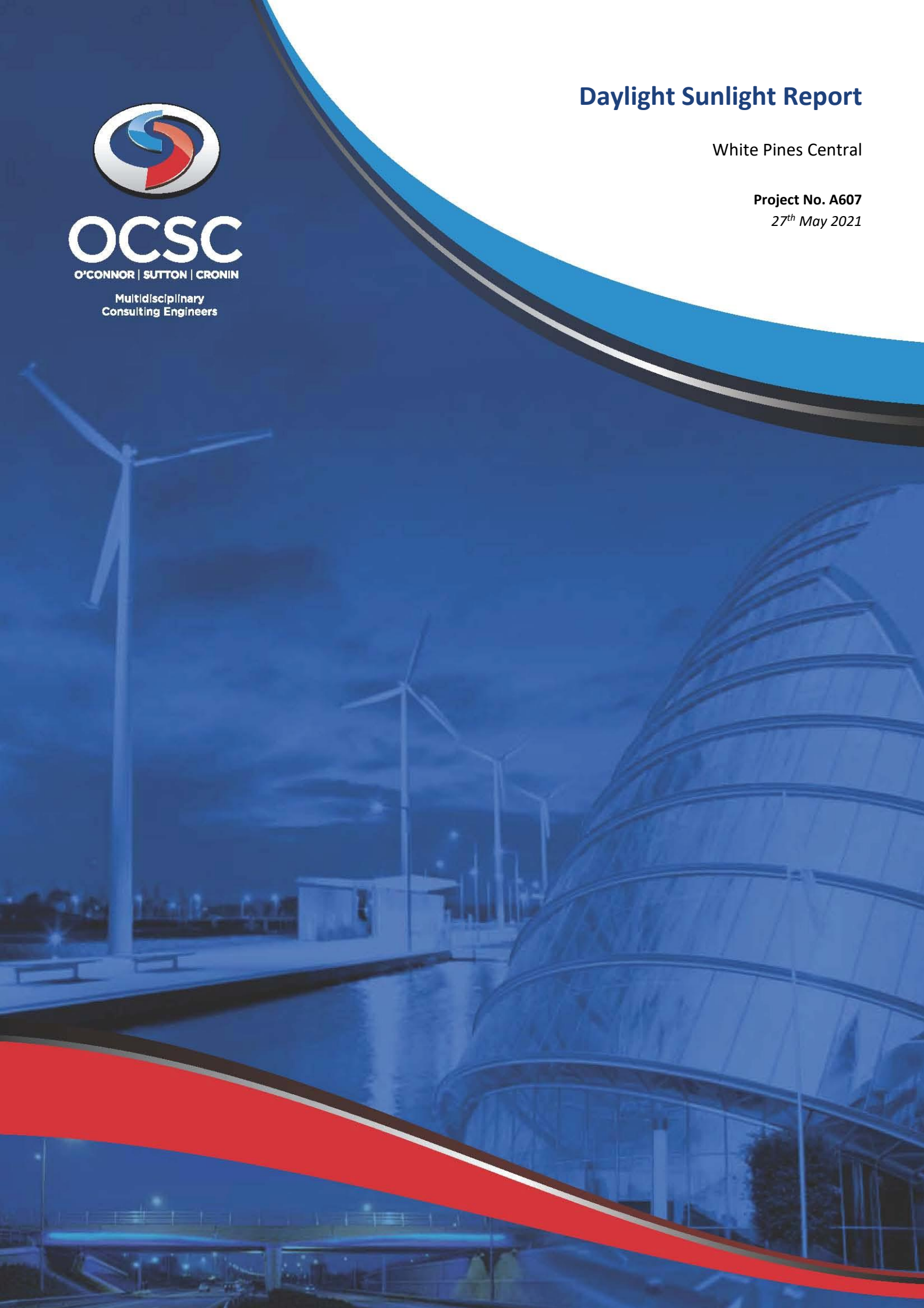
Multidisciplinary
Consulting Engineers

Daylight Sunlight Report

White Pines Central

Project No. A607
27th May 2021



Daylight Sunlight Report

NOTICE

DOCUMENT CONTROL & HISTORY

OCSC Job No.: A607	Project Code	Originator Code	Zone Code	Level Code	File Type	Role Type	Number Series	Status/ Suitability Code	Revision
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EXECUTIVE SUMMARY

OCSC has been appointed to carry out a Daylight/ Sunlight study for the White Pines Central development located in Rathfarnham, Dublin 16.

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

- The daylight levels within the living and bedroom areas, to give an indication of the expected daylight levels throughout the proposed development;
- The expected sunlight levels within the living areas and bedrooms within the proposed development;
- The quality of amenity space, being provided as part of the development, in relation to sunlight;
- Any potential daylight or sunlight impact the proposed development may have on properties adjacent to the site.

The analysis confirms that across the entire development excellent levels of internal daylight are achieved, with a 100% compliance rate achieved across the proposed development. All units not only meet but in the majority of cases exceed the Average Daylight Factor recommended in the BRE Guidelines.

It is important to note that the performance targets which are included should be used with a degree of flexibility as per the extract below from the BRE Guide:

"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 the many factors in site layout design."

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.

In relation to sunlight, the development shows compliance with BRE Guidelines receiving more than 2 hours of sunlight on more than half of the provided amenity spaces on March 21st.

Also, the annual probable sunlight hour assessment has shown that even though some windows are slightly under BRE recommendations due to their orientation, acceptable levels of sunlight will still being achieved within the proposed development.

The analysis also shows that the proposed development has negligible daylight or sunlight impact on any of the surrounding properties.

Finally, the overshadowing assessment has shown that negligible impact will be perceived by any of the surrounding open spaces.

DAYLIGHT SUNLIGHT REPORT

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1. INTRODUCTION

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- The daylight levels within the living and bedroom areas, to give an indication of the expected daylight levels throughout the proposed development;
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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.

2. DEVELOPMENT DESCRIPTION

The development consists of the following;

"The proposed residential development will provide for 114 No. Build to Rent residential units in a mix of 1, 2 and 3 bed apartment and duplex units, across 6 No. separate blocks;

- Block A is a part 6 part 4 storey apartment block comprising 47 No. 1 and 2 bed units;
- Block B is a 3 storey duplex block comprising 11 No. 1, 2 and 3 bed units;
- Block C1 is 3 storey duplex block comprising 15 No. 1, 2 and 3 bed units;
- Block C2 is a 3 storey duplex block comprising 19 No. 1, 2 and 3 bed units;
- Block D is a 3 storey duplex block comprising 18 No. 2 and 3 bed units; and
- Block E is a 3 storey duplex block comprising 4 No. 2 and 3 bed units.

The proposed development will also consist of the provision of: 110 sqm residential amenity space in the lower ground floor of Block A; waste storage facilities; 98 No. car parking spaces and 238 No. bicycle parking spaces; boundary treatments and street lighting; the provision of Sustainable Urban Drainage systems (SUDs); 1 No. ESB substation; plant and switch rooms and all ancillary works and services necessary to facilitate construction and operation; changes in levels across the site; associated hard and soft landscaping; and all other associated site excavation; and infrastructural and site development works above and below ground. The development will be served by a vehicular access from Stocking Avenue via White Pines South on the western side of the site."

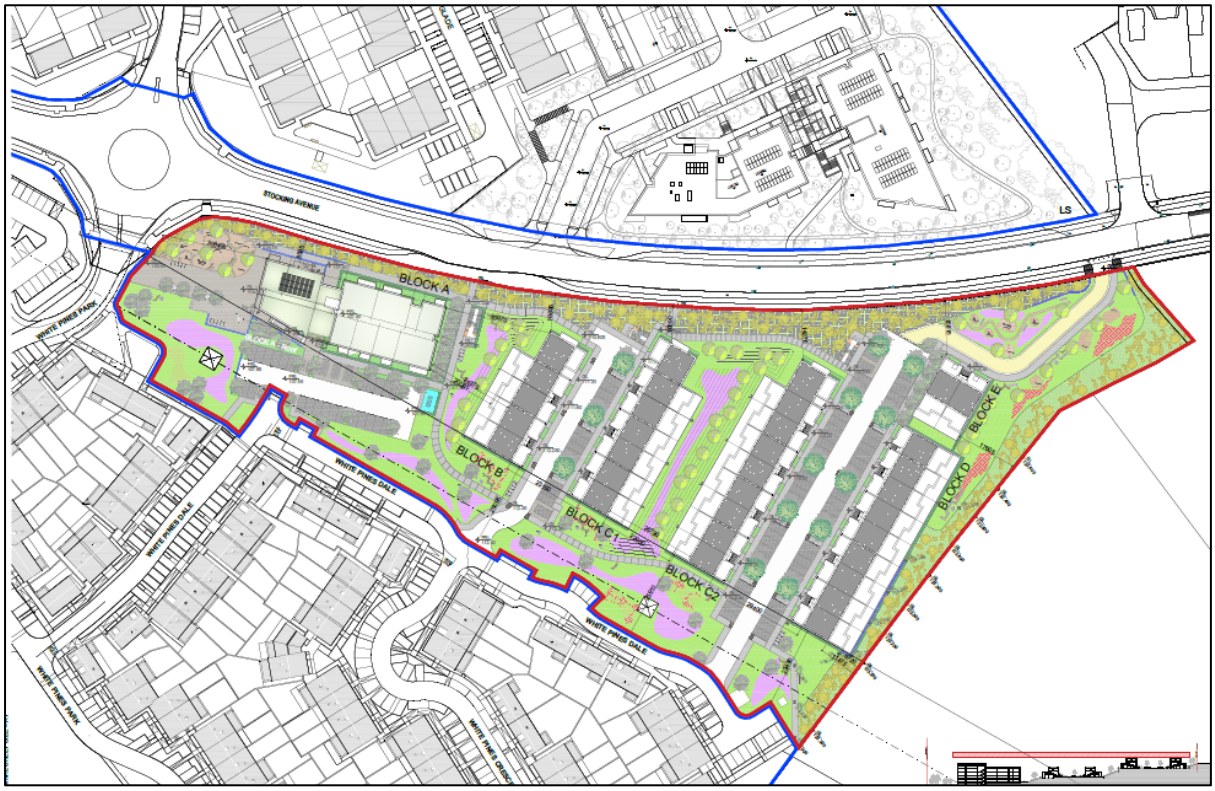

Figure 1 - Proposed Site Plan

3. PROPOSED BUILDING DESIGN

In order to ensure that daylight levels were maximised for the White Pines Central development, a number of key design strategies were analysed during concept design.

3.1. BUILDING MATERIAL SELECTION

The selection of materials play an important role in ambient daylight levels. The façade of the proposed development has been carefully selected to promote a sense of brightness and light and is composed of red brick combined with light materials. The inclusion of greenery to the amenity spaces will help to improve the sense of light and brightness within the apartments.

Figure 2 - Façade Views of Proposed Development

3.2. GLAZING TO WALL RATIO

The primary function of the glazing to wall ratio is to maximize daylight within the space while reducing unnecessary solar gains within the proposed development. The other advantage in conjunction with appropriate materials is that the more light coloured, reflective materials used externally, the more ambient daylight will be reflected to the surrounding areas. In addition, floor to ceiling heights have been maximised to further enhance the opportunity for improved daylight levels. Extensive analysis was undertaken on all building facades to ensure glazing widths were maximized to promote access to daylight. The image below illustrates the glazing to wall ratio of the proposed development.

Figure 3 – Block A South Elevation Glazing to Wall Ratio

4. BRE GUIDELINES FOR DAYLIGHT AND SUNLIGHT

The analysis of the development's potential and the quality of amenity for the new development, as well as for the surrounding properties once the scheme has been implemented, has been based on the Building Research Establishment (BRE) guidelines on "Site Layout Planning for Daylight and Sunlight. A Guide to Good Practice (Building Research Establishment Report, 2011)."

