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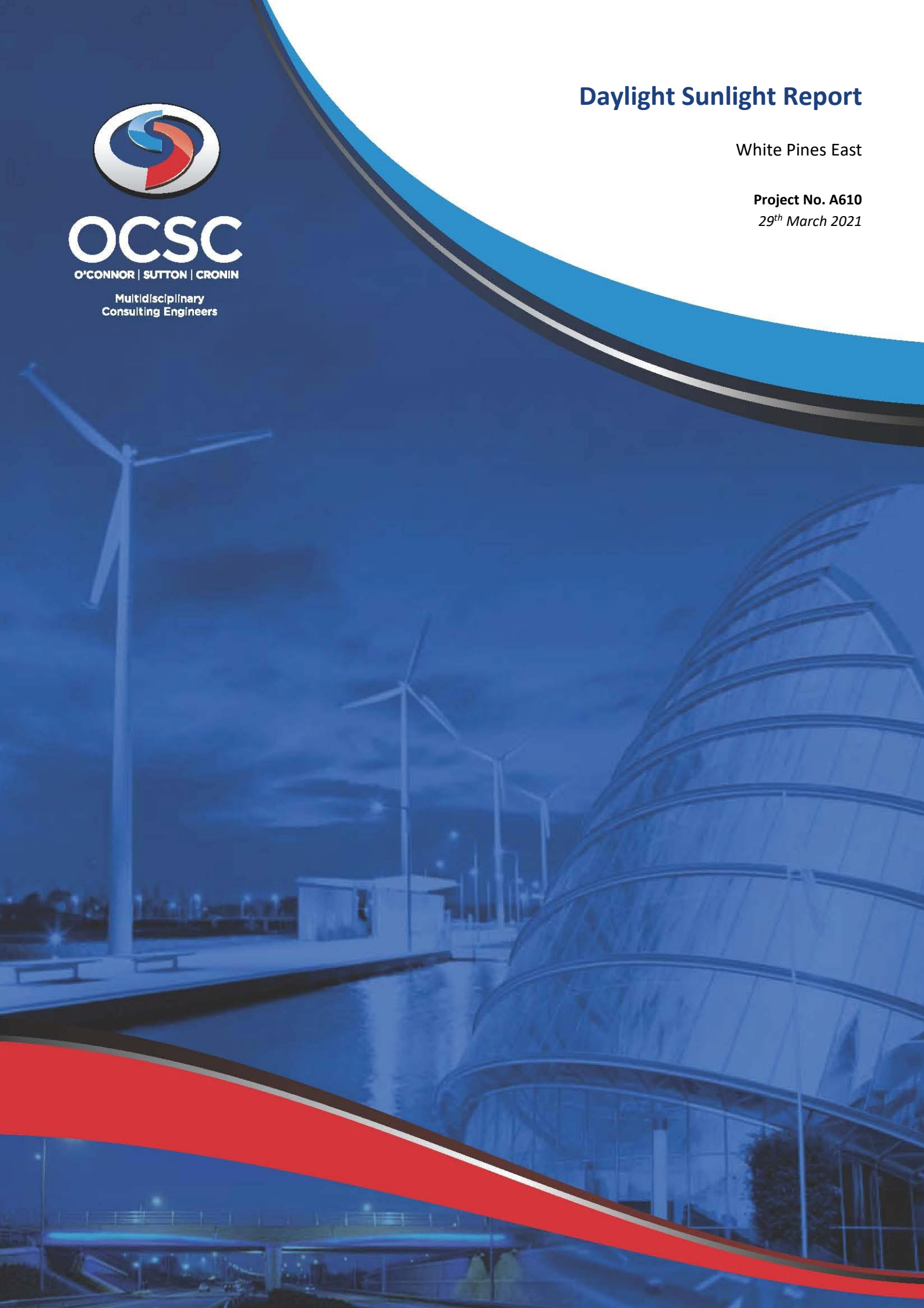
Daylight Sunlight Report

White Pines East

Project No. A610

29th March 2021



Daylight Sunlight Report

NOTICE

DOCUMENT CONTROL & HISTORY

OCSC Job No.: A610	Project Code	Originator Code	Zone Code	Level Code	File Type	Role Type	Number Series	Status/ Suitability Code	Revision
	A610	OCSC	XX	XX	RP	YS	0002	S4	P05

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5	For Planning	CA	DOC	DOC	29/03/2021
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EXECUTIVE SUMMARY

OCSC have been appointed to carry out a Daylight/ Sunlight study for the White Pines East development located in 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 of selected apartments, 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 98.6% compliance rate achieved across the proposed development. The majority of apartments not only meet but greatly exceed the ADF target set out.

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.

The annual probable sunlight hours assessment has shown that even though some windows are slightly under the BRE recommendations, acceptable levels of sunlight will still be achieved within the proposed development.

The analysis also shows that the proposed development has negligible daylight or overshadowing impact to surrounding properties.

DAYLIGHT SUNLIGHT REPORT

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1. INTRODUCTION

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- The daylight levels within the living and bedroom areas of selected apartments, 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 will consist of:

- The construction of 241 no. residential units, in 5 no. apartment blocks, ranging in height from 4-6 storeys, and 3 no. three storey duplex block. The development will provide 93 no. 1 Bed and 148 no. 2 bed units, as follows;
    - Block A is a 5 storey block comprising 40 units (20 no. 1 bed units; and 20 no. 2 bed units). Block A includes balconies on southern, northern and western elevations. A dedicated community building space comprising 552sq.m will also be provided on the ground floor of Block A.
    - Block B is a 4 storey block comprising 34 units (18 no. 1 bed units; and 16 no. 2 bed units). Block B includes balconies on southern, southern, western and eastern elevations;
    - Block C is a Part 4 Part 5 storey block comprising 43 units (21 no. 1 bed units; 22 no. 2 bed units) Block C includes balconies on southern, eastern and western elevations. Residential Tenant Amenities comprising c.171sq.m is provided at ground floor level of Block C to serve all residential units, comprising; a reception area, games space, residents lounge and gym space.
    - Block D is a 5 storey block comprising 49 no units (21 no. 1 bed units and 28 no. 2 bed units). Block D includes balconies on southern, western and eastern elevations;
    - Block E is a 6 storey block comprising 47 no units (13 no. 1 bed units and 34 no. 2 bed units). Block E includes balconies on southern, western, eastern and northern elevations;
    - 3 no. 3 storey duplex blocks are provided to the western boundary of the site, comprising 28 no. 2 bed units. Balconies and terrace space is provided to the eastern elevation.
- Provision of 204 no. on street car parking spaces
- Omission of crèche as approved under SDCC Ref. SD14A/0222;
- The main vehicular access to the scheme will be from Stocking Avenue. A second new vehicular access is proposed from White Pines North to the east.
- Provision of 401 no. bicycle parking spaces;
- All other ancillary site development works to facilitate construction, site services, piped infrastructure, ESB sub-stations, plant, public lighting, bin stores, bike stores, boundary treatments and provision of public and private open space including hard and soft landscaping, plant, provision of public and private open space areas comprising hard and soft landscaping, site services all other associated site excavation, infrastructural and site development works above and below ground.

Figure 1 - Proposed Site Plan

3. PROPOSED BUILDING DESIGN

In order to ensure that daylight levels were maximised for the White Pines East 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 light materials. This will ensure light is reflected throughout the development. 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 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 D North 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."

The difficulty in achieving the result set out by the BRE guidance in a city centre location is also recognised within planning guidance which has been published by the Irish Government. On page 43 of the Urban Design Manual 2009 the following advice is provided:

"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."

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 John Fleming Architects 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

It should be noted that for this report, the target ADF value for the living spaces containing a kitchen has been set at 1.5%.

Targeting a minimum ADF of 2% in open space kitchen/living rooms, results in significant challenges while complying with the Design Standards for New Apartments, which are as follows:

- Amenity spaces: the guidance set out in the Design Standards for New Apartment document states that private amenity spaces shall be provided in the form of balconies at the upper levels. It is also stated that balconies are preferably accessed from living rooms. In order to achieve the 2% in living/ kitchen spaces balcony spaces would need to be removed at the lower floors.

- Floor to ceiling height: in order to achieve an ADF of 2%, the floor to ceiling heights would have to be increased on all levels which would have a planning height impact.
- Solar gains: with the removal of the balconies, increased floor to ceiling height and extensive glazing area there is a risk of overheating within the apartments.

With all of these factors considered, the use of an ADF of 1.5% is the most appropriate for the following reasons:

- Balcony amenity spaces can be provided in line with the Design Standards for New Apartments document.
- Floor to ceiling height are kept in line with Design Standards for New Apartments document.
- The proportion of glazing will still provide excellent daylighting and will avoid the risk of overheating due to balcony provision.

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 APARTMENTS

This section outlines the apartment units that were selected for assessment of internal daylight levels for the proposed White Pines East 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. In addition, room depth and location of balconies also play an important role when it comes to daylight penetration within the room, therefore, a deep plan room with a balcony in front has been considered a 'worst case' unit. 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

In order to illustrate how this rationale was applied for the White Pines East development, the figures outlining the room references also include a '✓' in the rooms assumed to achieve compliance and an '*X*' in those rooms expected to fall short in compliance.

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, based on the above rationale, the vast majority of units not only meet but in the majority of cases exceed the Average Daylight Factor target set out. Of the 630 rooms that comprise the development, only 9 fall slightly under the BRE requirements, therefore a 98.6% compliance rate is achieved 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	30
Internal Partitions	70
Ceiling	70
Floor	40
Adjacent Buildings	30
Glazing Transmittance	70

Table 1 – Surface Reflectance Values

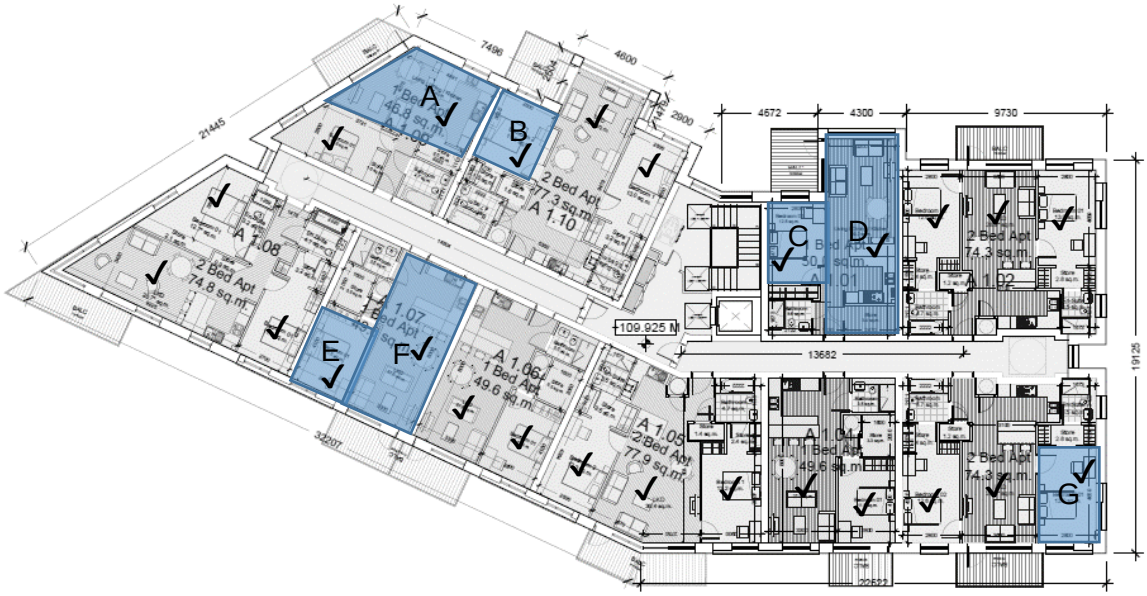


Figure 6 –Block A – First Floor Assessed Rooms Highlighted in Blue

Unit		ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Living/ Kitchen	1.5%	3.7%	Y
B	Bedroom	1.0%	1.3%	Y
C	Bedroom	1.0%	1.2%	Y
D	Living/ Kitchen	1.5%	5.3%	Y
E	Bedroom	1.0%	2.7%	Y
F	Living/ Kitchen	1.5%	1.8%	Y
G	Bedroom	1.0%	4.5%	Y

Table 2 – Average Daylight Factor Results – Block A - First Floor Assessed Rooms

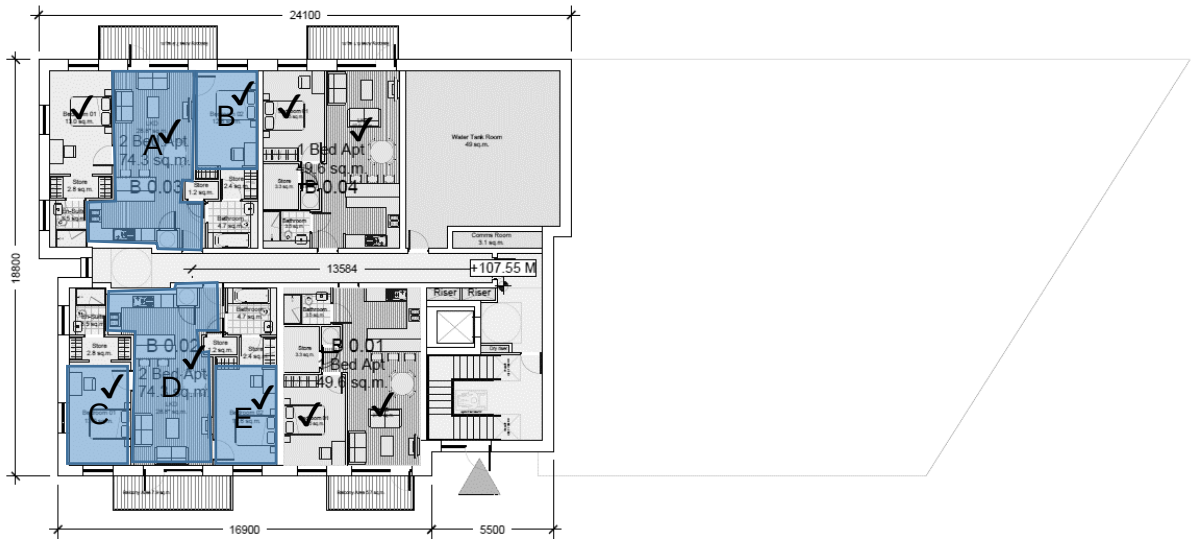


Figure 7 –Block B - Ground Floor Assessed Rooms Highlighted in Blue

Unit		ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Living/ Kitchen	1.5%	2.7%	Y
B	Bedroom	1.0%	3.1%	Y
C	Bedroom	1.0%	4.7%	Y
D	Living/ Kitchen	1.5%	1.8%	Y
E	Bedroom	1.0%	2.1%	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 target (%)	ADF results (%)	Meets minimum ADF target
A	Bedroom	1.0%	3.7%	Y
B	Living/ Kitchen	1.5%	2.8%	Y
C	Living/ Kitchen	1.5%	1.9%	Y
D	Bedroom	1.0%	2.3%	Y
E	Bedroom	1.0%	2.6%	Y
F	Living/ Kitchen	1.5%	1.9%	Y

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

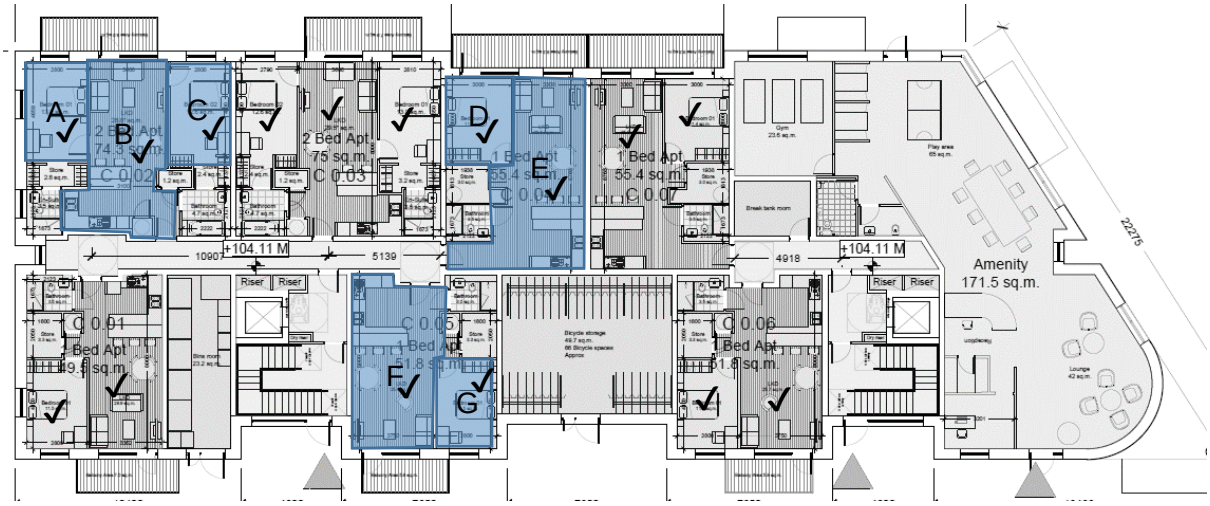


Figure 9 – Block C - Ground Floor Assessed Rooms Highlighted in Blue

Unit		ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Bedroom	1.0%	2.7%	Y
B	Living/ Kitchen	1.5%	2.3%	Y
C	Bedroom	1.0%	3.0%	Y
D	Bedroom	1.0%	2.7%	Y
E	Living/ Kitchen	1.5%	2.2%	Y
F	Living/ Kitchen	1.5%	2.1%	Y
G	Bedroom	1.0%	3.3%	Y

Table 5 – Average Daylight Factor Results – Block C - Ground Floor Assessed Rooms

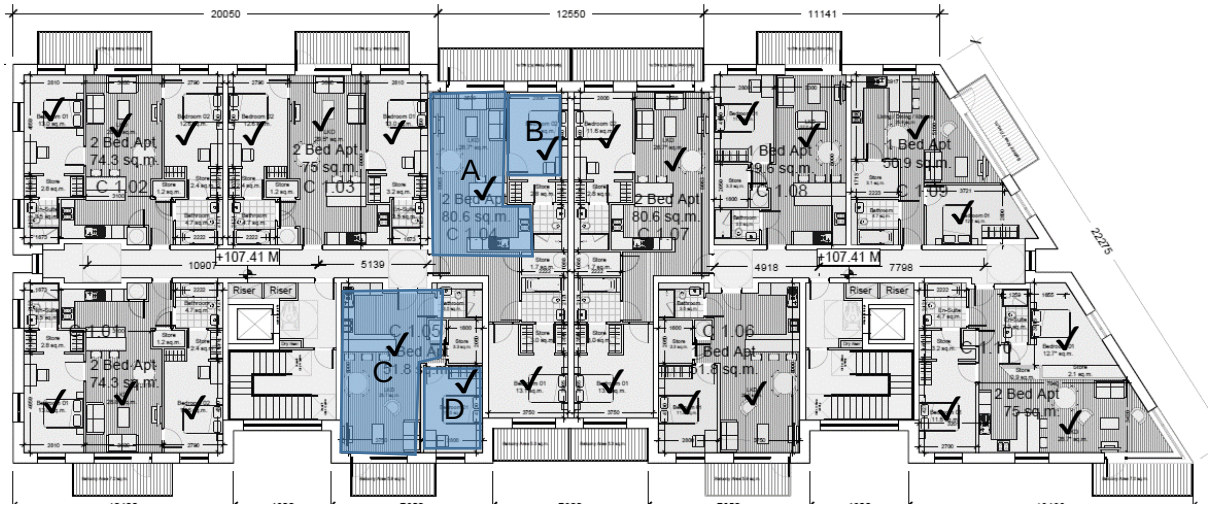


Figure 10 – Block C - First Floor Assessed Rooms Highlighted in Blue

Unit		ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Living/ Kitchen	1.5%	2.3%	Y
B	Bedroom	1.0%	2.9%	Y
C	Living/ Kitchen	1.5%	2.2%	Y
D	Bedroom	1.0%	3.4%	Y