These guidelines provide the criteria and methodology for calculations pertaining to daylight and sunlight, and is the primary reference for this matter. The guide gives simple rules for analysing sites where the geometry of the surroundings is straightforward, supplementing them with graphical methods for complex sites.

However, it is important to note that the performance targets which are included should be used with a degree of flexibility as per the extract below from the BRE Guideline:

"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 the many factors in site layout design."

5. DAYLIGHT LEVELS WITHIN THE PROPOSED DEVELOPMENT

5.1. ASSESSMENT CRITERIA – INTERNAL DAYLIGHT

The method of calculation selected for the internal 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.

Architectural plans and elevations provided by Reddy Architecture + Urbanism formed the basis for the internal daylight assessment.

In order to quantify the quality of daylight within a space as per BRE Guidelines, the British standards BS8206 sets out minimum daylight factors to be achieved in new build residential units.

Table 2 **Minimum average daylight factor**

Room type	Minimum average daylight factor %
Bedrooms	1
Living rooms	1.5
Kitchens	2

Where one room serves more than one purpose, the minimum average daylight factor should be that for the room type with the highest value. For example, in a space which combines a living room and a kitchen the minimum average daylight factor should be 2%.

Figure 4 - BS 8206 – Table 2

In order to analyse the ADF within the proposed residential development, simulations have been completed within the IES VE Software package. A detailed model of the development has been constructed using the software. The model includes the proposed development as well as the surrounding buildings adjacent to the site. Heights of surrounding buildings have been obtained from survey data.

5.2. DAYLIGHT RESULTS – INTERNAL DAYLIGHT

This section outlines the units that were selected for assessment of internal daylight levels for the proposed White Pines Central development. The results of the analysis are outlined in the accompanying tables.

In line with standard industry practice, units presented at the lower levels have been selected as 'worst case' for analysis. The theory being that as floor level height increases so too does access to daylight. The units selected for analysis are considered to be representative of the units across the site and therefore results are indicative of daylight levels to be expected across the entire development.

In order to calculate a percentage of compliance across the proposed development, similar rooms within the same façade and same obstructions are known to present a similar ADF. Therefore, it is possible to apply this rationale across the full development and calculate a percentage of compliance based on a sample of rooms. Figure 5 illustrates an example of how this rationale is applied. The same colour rooms are expected to have a similar ADF.

Figure 5 – Rooms with similar ADF values

If a room achieves compliance on a floor level, the unit above will present a higher value. As previously outlined, as floor level height increases so too does access to daylight. Therefore, if a room is showing compliance or a close value to compliance, similar rooms on the floor above are assumed to pass.

In summary, all units not only meet but in the majority of cases exceed the Average Daylight Factor recommended in the BRE Guidelines, thus achieving a compliance rate of 100% across the development.

In all cases generous floor to ceiling heights have been designed into the project with glazing areas being maximised to amplify the quality of daylight received. Careful consideration has been given to room layout design attributing store rooms and circulation areas to the back of rooms and living spaces to the front where the highest level of daylight is experienced.

The surface reflectance values outlined in Table 1 have been used in the analysis.

Surface Type	Reflectance (%)
External Wall	40
Internal Partitions	70
Ceiling	70
Floor	40
Adjacent Buildings	30
Glazing Transmittance	70

Table 1 – Surface Reflectance Values

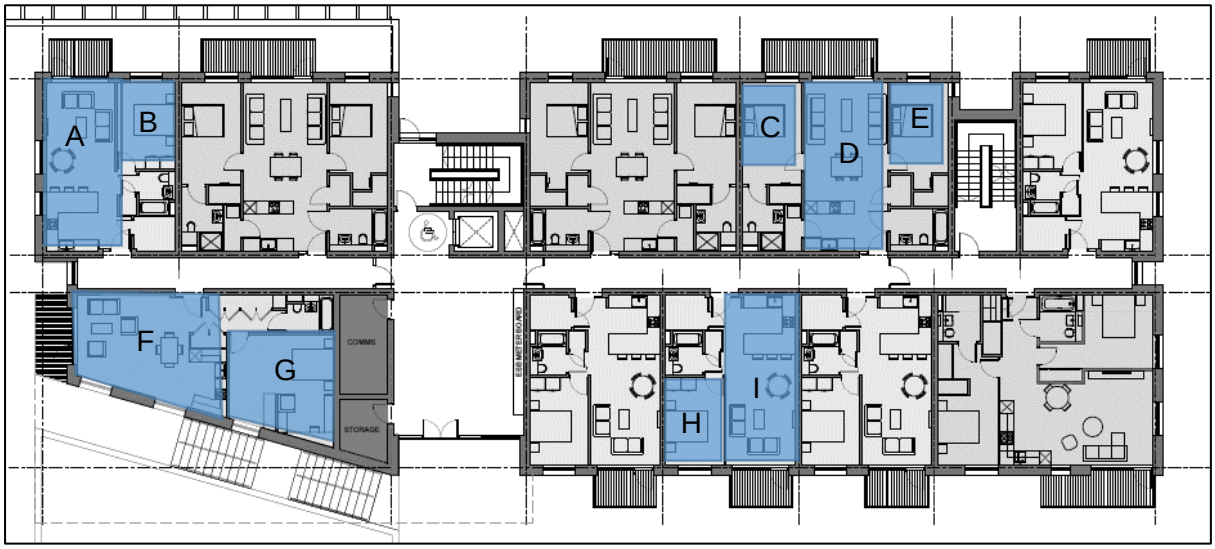

Figure 6 – Block A – Upper Ground Floor Assessed Rooms Highlighted in Blue

Unit		ADF required (%)	ADF results (%)	Meets minimum ADF target
A	Living/ Kitchen/ Dining	2.0%	5.3%	Y
B	Bedroom	1.0%	2.9%	Y
C	Bedroom	1.0%	2.8%	Y
D	Living/ Kitchen/ Dining	2.0%	2.6%	Y
E	Bedroom	1.0%	3.3%	Y
F	Living/ Kitchen/ Dining	2.0%	5.0%	Y
G	Bedroom	1.0%	1.5%	Y
H	Bedroom	1.0%	3.0%	Y
I	Living/ Kitchen/ Dining	2.0%	2.7%	Y

Table 2 – Average Daylight Factor Results – Block A – Upper Ground Floor Assessed Rooms

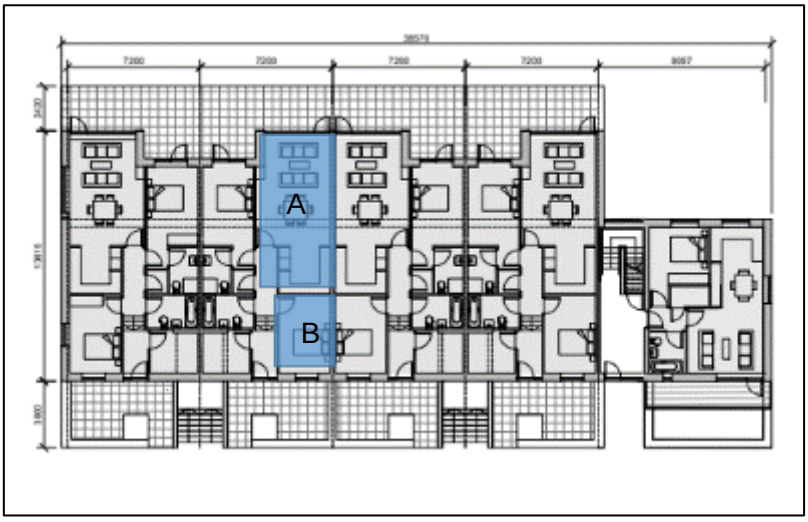

Figure 7 – Block B – Ground Floor Assessed Rooms Highlighted in Blue

Unit		ADF required (%)	ADF results (%)	Meets minimum ADF target
A	Living/ Kitchen/ Dining	2.0%	2.0%	Y
B	Bedroom	1.0%	2.5%	Y

Table 3 – Average Daylight Factor Results – Block B – Ground Floor Assessed Rooms

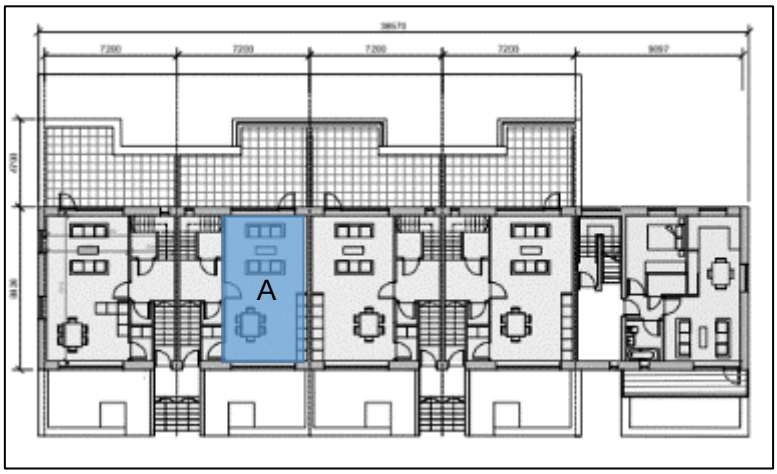

Figure 8 – Block B – First Floor Assessed Rooms Highlighted in Blue

Unit		ADF required (%)	ADF results (%)	Meets minimum ADF target
A	Living/ Kitchen/ Dining	2.0%	5.0%	Y

Table 4 – Average Daylight Factor Results – Block B – First Floor Assessed Rooms

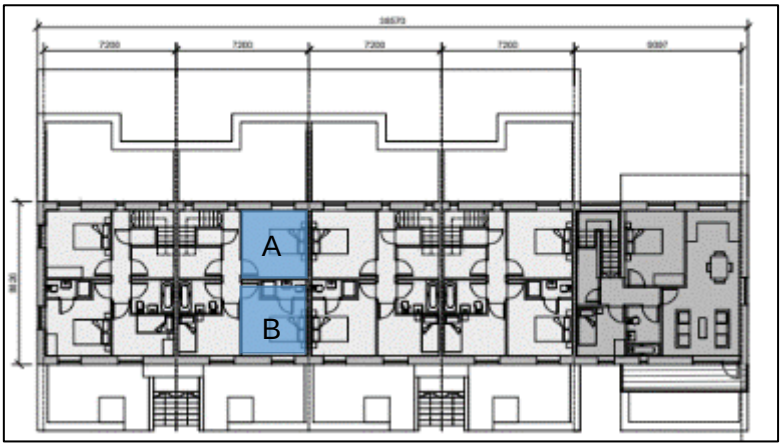

Figure 9 – Block B – Second Floor Assessed Rooms Highlighted in Blue

	Unit	ADF required (%)	ADF results (%)	Meets minimum ADF target
A	Bedroom	1.0%	2.5%	Y
B	Bedroom	1.0%	3.2%	Y

Table 5 – Average Daylight Factor Results – Block B – Second Floor Assessed Rooms

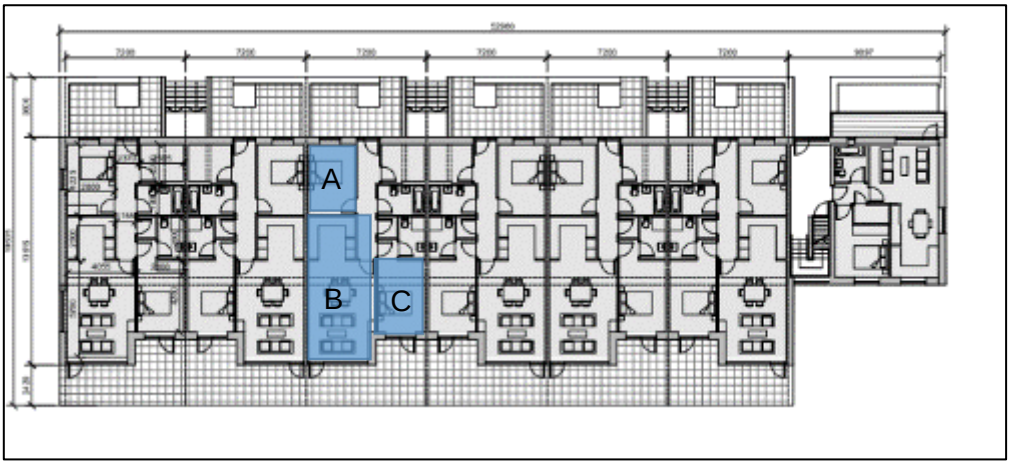

Figure 10 – Block C1 – Ground Floor Assessed Rooms Highlighted in Blue

	Unit	ADF required (%)	ADF results (%)	Meets minimum ADF target
A	Bedroom	1.0%	2.5%	Y
B	Living/ Kitchen/ Dining	2.0%	2.4%	Y
C	Bedroom	1.0%	2.2%	Y

Table 6 – Average Daylight Factor Results – Block C1 – Ground Floor Assessed Rooms

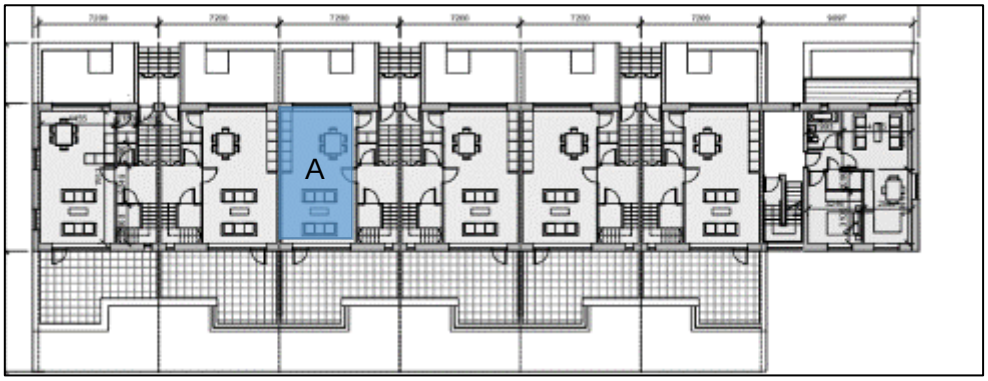

Figure 11 – Block C1 – First Floor Assessed Rooms Highlighted in Blue

	Unit	ADF required (%)	ADF results (%)	Meets minimum ADF target
A	Living/ Kitchen/ Dining	2.0%	5.4%	Y

Table 7 – Average Daylight Factor Results – Block C1 – First Floor Assessed Rooms

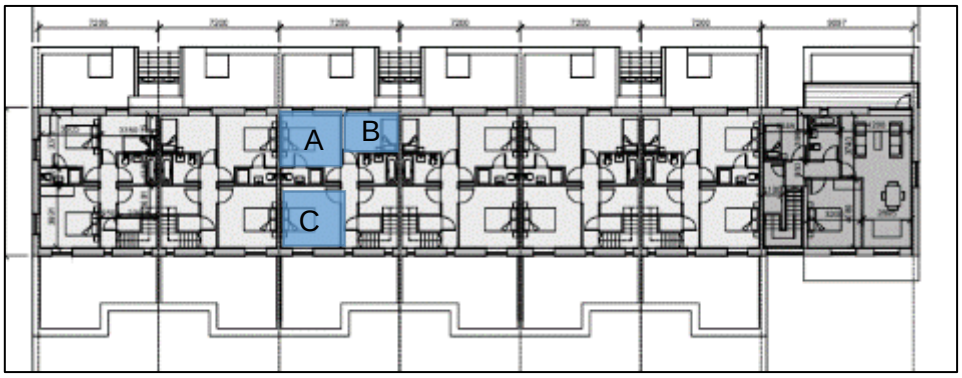

Figure 12 – Block C1 – Second Floor Assessed Rooms Highlighted in Blue

	Unit	ADF required (%)	ADF results (%)	Meets minimum ADF target
A	Bedroom	1.0%	3.2%	Y
B	Bedroom	1.0%	5.0%	Y
C	Bedroom	1.0%	2.6%	Y

Table 8 – Average Daylight Factor Results – Block C1 – Second Floor Assessed Rooms

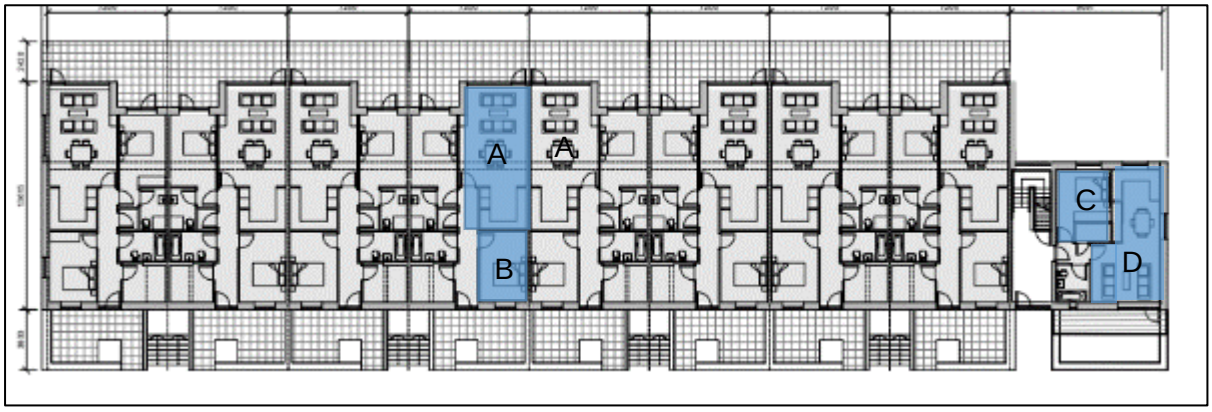

Figure 13 – Block C2 – Ground Floor Assessed Rooms Highlighted in Blue

Unit		ADF required (%)	ADF results (%)	Meets minimum ADF target
A	Living/ Kitchen/ Dining	2.0%	5.4%	Y
B	Bedroom	1.0%	2.4%	Y
C	Bedroom	1.0%	3.3%	Y
D	Living/ Kitchen/ Dining	2.0%	5.2%	Y

Table 9 – Average Daylight Factor Results – Block C2 – Ground Floor Assessed Rooms

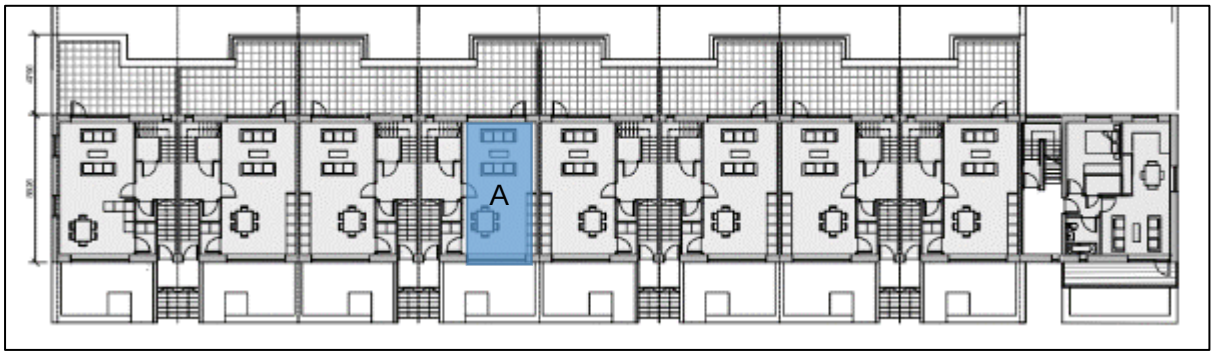

Figure 14 – Block C2 – First Floor Assessed Rooms Highlighted in Blue

Unit		ADF required (%)	ADF results (%)	Meets minimum ADF target
A	Living/ Kitchen/ Dining	2.0%	6.5%	Y

Table 10 – Average Daylight Factor Results – Block C2 – First Floor Assessed Rooms

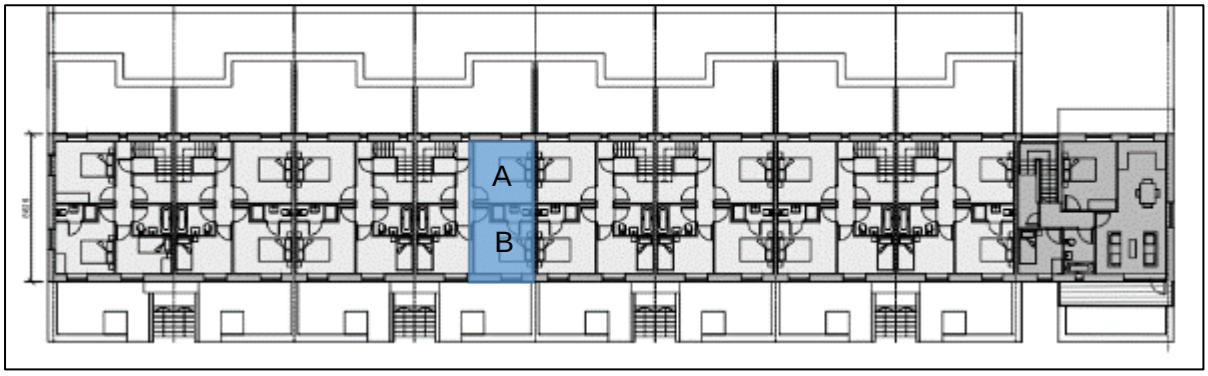

Figure 15 – Block C2 – Second Floor Assessed Rooms Highlighted in Blue

	Unit	ADF required (%)	ADF results (%)	Meets minimum ADF target
A	Bedroom	1.0%	2.8%	Y
B	Bedroom	1.0%	2.8%	Y

Table 11 – Average Daylight Factor Results – Block C2 – Second Floor Assessed Rooms

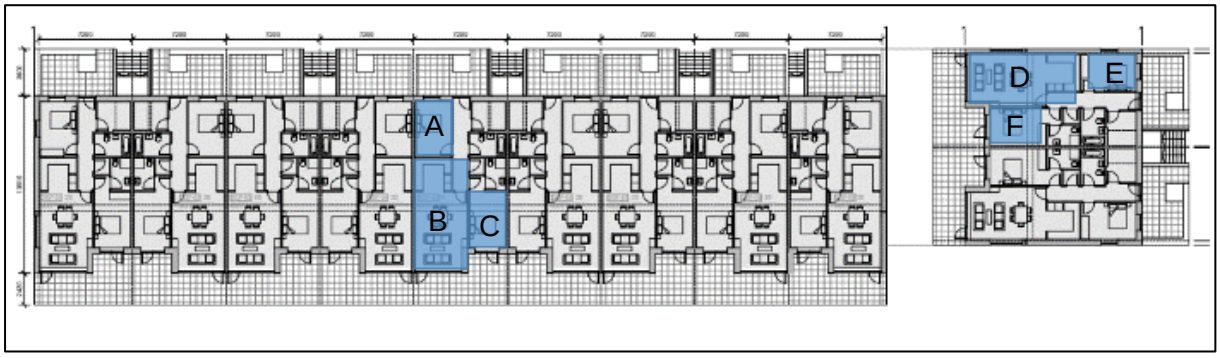

Figure 16 – Block D&E – Ground Floor Assessed Rooms Highlighted in Blue

	Unit	ADF required (%)	ADF results (%)	Meets minimum ADF target
A	Bedroom	1.0%	2.5%	Y
B	Living/ Kitchen/ Dining	2.0%	4.3%	Y
C	Bedroom	1.0%	3.5%	Y
D	Living/ Kitchen/ Dining	2.0%	5.5%	Y
E	Bedroom	1.0%	7.2%	Y
F	Bedroom	1.0%	2.4%	Y