Table 6 – Average Daylight Factor Results – Block C - First Floor Assessed Rooms

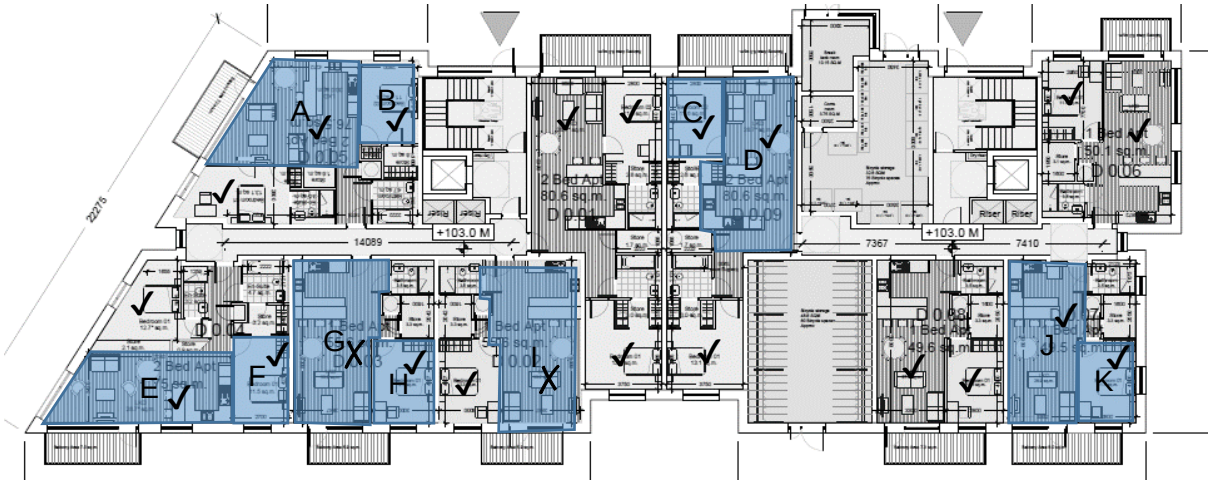


Figure 11 – Block D - Ground Floor Assessed Rooms Highlighted in Blue

Unit		ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Living/ Kitchen	1.5%	4.1%	Y
B	Bedroom	1.0%	3.8%	Y
C	Bedroom	1.0%	2.8%	Y
D	Living/ Kitchen	1.5%	2.1%	Y
E	Living/ Kitchen	1.5%	5.2%	Y
F	Bedroom	1.0%	1.8%	Y
G	Living/ Kitchen	1.5%	1.2%	N
H	Bedroom	1.0%	2.0%	Y
I	Living/ Kitchen	1.5%	1.4%	N
J	Living/ Kitchen	1.5%	2.3%	Y
K	Bedroom	1.0%	5.0%	Y

Table 7 – Average Daylight Factor Results – Block D - Ground Floor Assessed Rooms

Figure 12 – Block D - First Floor Assessed Rooms Highlighted in Blue

Unit		ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Living/ Kitchen	1.5%	2.2%	Y
B	Bedroom	1.0%	3.0%	Y
C	Living/ Kitchen	1.5%	1.3%	N
D	Bedroom	1.0%	2.1%	Y
E	Living/ Kitchen	1.5%	1.5%	Y

Table 8 – Average Daylight Factor Results – Block D - First Floor Assessed Rooms

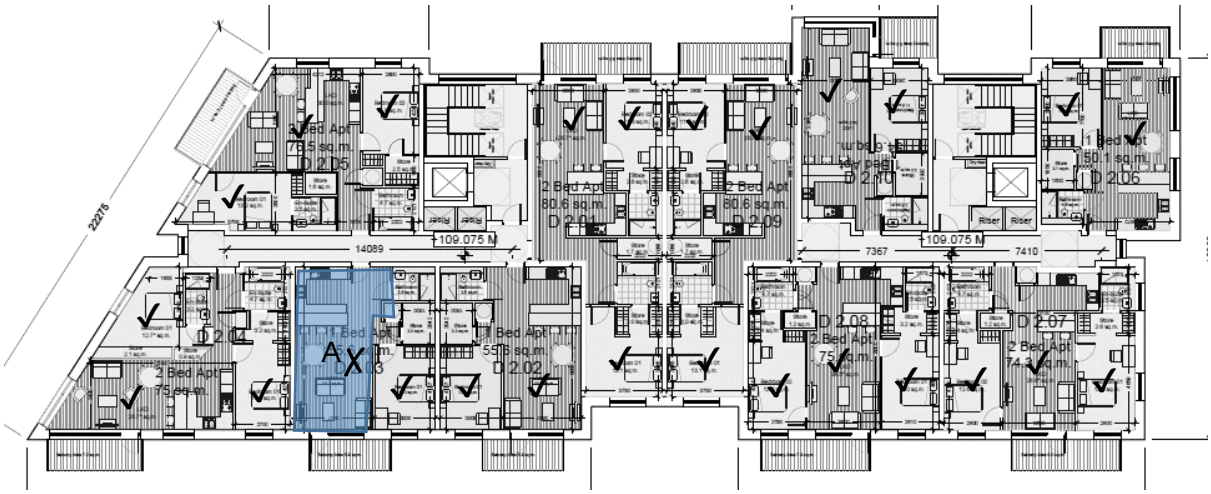


Figure 13 – Block D - Second Floor Assessed Rooms Highlighted in Blue

Unit		ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Living/ Kitchen	1.5%	1.4%	N

Table 9 – Average Daylight Factor Results – Block D - Second Floor Assessed Rooms

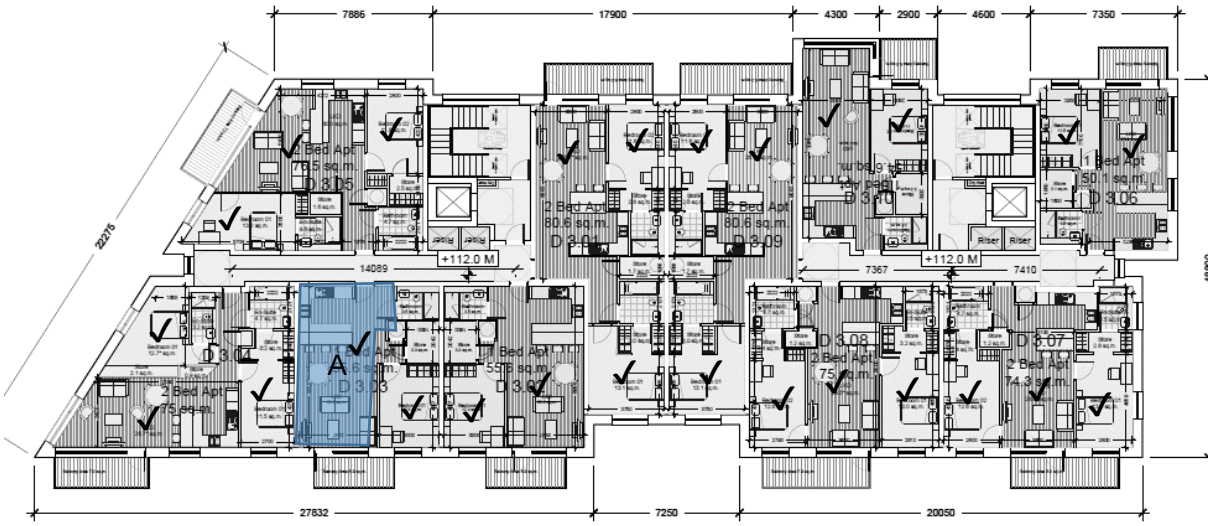


Figure 14 – Block D - Third Floor Assessed Rooms Highlighted in Blue

Unit		ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Living/ Kitchen	1.5%	1.5%	Y

Table 10 – Average Daylight Factor Results – Block D - Third Floor Assessed Rooms

Figure 15 – Block E - Ground Floor Assessed Rooms

Unit		ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Living/ Kitchen	1.5%	3.3%	Y
B	Bedroom	1.0%	2.7%	Y
C	Bedroom	1.0%	3.0%	Y
D	Living/ Kitchen	1.5%	2.2%	Y
E	Living/ Kitchen	1.5%	1.0%	N* (fails up to the 4th floor inclusive)
F	Bedroom	1.0%	2.2%	Y
G	Living/ Kitchen	1.5%	2.4%	Y

Table 11 – Average Daylight Factor Results – Block E - Ground Floor Assessed Rooms

Figure 16 – Block E - First Floor Assessed Rooms

Unit		ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Bedroom	1.0%	5.0%	Y
B	Living/ Kitchen	1.5%	2.0%	Y
C	Living/ Kitchen	1.5%	2.3%	Y
D	Living/ Kitchen	1.5%	1.1%	N* (fails up to the 4th floor inclusive)
E	Bedroom	1.0%	2.3%	Y

Table 12 – Average Daylight Factor Results – Block E - First Floor Assessed Rooms

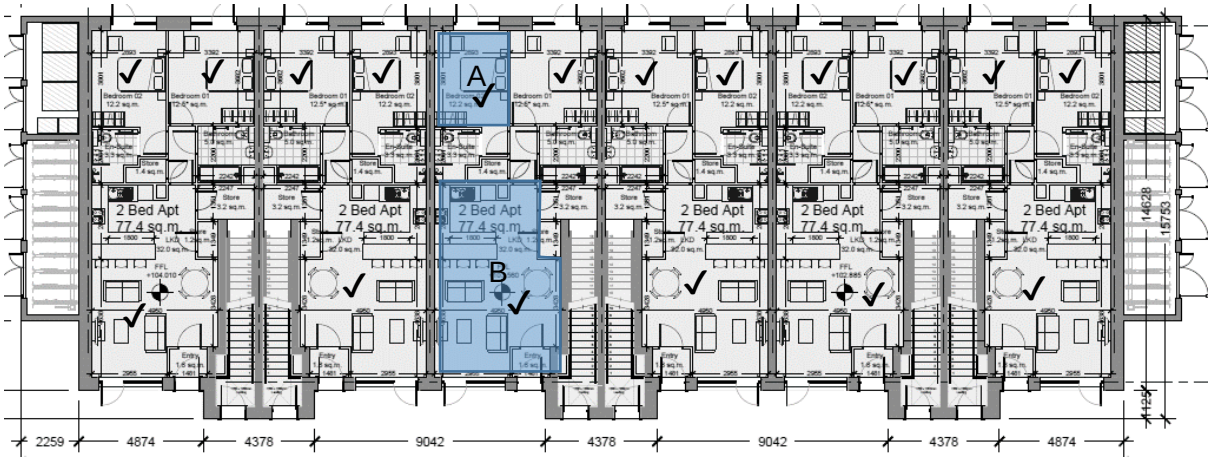


Figure 17 – Duplexes Ground Floor Assessed Rooms

	Unit	ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Bedroom	1.0%	4.0%	Y
B	Living/ Kitchen	1.5%	2.1%	Y

Table 13 – Average Daylight Factor Results – Duplexes Ground Floor Assessed Rooms

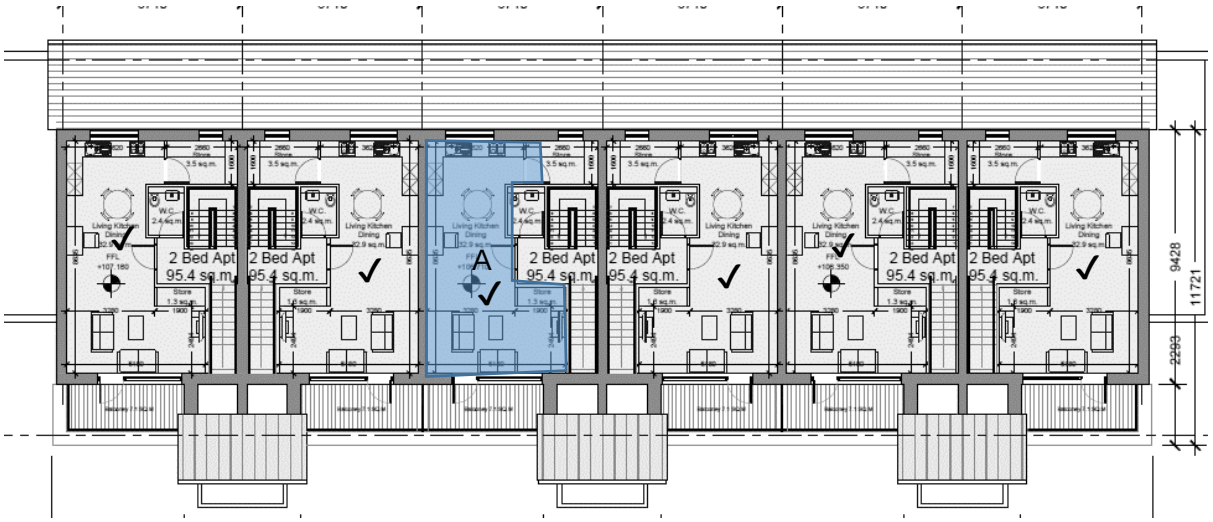


Figure 18 – Duplexes First Floor Assessed Rooms

	Unit	ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Living/ Kitchen	1.5%	4.5%	Y

Table 14 – Average Daylight Factor Results – Duplexes First Floor Assessed Rooms

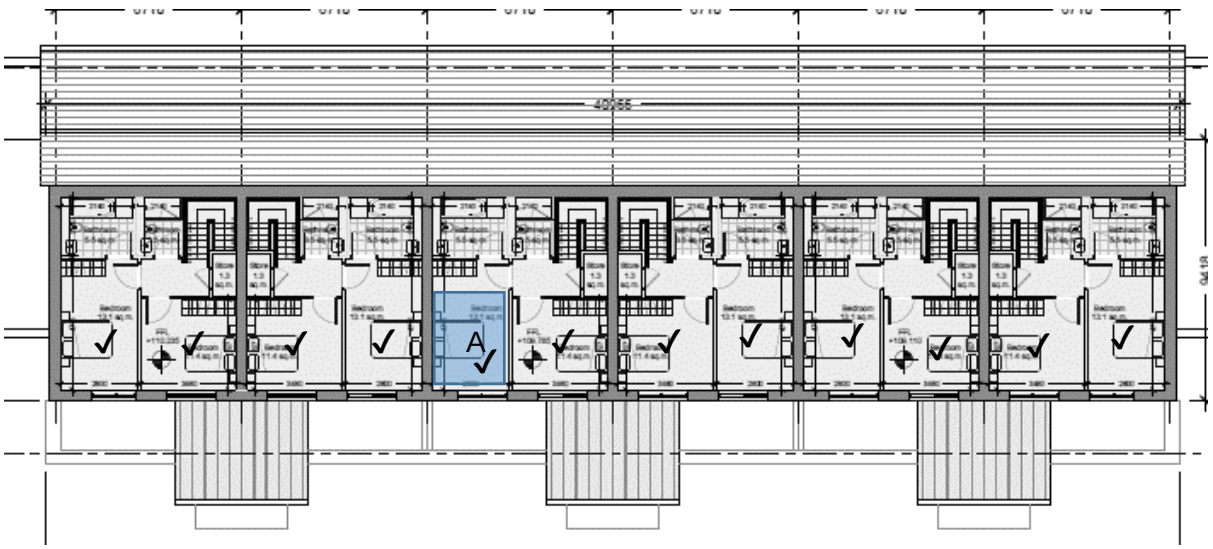


Figure 19 – Duplexes Second Floor Assessed Rooms

Unit		ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Bedroom	1.0%	4.8%	Y

Table 15 – Average Daylight Factor Results – Duplexes 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 20 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.

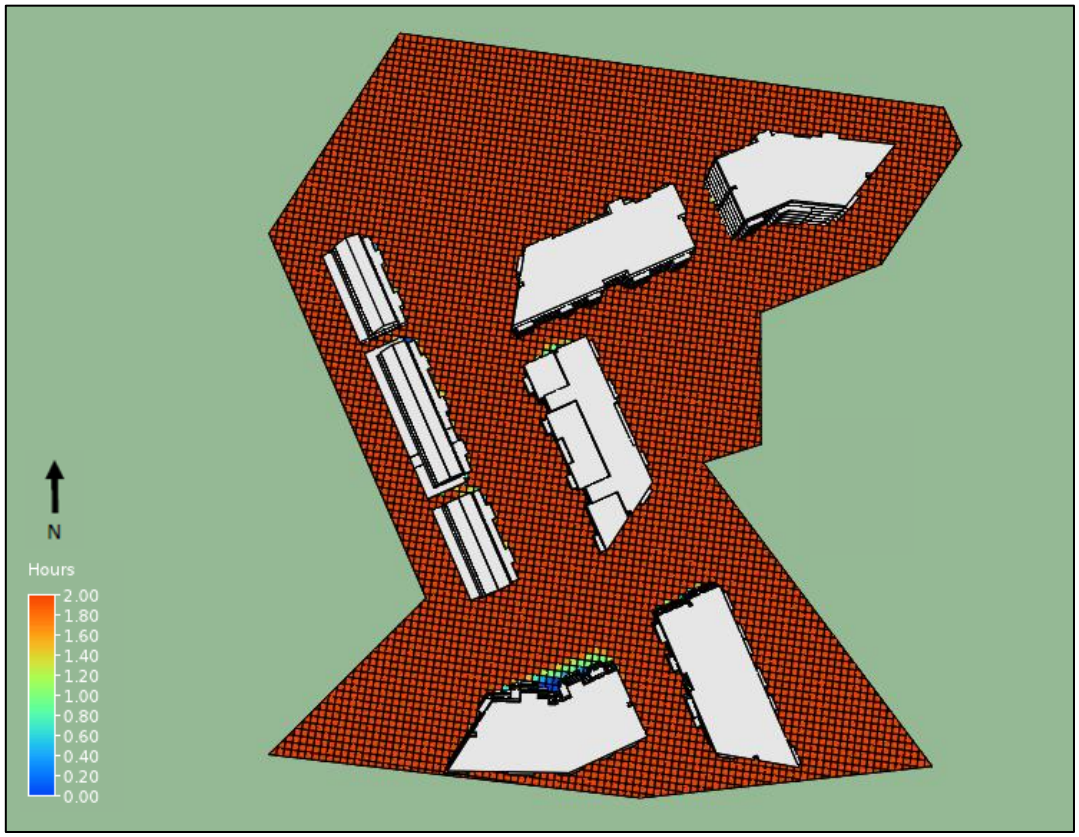


Figure 20 – Amenity Spaces - Hours of Sunlight on March 21st

The excellent daylight and sunlight access can also be attributed to the sunlight reflection from the building facades that have been carefully designed with light materials, thus creating comfortable and desirable spaces for the residents.