Table 12 – Average Daylight Factor Results – Block D&E – Ground Floor Assessed Rooms

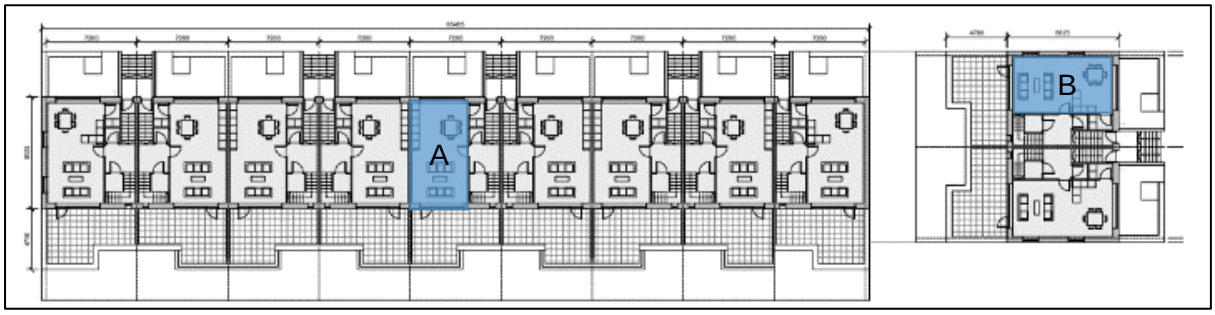

Figure 17 – Block D&E – First Floor Assessed Rooms Highlighted in Blue

Unit		ADF required (%)	ADF results (%)	Meets minimum ADF target
A	Living/ Kitchen/ Dining	2.0%	8.2%	Y
B	Living/ Kitchen/ Dining	2.0%	9.2%	Y

Table 13 – Average Daylight Factor Results – Block D&E – First Floor Assessed Rooms

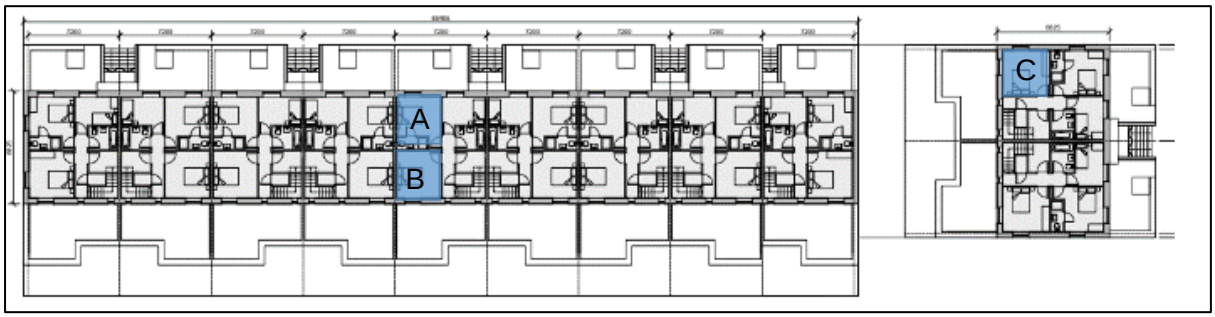

Figure 18 – Block D&E – Second Floor Assessed Rooms Highlighted in Blue

Unit		ADF required (%)	ADF results (%)	Meets minimum ADF target
A	Bedroom	1.0%	3.4%	Y
B	Bedroom	1.0%	2.8%	Y
C	Bedroom	1.0%	5.7%	Y

Table 14 – Average Daylight Factor Results – Block D&E – Second Floor Assessed Rooms

6. SUNLIGHT ASSESSMENT TO AMENITY SPACES WITHIN THE DEVELOPMENT

BRE Guidelines (2011) recommend that for external amenity spaces to appear adequately sunlit throughout the year, at least half of the garden or amenity space should receive at least two hours of sunlight on March 21st.

In order to show that sunlight levels within the development achieve compliance with current BRE Guidelines a sunlight study has been carried out for the proposed development.

The red squares in Figure 19 highlight the areas that receive a minimum of 2 hours of sunlight on the 21st of March for the proposed development. The majority of the communal amenity spaces receive 2 hours or more of sunlight on March 21st, therefore compliance with BRE Guidelines is achieved.

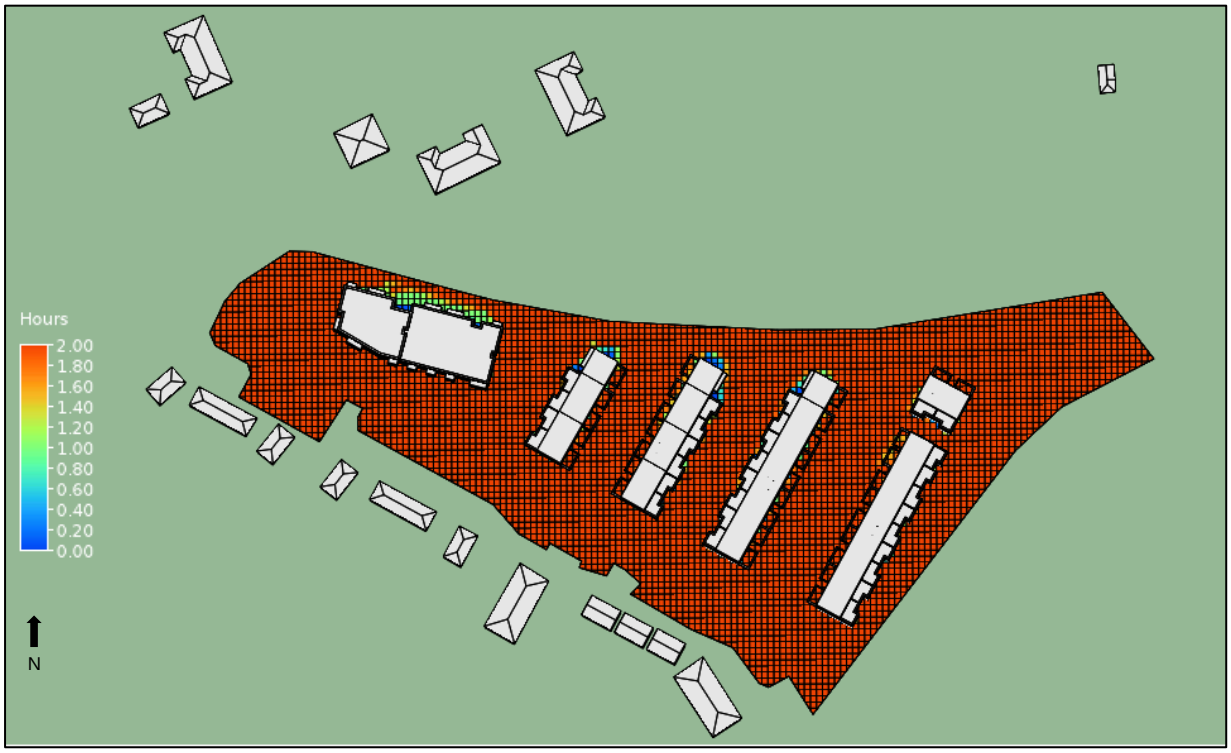

Figure 19 – Amenity Spaces - Hours of Sunlight on March 21st

7. SUNLIGHT ASSESSMENT WITHIN THE PROPOSED DEVELOPMENT (APSH)

In order to determine the amount of sunlight that is received by windows within the proposed development, the Annual Probable Sunlight Hours (APSH) calculation method as outlined in BRE Guidelines has been used.

BRE Guidelines outline that in housing, the main requirement for sunlight is in living rooms, where it is valued at any time of the day but especially in the afternoon. BRE Guidelines also state that sunlight is less important in bedrooms and kitchens, however, all windows to occupied rooms within the development have been included within the analysis.

The recommendation set out in BRE Guidelines state that in order to show that adequate sunlight reaches windows within occupied rooms, the centre of at least one window to a main living room must receive 25% of annual probable sunlight hours, including at least 5% of annual probable sunlight hours during the winter months between 21st September and 21st March.

The table below summarises the annual probable sunlight hours for the annual period and for the winter period based on the BRE recommendations. Two additional checks have been carried out to show that the windows failing are just marginally so, and the majority of windows achieve acceptable levels of sunlight across the development.

	BRE Guidelines Analysis		Additional check 1	Additional check 2
	APSH greater than 25%	APSH greater than 5%	APSH greater than 20%	APSH greater than 15%
	Annual Period	Winter Period	Annual Period	Annual Period
Percentage of Compliance	77%	77%	81%	90%

Table 15 – APSH Summary Table

The results have shown that 90% of the windows within the development will achieve good levels of sunlight when calculated based on the relaxation of the recommended guidance in BRE, achieving at least 15% of annual probable sunlight hours across the year. The reason for the units failing can be attributed to their North orientation.

It must be noted that the results within this report should be treated with a certain degree of flexibility, based on the following statement in the BRE Guidelines:

"The guide is intended for building designers and their clients, consultants and planning officials. 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 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 addition, BS8206 states that *"the degree of satisfaction is related to the expectation of sunlight. If a room is necessarily north facing or if the building is in a densely-built urban area, the absence of sunlight is more acceptable than when its exclusion seems arbitrary".*

The images below illustrate the sunlight levels achieved within the development.