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.

While the BRE criteria sets out these recommendations for living room windows to receive direct sunlight throughout the year, the guidance set out in the Design Standards for New Apartments states that balconies should adjoin and have a functional relationship with the main living areas of the apartment. They also state that it is preferable that balconies would be primarily accessed from living rooms, which can reduce the sunlight being received in some instances.

As the location of balconies have been designed to primarily comply with the apartment design guidelines, the amount of sunlight reaching these living room windows at lower floors will naturally be reduced and achieving the recommended values within BRE Guidelines can become challenging. Therefore, in addition to assessing the criteria recommended in the BRE Guidelines, a relaxed value has been set to give further reference in relation to sunlight levels.

The below table summarises the annual probable sunlight hours for the annual period and for the winter period based on the BRE recommendations. Two additional checks with relaxed benchmarks have been carried out to show the majority of windows still achieve good levels of sunlight across the development.

	BRE Guidelines Check 1 **APSH > 25%** **Annual Period**	**BRE Guidelines Check 2** **APSH > 5%** **Winter Period**	**Additional Check 1** **APSH > 20%** **Annual Period**	**Additional Check 2** **APSH > 15%** **Annual Period**
Percentage of Compliance	69%	73%	75%	83%

Table 16 – APSH Summary Table

The results from the analysis have shown that for the annual period, 69% of the analysed windows achieve the recommended APSH values stated in the BRE Guidelines, while 73% of windows achieve the recommended values during the winter months, when sunlight is more valuable. When a relaxed benchmark of 20% and 15% is applied, 75% and 83% of the analysed windows achieve this alternative value, showing that acceptable levels of sunlight will be achieved across the development. The shortfall in compliance can be attributed to the projection of balconies over the lower levels rooms and to the north facing facades.

It must be noted that the results within this report should be treated with 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 in Appendix A illustrate the sunlight levels achieved within the development.

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.

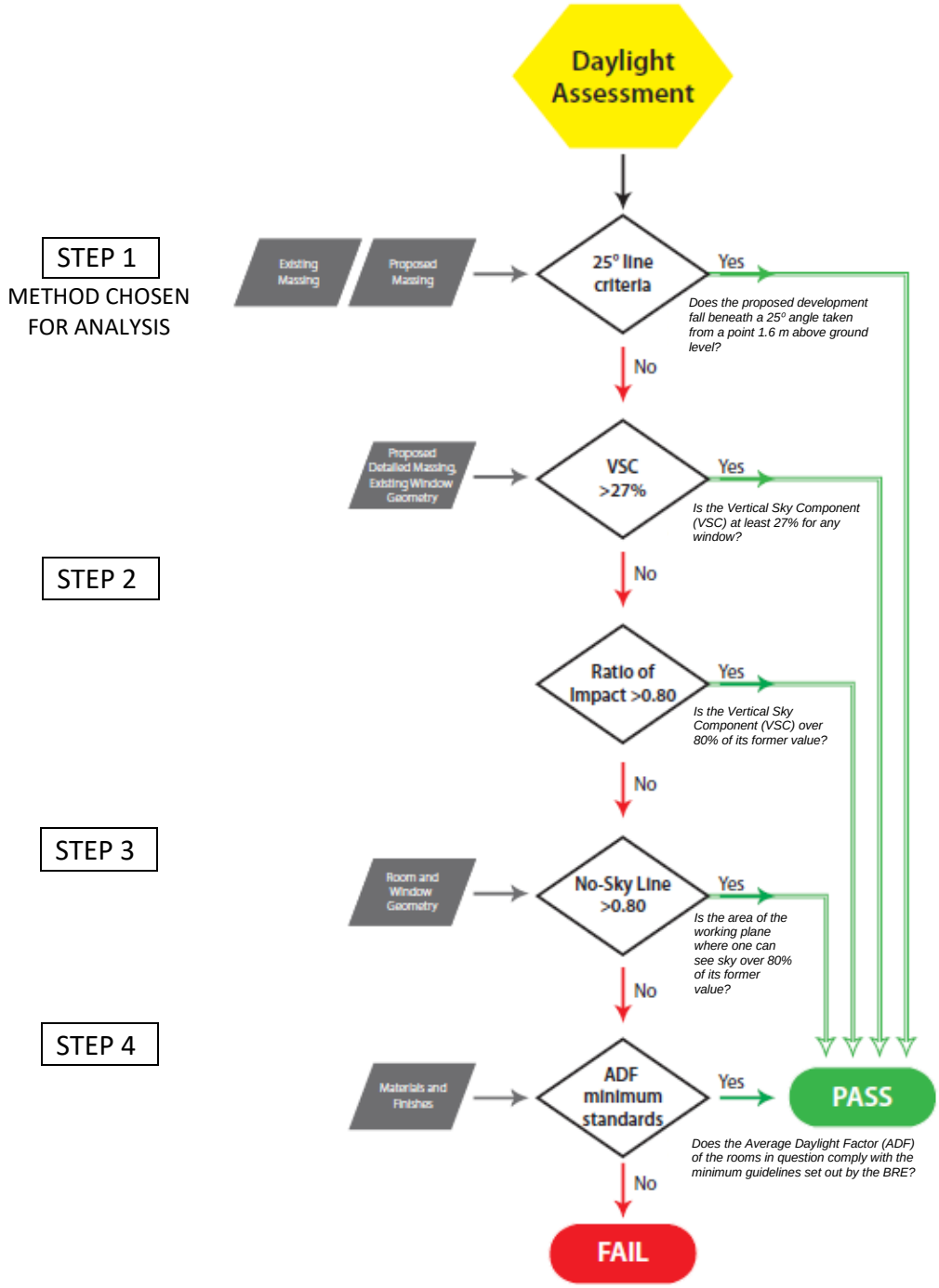


Figure 21 – Daylight Assessment Methodology

As per the flow matrix, the BRE and BS8206 guidelines provide four main methods for assessing daylight availability. In order to assess the impact of the proposed White Pines East 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. In the case of the White Pines East development, this method was successful, showing that all adjacent properties are located a substantial distance from the proposed development, therefore, 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. If the VSC standard is not met on any window, a more detailed assessment based on the Average Daylight Factor should be undertaken.
Since the first step (25°line) has shown compliance, this method of assessment was not required.

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.

8.1.4 AVERAGE DAYLIGHT FACTOR

The final method of calculation is the Average Daylight Factor (ADF). This is a more detailed and thus more 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. Where dimensions for the room to be assessed are available, this is the best method of assessment, but even where they are not, it provides a very informative result. It gives guidance as to the qualitative and quantitative change in daylight and is related to the British Standard BS 8206 Part II.

This step is only utilised for assessing the impact to adjacent properties where compliance is not achieved using the VSC analysis. As the 25° line method showed compliance, this step 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 17 identifies all sensitive receptors analysed, whilst Figure 22 identifies their location.

Development name
The Green Acres House
White Pines North

Table 17 – Sensitive Receptors surrounding White Pines East development

The image below identifies the location of the sensitive receptors located in closest proximity to the proposed site.

Figure 22 - Location of Sensitive Receptors

8.3. DAYLIGHT IMPACT ON SURROUNDING PROPERTIES

25° line

BRE Guidelines state that if a proposed development falls beneath a 25° line taken from a point 1.6 metres above ground level from any adjacent properties, then no impact is perceived and further analysis is not required.

The image below highlights in red the 25° line created. All adjacent properties fall outside the 25° line therefore, no further analysis is required.

Figure 23 - 25° Line Criteria

Even though all adjacent properties fall outside the 25° line, since the properties located to the East are in close proximity to the 25° line, a VSC check was carried out to ensure that daylight impact was not perceived.

Vertical Sky Component

BRE Guidelines state that if the VSC is ≥ 27% with the new development in place, then enough sky light should still be reaching the existing window. If the VSC value is under 27%, in order for the window to perceive a negligible impact, the VSC with the proposed development in place should still be ≥80% of its former value.

As previously outlined, all adjacent properties fall outside the 25° line, therefore negligible daylight impact will be perceived. However, since the properties to the East are in close proximity to the 25° line, a VSC analysis was carried out to confirm that negligible impact is perceived. In order to analyse the VSC levels within the selected adjacent properties, 'worst case' windows located at lower level were modelled for each house being analysed. In all cases, the VSC results achieved for the adjacent properties is well in excess of 27%, with VSC results of around 33%. Therefore, excellent levels of daylight will still be perceived once the proposed development is constructed.