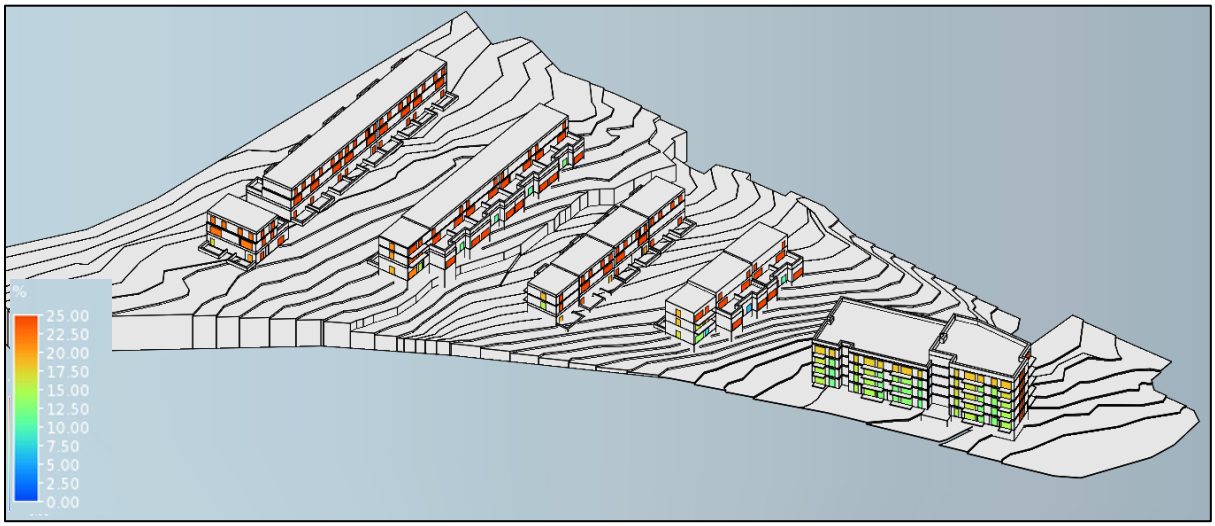

Figure 20 - APSH North West Elevation

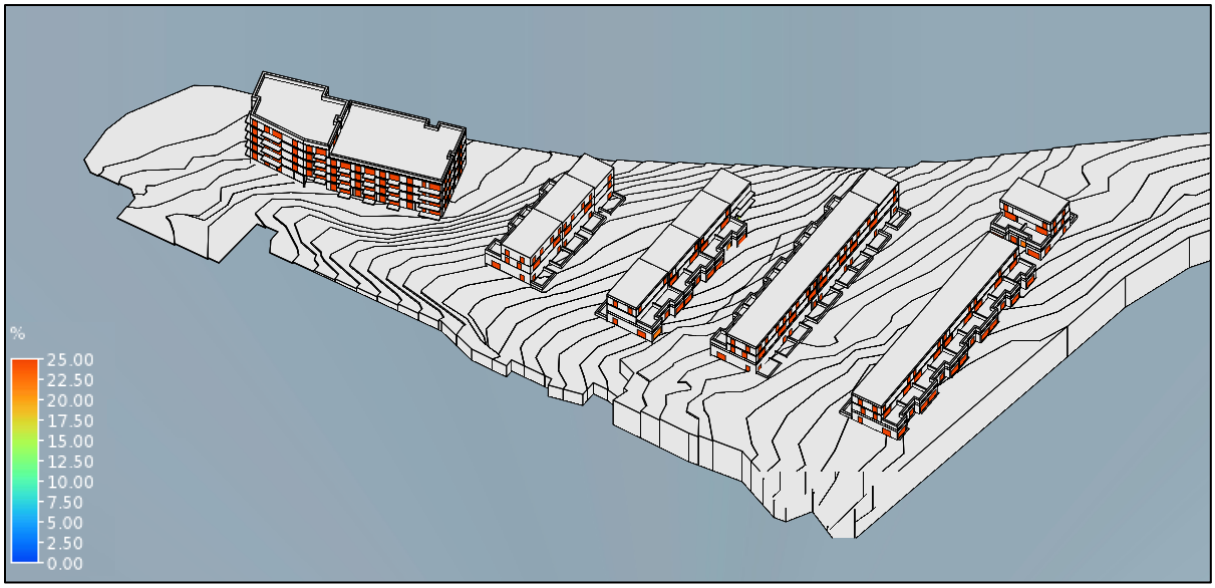

Figure 21 - APSH South East Elevation

8. ASSESSING THE IMPACT ON SURROUNDING PROPERTIES

8.1. DAYLIGHT IMPACT METHODOLOGY

As per the BRE Guidelines, it is important to safeguard the daylight to nearby buildings, from a proposed development, where a reasonable expectation of daylight is required. The flow matrix below outlines the criteria to be assessed, as per the BRE Guidelines, in order to ascertain any potential impact to adjacent buildings from the proposed development.

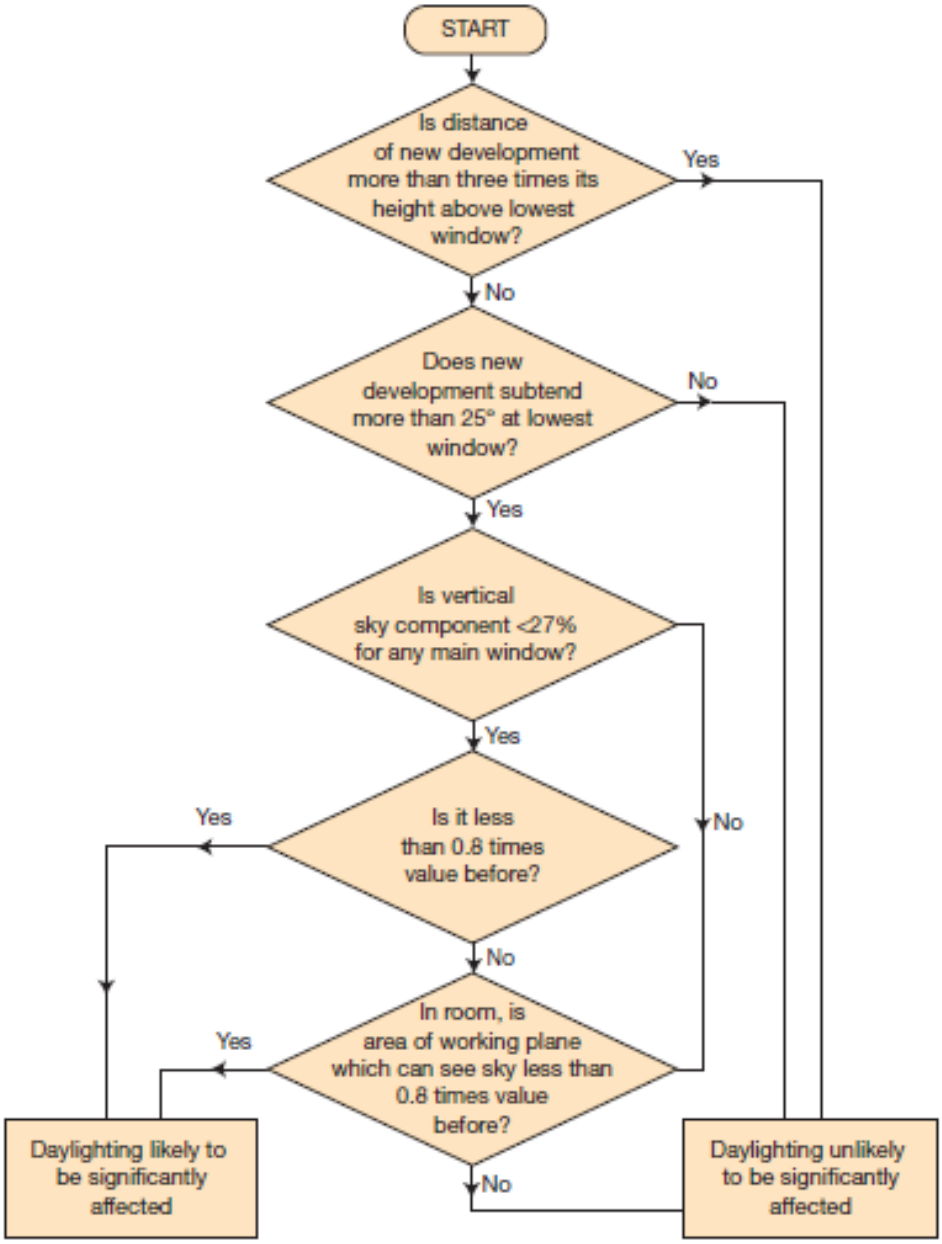

Figure 22 – Daylight Assessment Methodology

As per the flow matrix, the loss of light to existing windows is not required to 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 windows. Otherwise, BRE guideline provide three main methods for assessing daylight availability. In order to assess the impact of the proposed White Pines Central development to surrounding buildings, the 25° line was selected as the method of analysis.

8.1.1 25° LINE CRITERIA

In the first instance, if a proposed development falls beneath a 25° angle taken from a point 1.6 metres above ground level from any adjacent properties, then the BRE Guidelines say that no further analysis is required in relation to impact on surrounding properties as adequate skylight will still be available. For the White Pines Central development, this method was successful for all adjacent properties and no further analysis was required.

8.1.2 VERTICAL SKY COMPONENT

The second method is known as the Vertical Sky Component (VSC). The VSC calculation is the ratio of the direct sky illuminance falling on the outside of a window, to the simultaneous horizontal illuminance under an unobstructed sky. The BRE Guide sets out two guidelines for the VSC analysis:

- If the VSC at the centre of the existing window exceeds 27% with the new development in place, then enough sky light should still be reaching the existing window.
- If the VSC with the new development in place is both less than 27% and less than 80% its former value, then the reduction in light to the window is likely to be noticeable.
- This means that even if the VSC is less than 27%, as long as the VSC value is still greater than 80% of its former value, this would be acceptable and thus the impact would be considered negligible.

It is important to note that 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.

This method of assessment was not required as the 25° line method has shown compliance.

8.1.3 NO SKY LINE

The third method is the No Sky Line or Daylight Distribution Method. This method assesses the change in position of the No Sky Line between the existing and proposed situations. 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. Thus, as this method is limited, it was not used as part of the analysis.

Sections 8.2 and 8.3 on the following pages outline the details of the analysis undertaken.

8.2. IDENTIFYING SENSITIVE RECEPTORS

Prior to following the flow matrix, first the key sensitive receptors around the site need to be identified. According to the BRE Guidelines, sensitive receptors are described as:

- Habitable rooms in residential buildings, where the occupants have a reasonable expectation of daylight;
- Other sensitive receptors are gardens and open spaces on adjacent properties to the new scheme, excluding public footpaths, front gardens and car parks. In accordance with the BRE Guide, windows are selected as sensitive receptors on the basis of being a habitable room facing the proposed development.

Similarly, amenities and open spaces are selected on the basis of being in the immediate vicinity of the proposed development. The primary purpose of a daylight, sunlight and overshadowing assessment is to determine the likely loss of light to adjacent buildings resulting from the construction of the proposed development.

Therefore, in this case, the proposed development is identified as the potential source of impact. The sensitive receptors identified for this study are windows of habitable rooms facing the site where the occupants have a reasonable expectation of daylight. Table 16 identifies all sensitive receptors analysed, whilst Figure 23 identifies their location.

Sensitive Receptor Ref.	Development name
Ref. 1	Properties at White Pines Way
Ref. 2	Properties at White Pines Glade
Ref. 3	Properties at Stocking Well Row
Ref. 4	Properties at White Pines Dale

Table 16 – Sensitive Receptors surrounding White Pines Central Development

The image below identifies the location of the sensitive receptors.

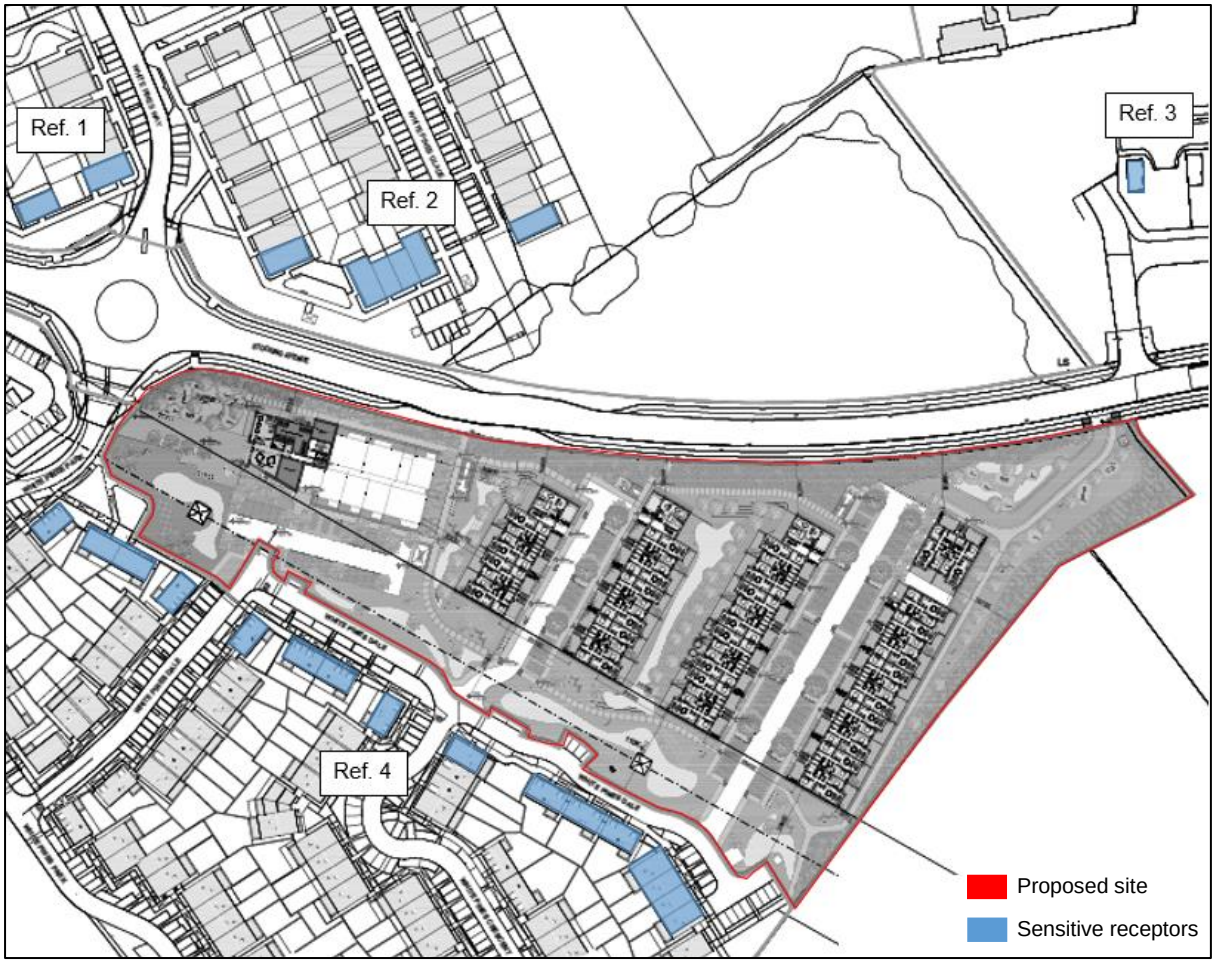

Figure 23 - Location of Sensitive Receptors

8.3. DAYLIGHT IMPACT ON SURROUNDING PROPERTIES

25° line

In order to analyse any potential impact on the properties adjacent to the proposed development, a line has been created which is reflective of a 25° angle taken from a horizontal level at 1.6m above ground to the highest point on the proposed structures.

As illustrated below, all adjacent properties fall outside the 25° line criteria. Therefore, the distance to the proposed development is substantial and negligible daylight impact will be perceived by any of the adjacent properties.

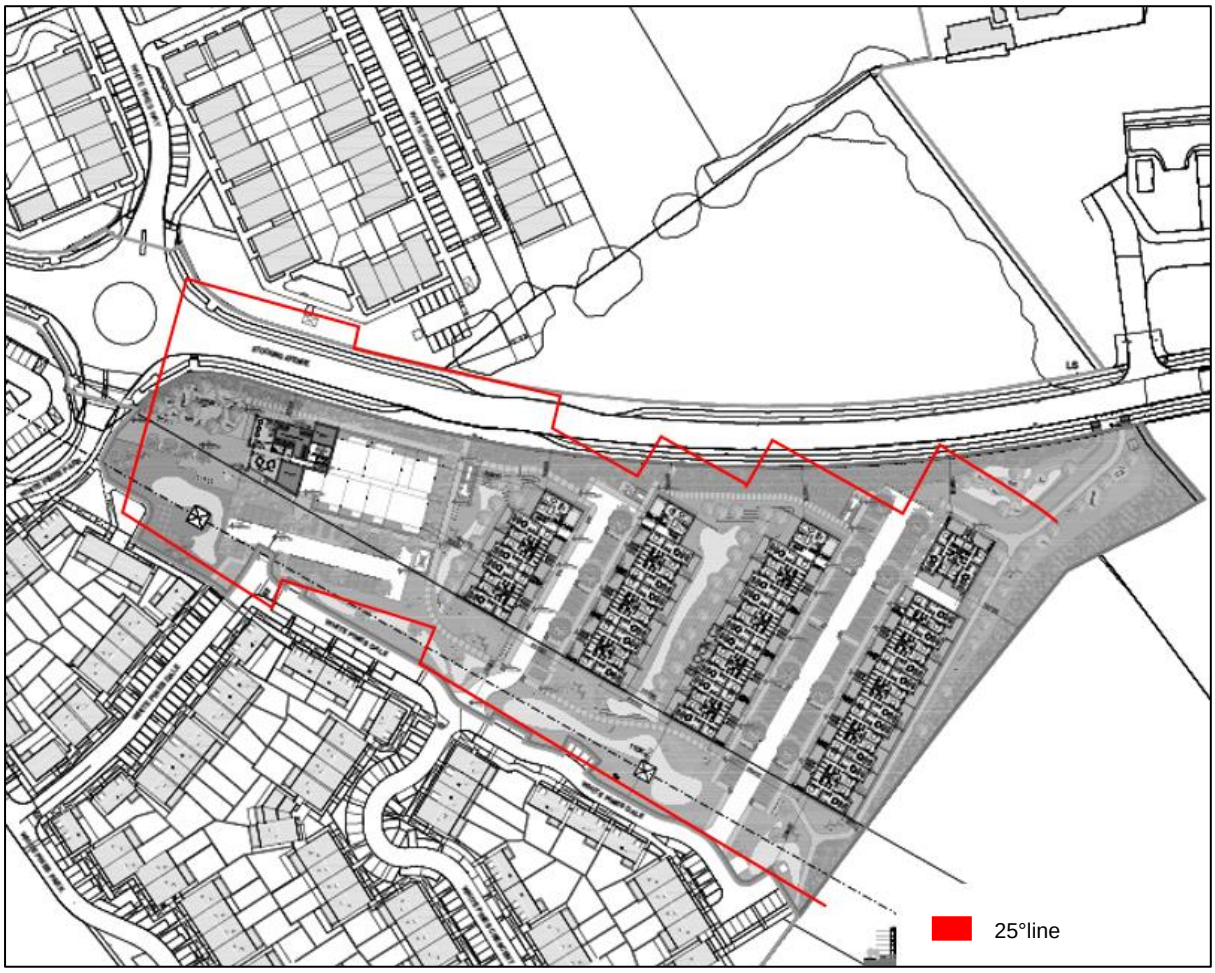

Figure 24 - 25° Line Criteria

9. OVERSHADOWING IMPACT TO SURROUNDING PROPERTIES

BRE Guidelines identify gardens (usually the main back garden of a house) as sensitive receptors that must be selected for analysis in order to assess the impact that will be perceived once the proposed development takes place. The image below highlights in green the surrounding open spaces selected for overshadowing analysis.

Figure 25 – Surrounding Sensitive Receptors - Open Spaces

BRE Guidelines state that *"if a space is used all year round, the equinox (March 21st) is the best date for which to prepare shadow plots as it gives an average level of shadowing. Lengths of shadows at the autumn equinox (September 21st) will be the same as those for March 21st, so a separate set of plots for September is not required. However, clock times for September will be one hour later, because British Summer Times (BST)".*

Based on the recommendations within the BRE Guidelines, March 21st has been used to create the overshadowing images. In addition, overshadowing images for June and December 21st have also been

created and are illustrated in Appendix A, to give an indication of the sunlight levels that will be received during the summer and winter months. It is evident from the overshadowing images that negligible impact will be perceived by any adjacent property.

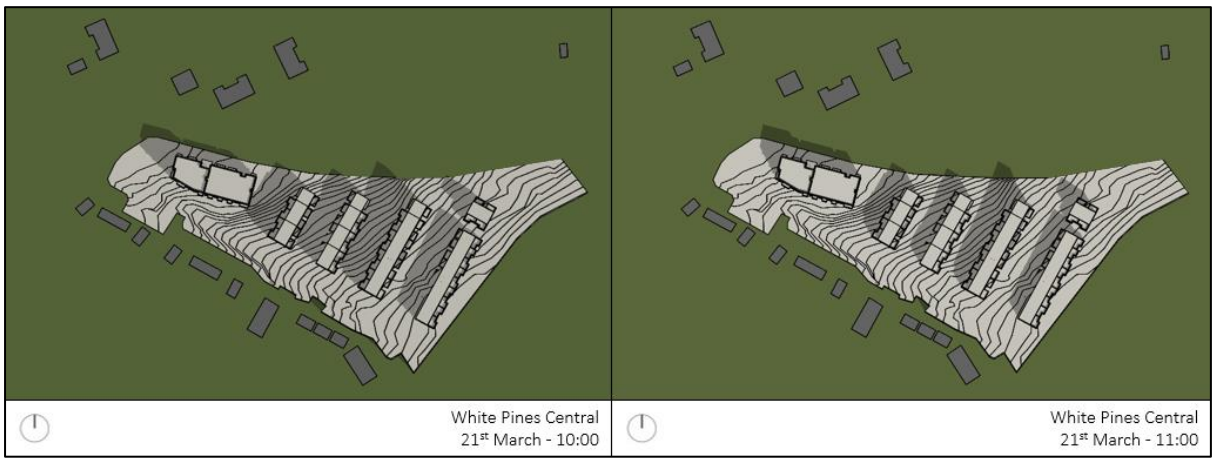

Figure 26 – Overshadowing Image on March 21st at 10 a.m. and 11 a.m.

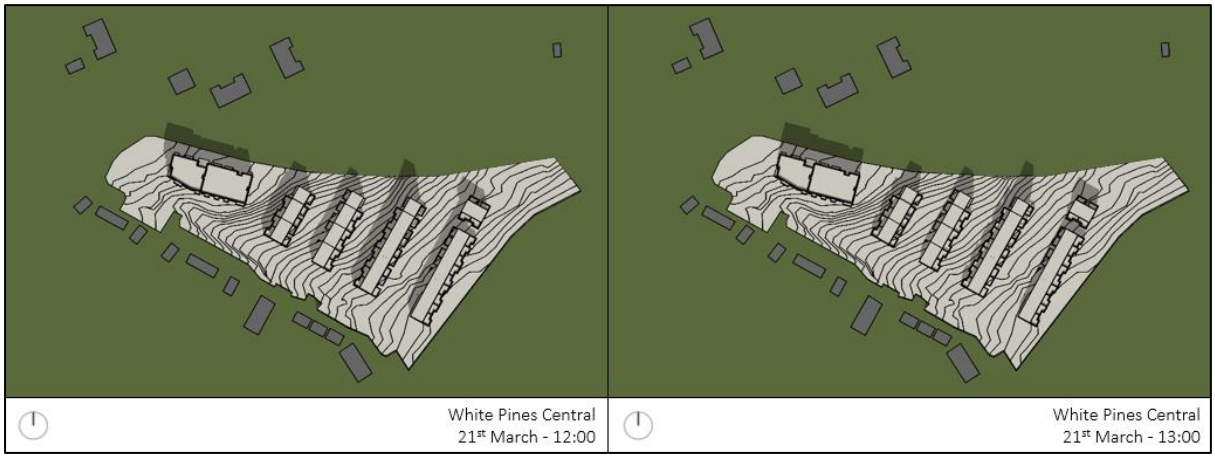

Figure 27 – Overshadowing Image on March 21st at 12 p.m. and 1 p.m.

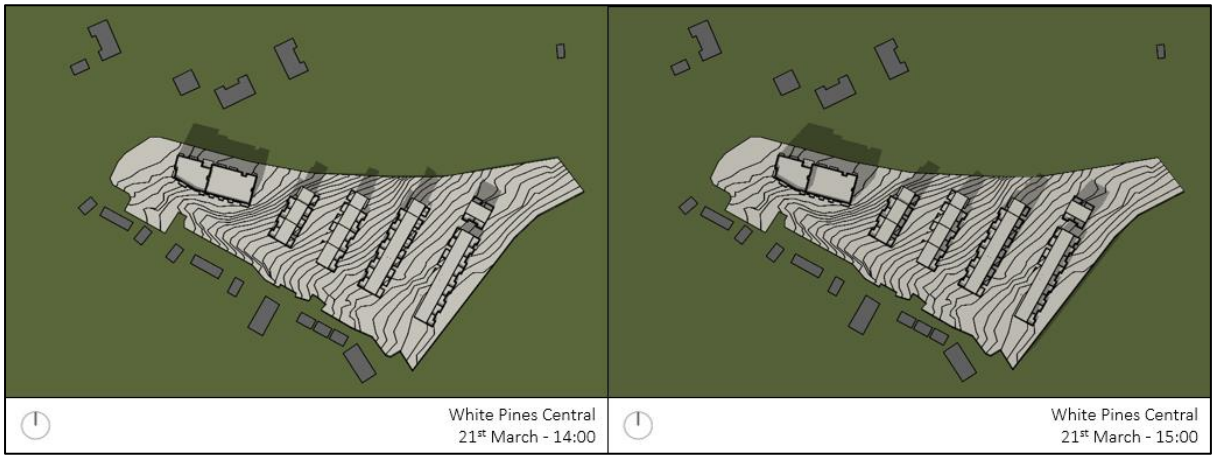

Figure 28 – Overshadowing Image on March 21st at 2 p.m. and 3 p.m.