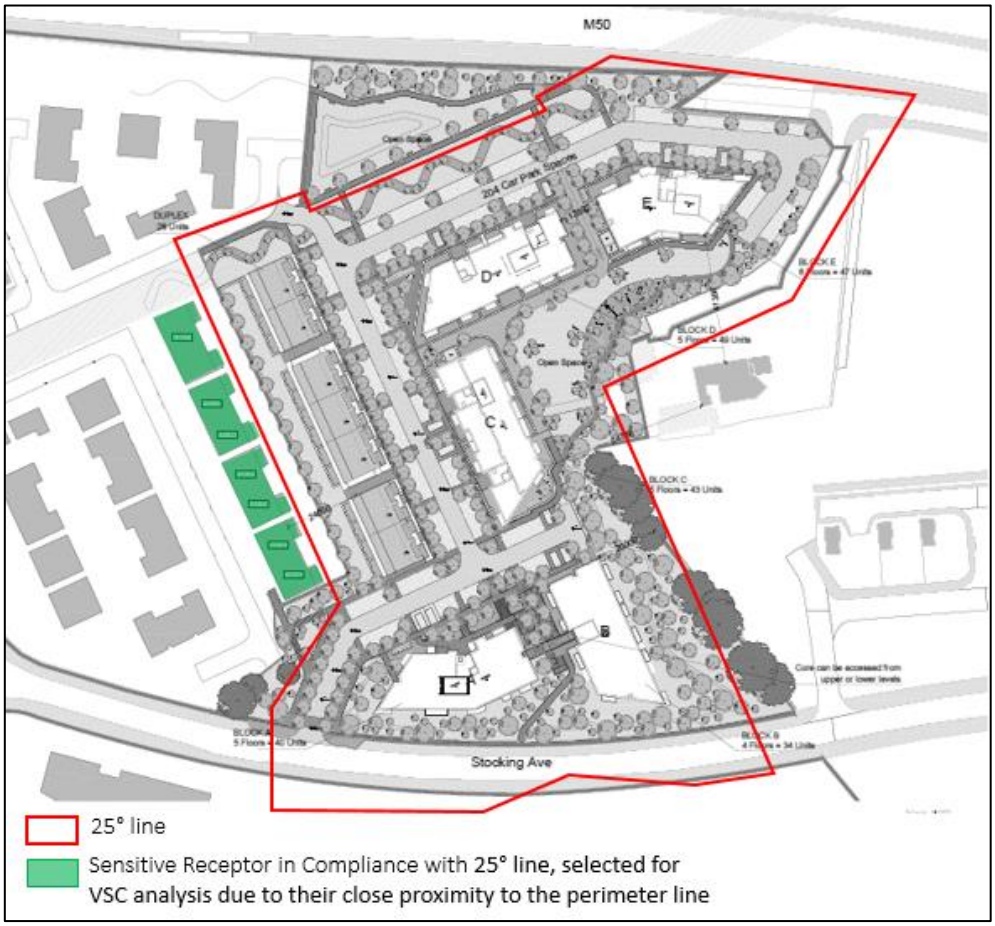


Figure 24 - 25° Line Criteria and VSC properties

9. OVERSHADOWING IMPACT TO SURROUNDING PROPERTIES

The overshadowing impact from the proposed development on surrounding buildings has been analysed for the proposed development. The overshadowing images illustrate the overshadowing impact on March 21st from 10 a.m. to 5 p.m.. Overshadowing images for June 21st and December 21st are illustrated in Appendix B.

The only adjacent property that would receive a minimal sunlight impact is the Green Acres House, however, the impact will be perceivable after 5 p.m. on March 21st. Due to the location of the Green Acres House garden and the only perceivable impact from the proposed development being after 5 p.m., no further analysis was required. It can be stated that no further overshadowing to any of the sensitive receptors will be perceived and all receptors will still receive excellent levels of sunlight once the proposed development is constructed.

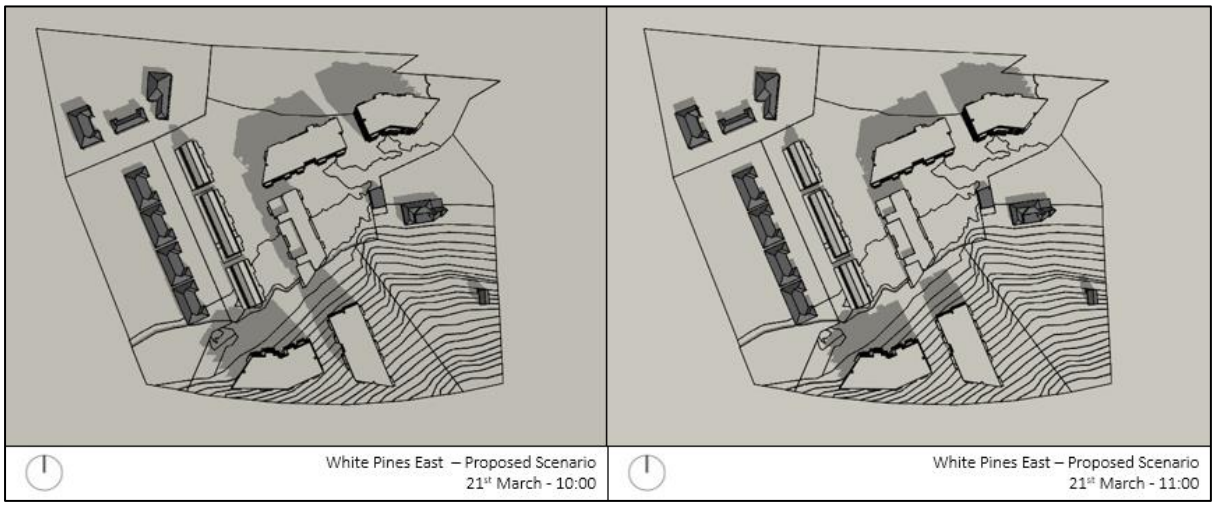


Figure 25 – Overshadowing Image on March 21st at 10 a.m. and 11 a.m.

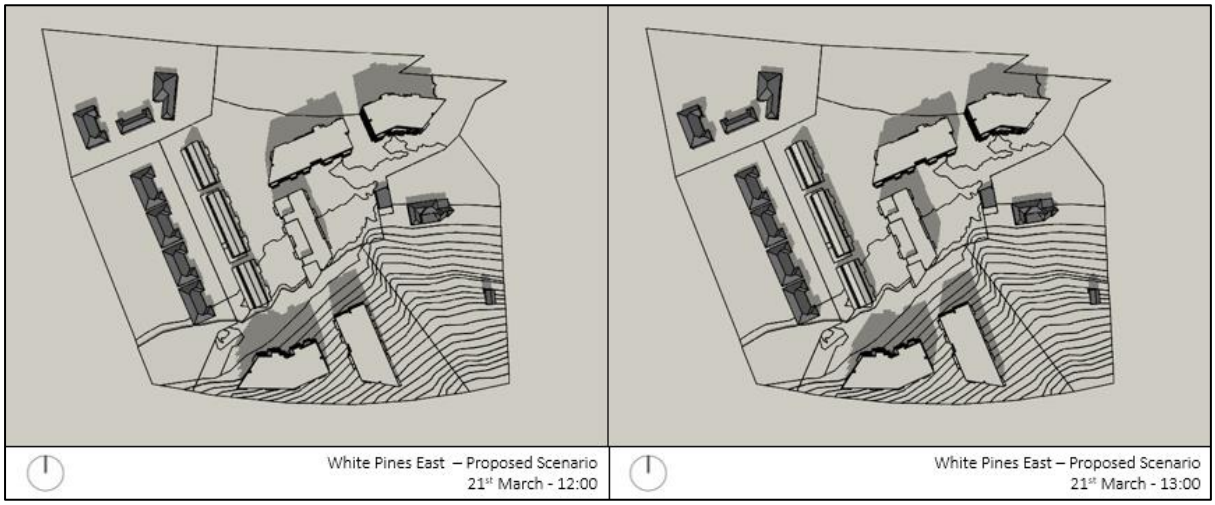


Figure 26 – Overshadowing Image on March 21st at 12 p.m. and 1 p.m.

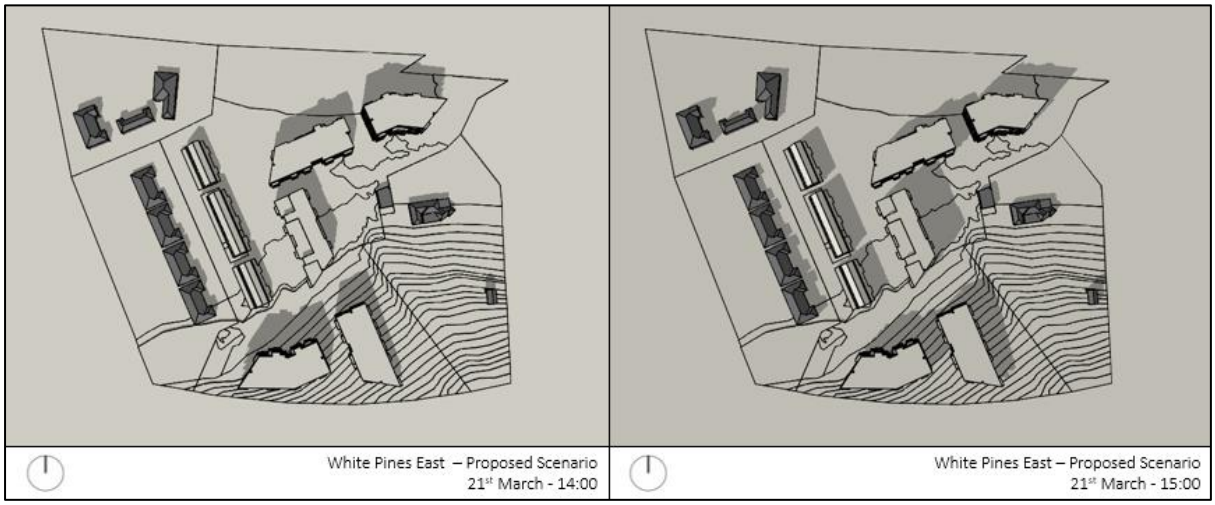


Figure 27 – Overshadowing Image on March 21st at 2 p.m. and 3 p.m.