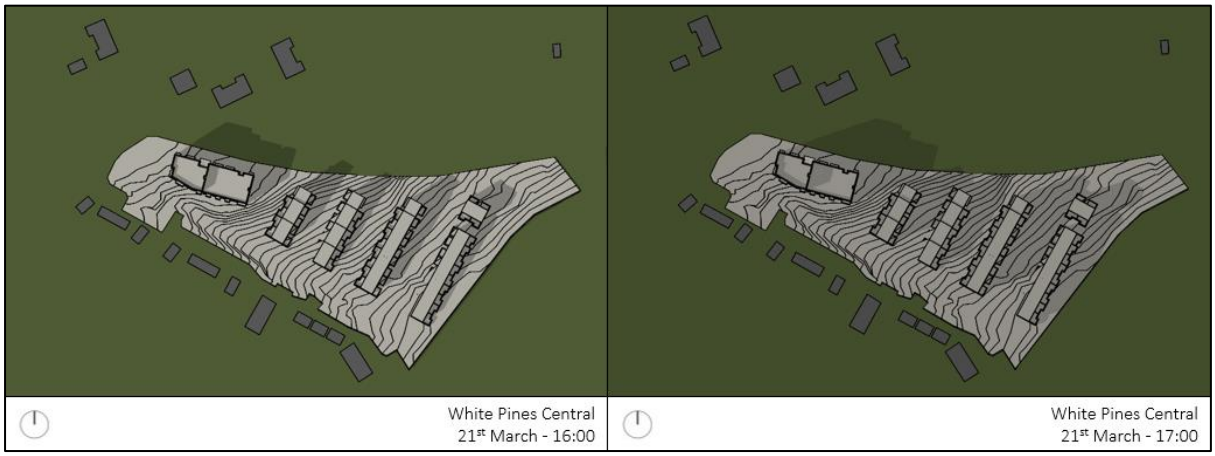

Figure 29 – Overshadowing Image on March 21st at 4 p.m. and 5 p.m.

10. SUNLIGHT IMPACT TO SURROUNDING PROPERTIES (APSH)

In order to assess the sunlight access within the adjacent properties to the White Pines Central development the Annual Probable Sunlight Hour (APSH) have been analysed.

BRE Guidelines outline that if a living room of an existing dwelling has a main window facing within 90° of due south, and any part of a new development subtends an angle of more than 25° to the horizontal measured from the centre of the window in a vertical section perpendicular to the window (a diagram explaining this is illustrated in Figure 30), then the sunlight of the existing dwelling may be adversely affected. This will be the case if the centre of the window:

- Receives less than 25% of annual probable sunlight hours, or less than 5% of annual probable sunlight hours between September 21st and March 21st
- Receives less than 80% its former sunlight hours during either period
- Has a reduction in sunlight received over the whole year greater than 4% of annual probable sunlight hours

Since all adjacent properties fall outside the 25° line criteria, the distance to the proposed development is substantial and negligible sunlight impact will be perceived by any of the adjacent properties. Therefore, further analysis was not required.

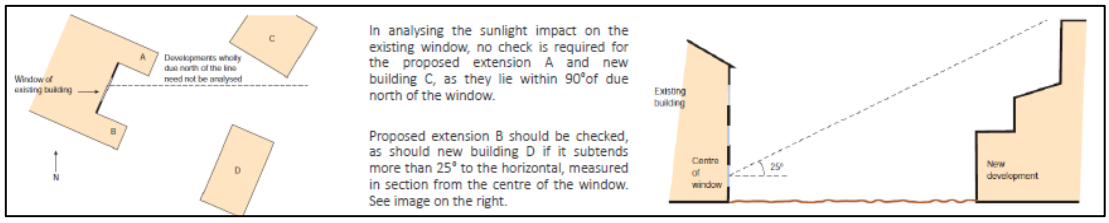

Figure 30 – APSH diagram to Selected Properties

11. CONCLUSION

The proposed White Pines Central development has been analysed in order to determine the following:

- The daylight levels within the living and bedroom areas, to give an indication of the expected daylight levels throughout the proposed development;
- The expected sunlight levels within the living areas and bedrooms of the proposed development;
- The quality of amenity spaces, being provided as part of the development, in relation to sunlight;
- Any potential daylight or sunlight impact the proposed development may have on properties adjacent to the site.

Calculations and methodology used are in accordance with BRE Guidelines for daylight and sunlight and based on the British Research Establishments "Site Layout Planning for Daylight and Sunlight: A Good Practice Guide" by PJ Littlefair, 2011 Second Edition, however, the following should be reiterated as previously outlined:

"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 that constrain the designer. Although it gives numerical guidelines these should be interpreted flexibly because natural lighting is only one of the many factors in site layout design"

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.

Internal Daylight

The analysis confirms that across the entire development excellent levels of internal daylight are achieved. A 100% compliance rate is achieved across the entire development.

Throughout the development, comfortable and desirable spaces have been designed with floor to ceiling heights that enhance the opportunity for improved daylight levels and extensive glazing to

every room enabling deep daylight penetration and providing enhanced views to a beautiful landscaped area.

Sunlight

Sunlight analysis has shown that excellent levels of sunlight will be achieved within the proposed development. At least 2 hours of sunlight are achieved on March 21st on the majority of the amenity spaces provided, thus complying with BRE Guidelines.

The annual probable sunlight hour assessment has shown that even though some windows are slightly under BRE recommendations due to their orientation, acceptable levels of sunlight will still being achieved within the proposed development.

Impact to surrounding properties

The 25° line analysis has demonstrated that the proposed building has negligible daylight or sunlight impact on any adjacent property.

The overshadowing assessment has shown that negligible impact will be perceived by any of the surrounding open spaces.

APPENDIX A

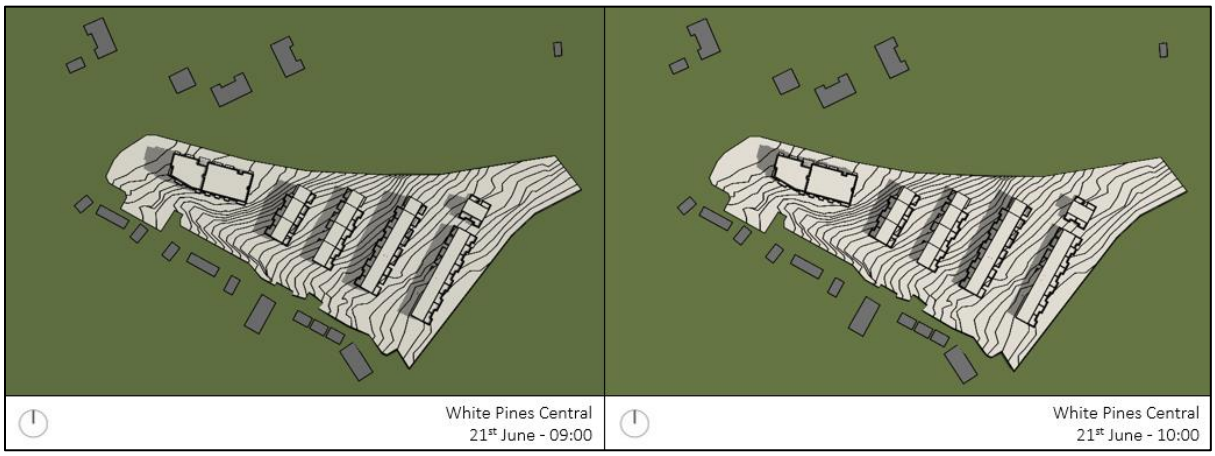

Figure A.1 – Overshadowing Image on June 21st at 9 a.m. and 10 a.m.

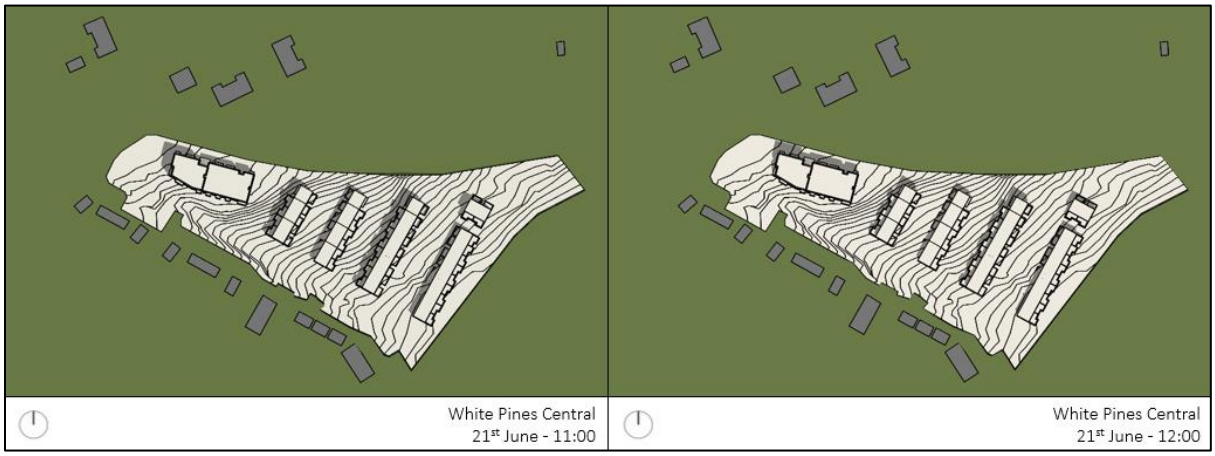

Figure A.2 – Overshadowing Image on June 21st at 11 a.m. and 12 p.m.

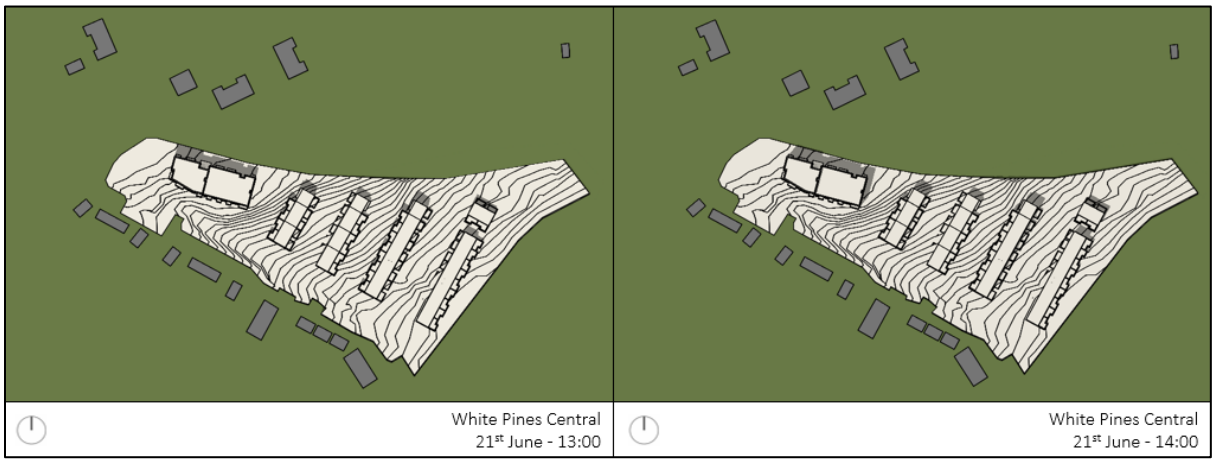

Figure A.3 – Overshadowing Image on June 21st at 1 p.m. and 2 p.m.