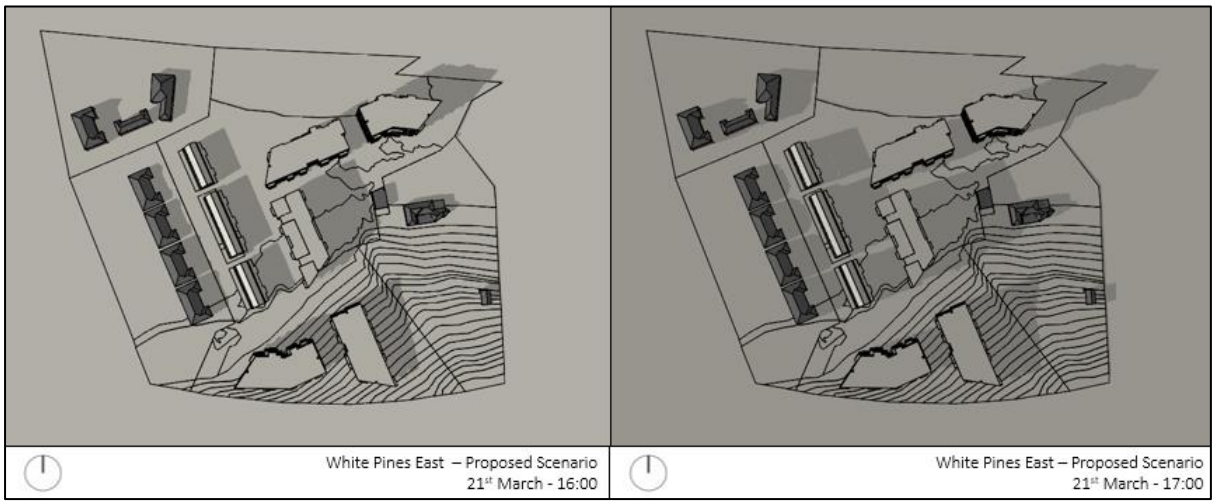


Figure 28 – Overshadowing Image on March 21st at 4 p.m. and 5 p.m.

10. SUNLIGHT IMPACT TO SURROUNDING PROPERTIES (APSH)

In order to analyse the sunlight access within the adjacent properties to the White Pines East development, the Annual Probable Sunlight Hours (APSH) is the method used for this assessment.

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, then the sunlight of the existing dwelling may be adversely affected (refer to Figure 29).

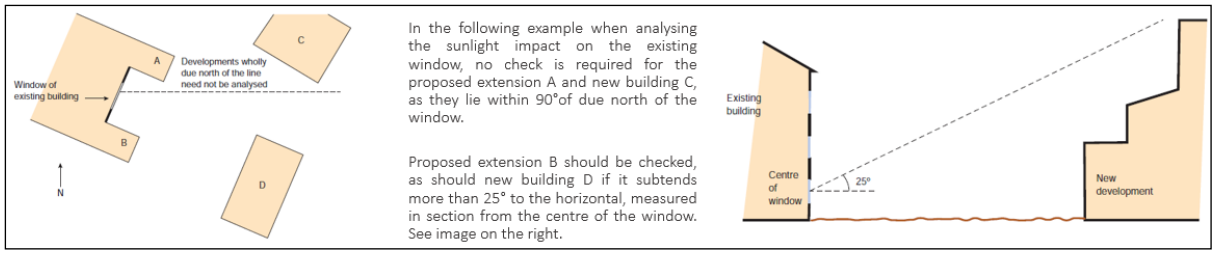


Figure 29 – BRE Extract of the methodology for rooms selection - APSH

The sunlight within adjacent properties may be adversely affected if the center 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% of 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

As illustrated in Figure 23, all adjacent properties fall outside the 25° line. Therefore, all adjacent properties are a substantial distance from the proposed development and no analysis is required as there will be negligible impact due to the proposed development.

11. CONCLUSION

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

- The daylight levels within the living and bedroom areas of selected apartments, 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 overshadowing 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 numeral 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 98.6% compliance rate is achieved across the entire development.

Throughout the full development, comfortable and desirable spaces have been designed with floor to ceiling heights maximised to further 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 hours assessment has shown that even though some windows are slightly under the BRE recommendations, good levels of sunlight will still be achieved within the proposed development. The shortfall in achieving the BRE recommendations is marginal in the majority of cases and can be attributed to the location of these windows in low levels and with a north orientation. Also, the location of balconies to living rooms, which have been designed in line with the Design Standards for New Apartments documents, will naturally reduce the amount of sunlight to those windows but will provide the occupant with an amenity space that will receive excellent levels of sunlight.

Impact to surrounding properties

The 25° line and APSH analysis have demonstrated that the proposed building has negligible daylight and sunlight impact to adjacent properties.

The shadow analysis confirms that the only adjacent property that would be impacted is the Green Acres House, however, the impact will be perceivable after 4 p.m. on March 21st. Therefore, it can be stated that no further overshadowing to any of the sensitive receptors will be perceived and they will still receive excellent levels of sunlight once the proposed development is constructed.

In conclusion, the steps taken by the project team during design have ensured that levels of daylight and sunlight within the development have been safeguarded and the impact to adjacent properties is negligible.

APPENDIX A

The following images illustrate in orange the windows that achieve the recommended values within the BRE Guidelines and in blue the windows that fall marginally under the recommended values for the annual period as outlined in the BRE Guidelines.