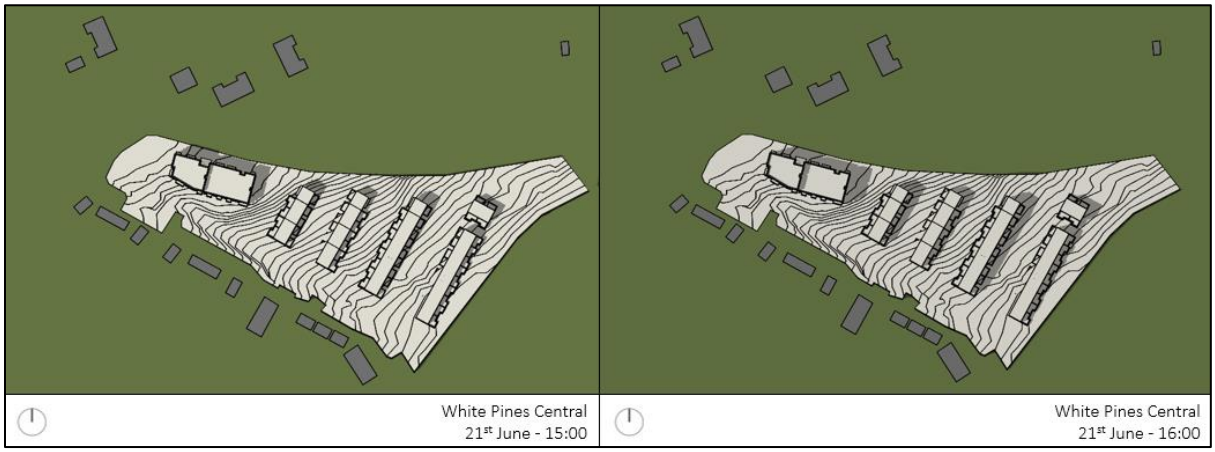

Figure A.4 – Overshadowing Image on June 21st at 3 p.m. and 4 p.m.

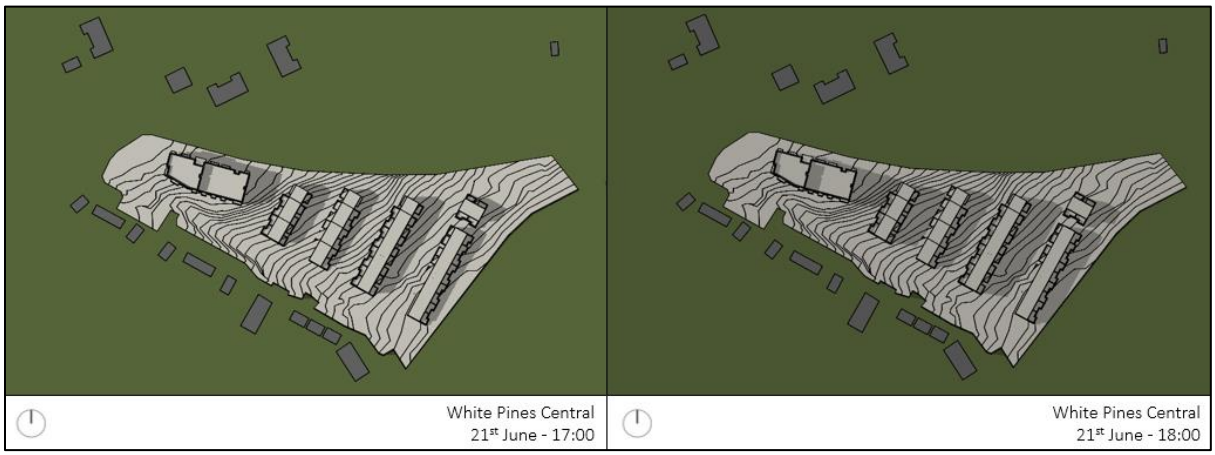

Figure A.5 – Overshadowing Image on June 21st at 5 p.m. and 6 p.m.

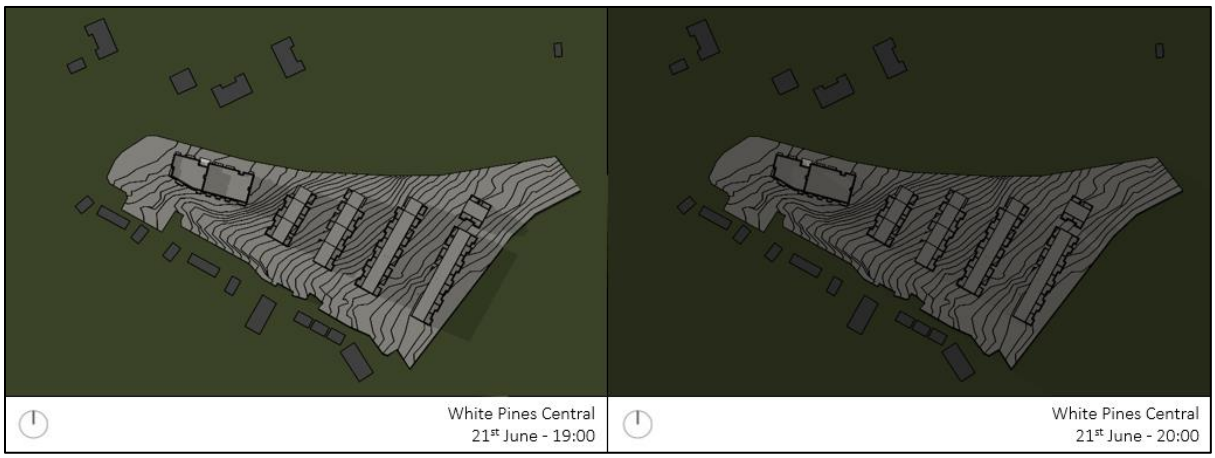

Figure A.6 – Overshadowing Image on June 21st at 7 p.m. and 8 p.m.

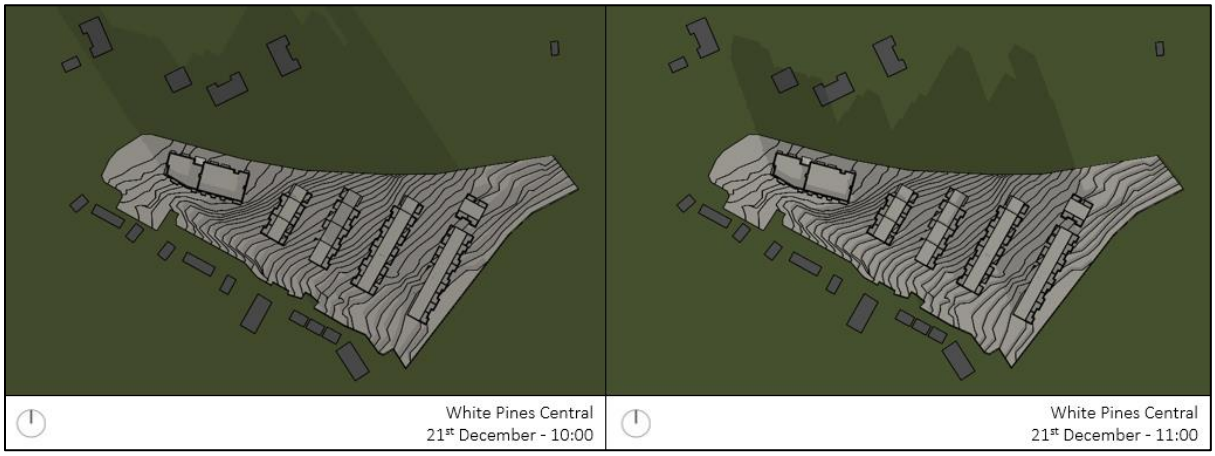

Figure A.7 – Overshadowing Image on December 21st at 10 a.m. and 11 a.m.

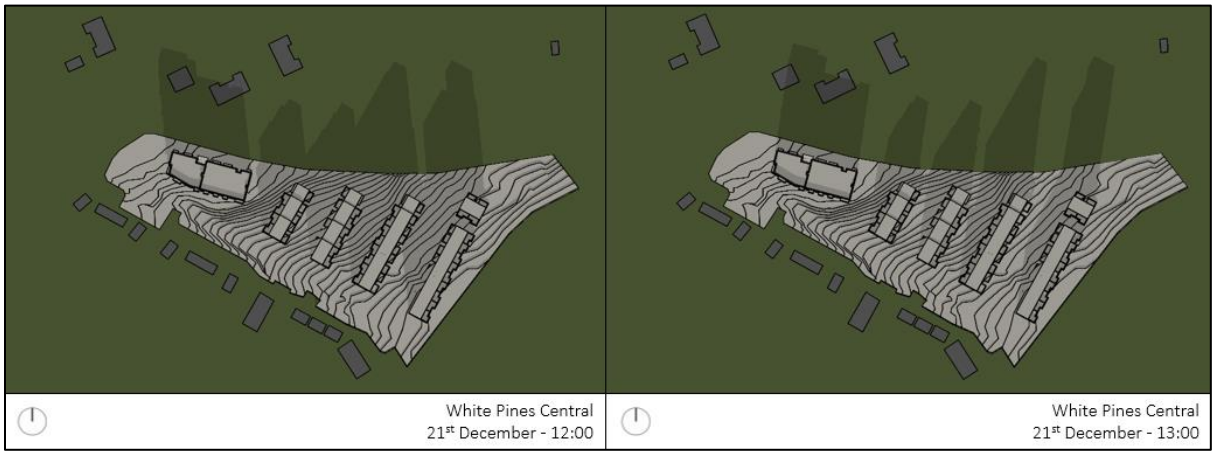

Figure A.8 – Overshadowing Image on December 21st at 12 p.m. and 1 p.m.

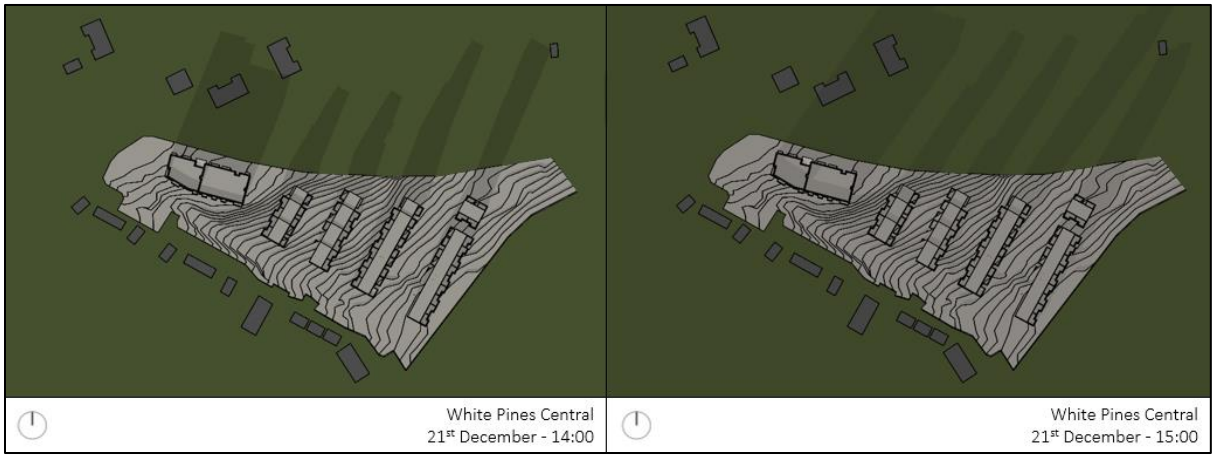

Figure A.9 – Overshadowing Image on December 21st at 2 p.m. and 3 p.m.

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