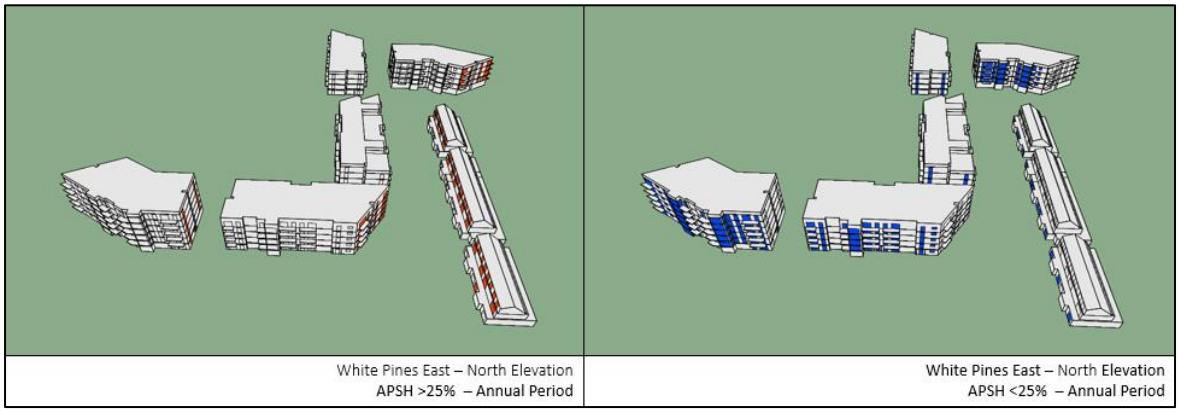


Figure A.1 – APSH Annual Period (BRE Recommended Benchmark) – North Elevation

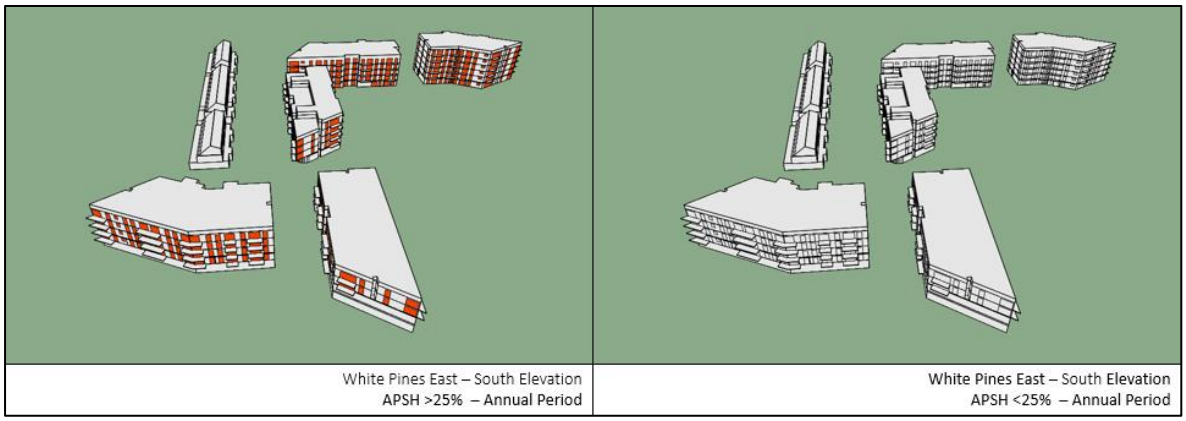


Figure A.2– APSH Annual Period (BRE Recommended Benchmark) – South Elevation

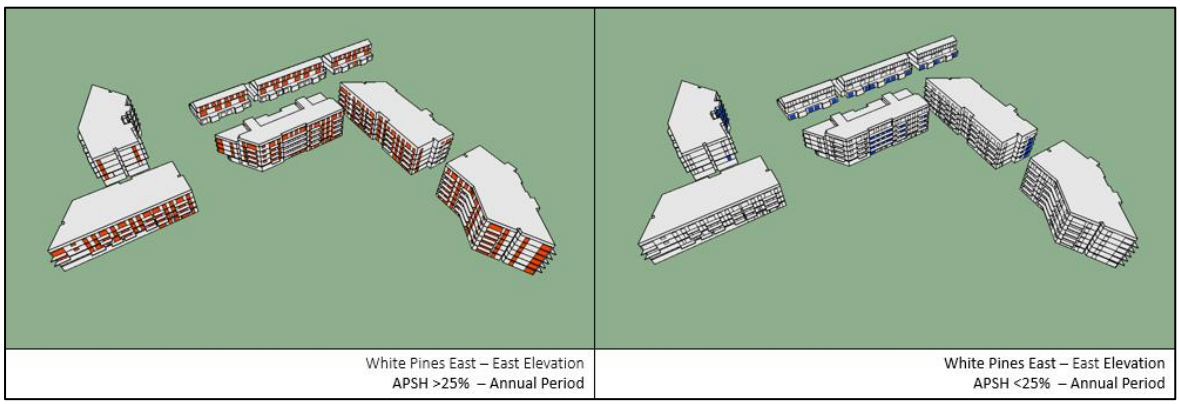


Figure A.3 – APSH Annual Period (BRE Recommended Benchmark) – East Elevation

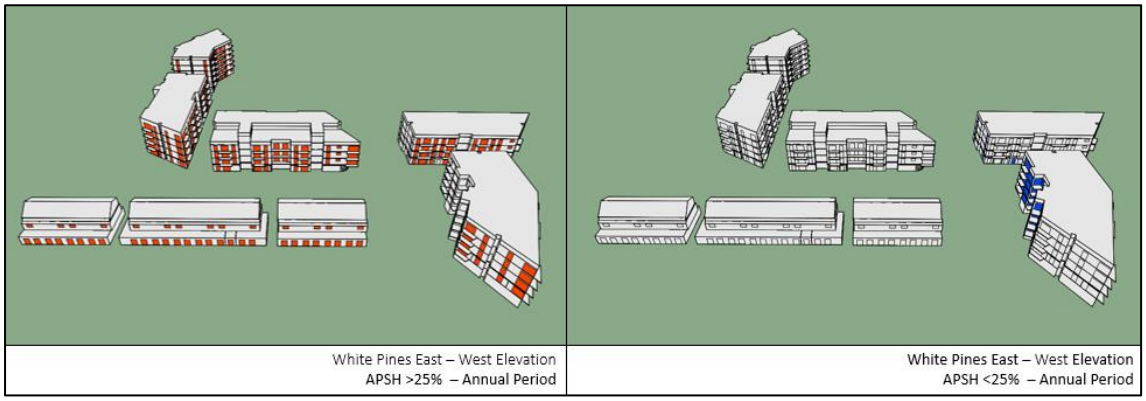


Figure A.4 – APSH Annual Period (BRE Recommended Benchmark) – West Elevation

In addition, the following images illustrate in orange the windows that achieve the relaxed benchmark of 15% and in blue the windows that are under 15% of APSH for the annual period. It is evident the majority of windows achieve the relaxed benchmark. The only windows falling under the 15% benchmark are those on the north elevation. This is normal due to their orientation. As outlined in the BRE Guidelines, north facing windows will only receive sunlight on a handful of occasions.

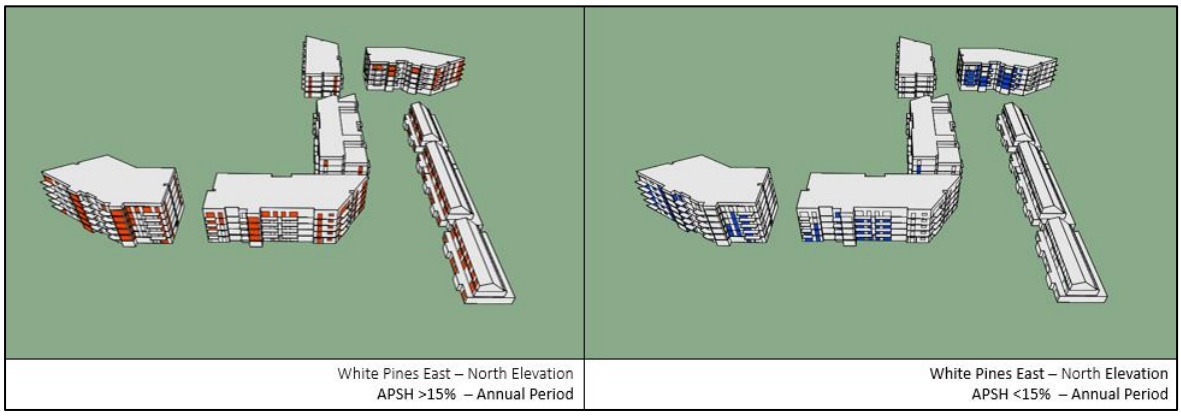


Figure A.5 – APSH Annual Period (Relaxed Benchmark) – North Elevation

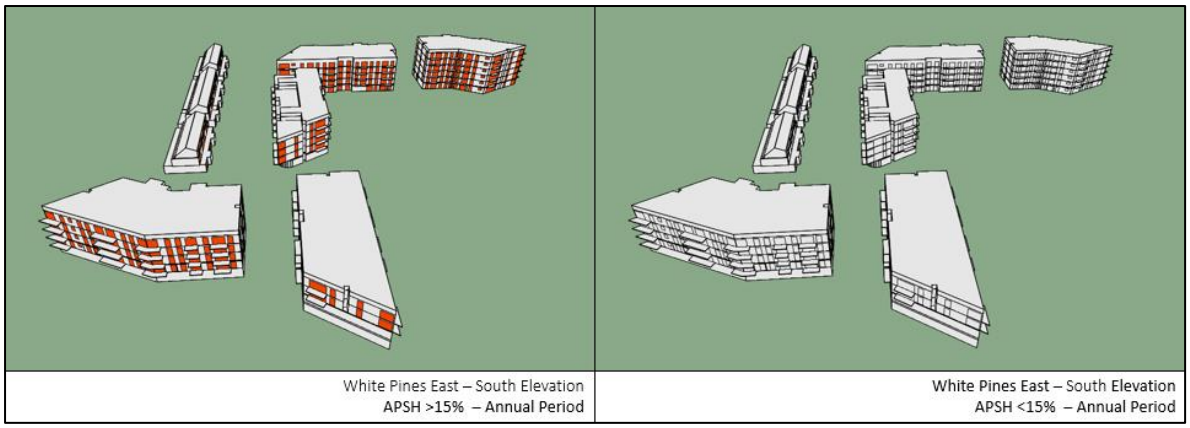
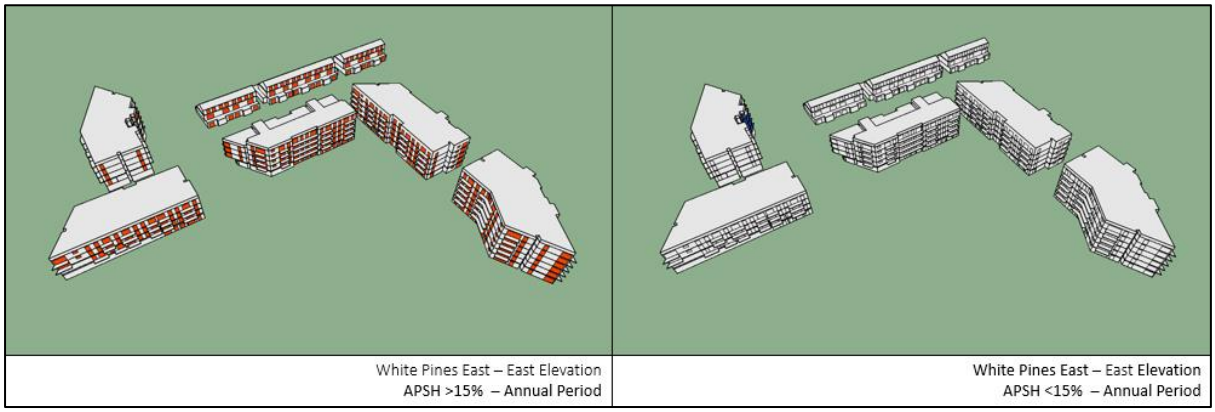


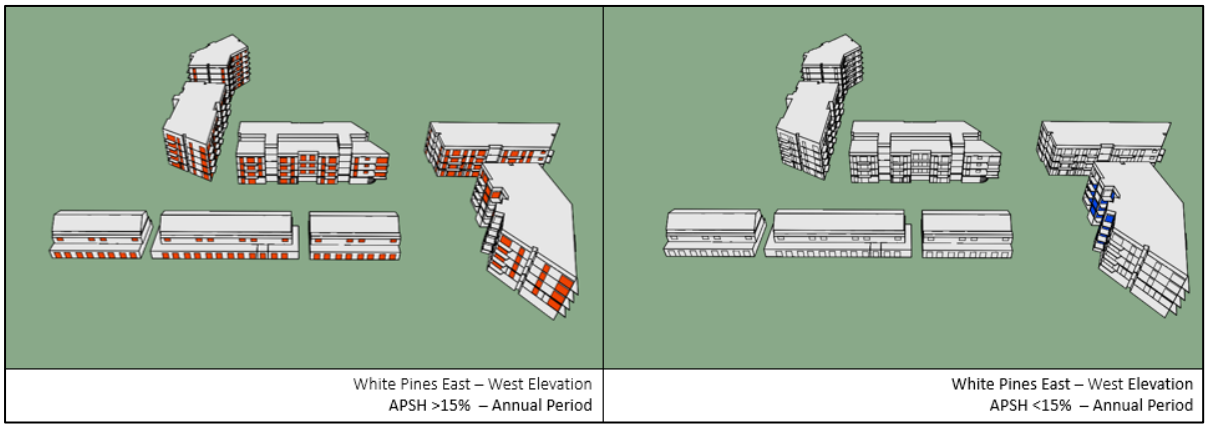
Figure A.6 – APSH Annual Period (Relaxed Benchmark) – South Elevation



White Pines East – East Elevation
APSH >15% – Annual Period

White Pines East – East Elevation
APSH <15% – Annual Period

Figure A.7 – APSH Annual Period (Relaxed Benchmark) – East Elevation



White Pines East – West Elevation
APSH >15% – Annual Period

White Pines East – West Elevation
APSH <15% – Annual Period

Figure A.8 – APSH Annual Period (Relaxed Benchmark) – West Elevation

APPENDIX B

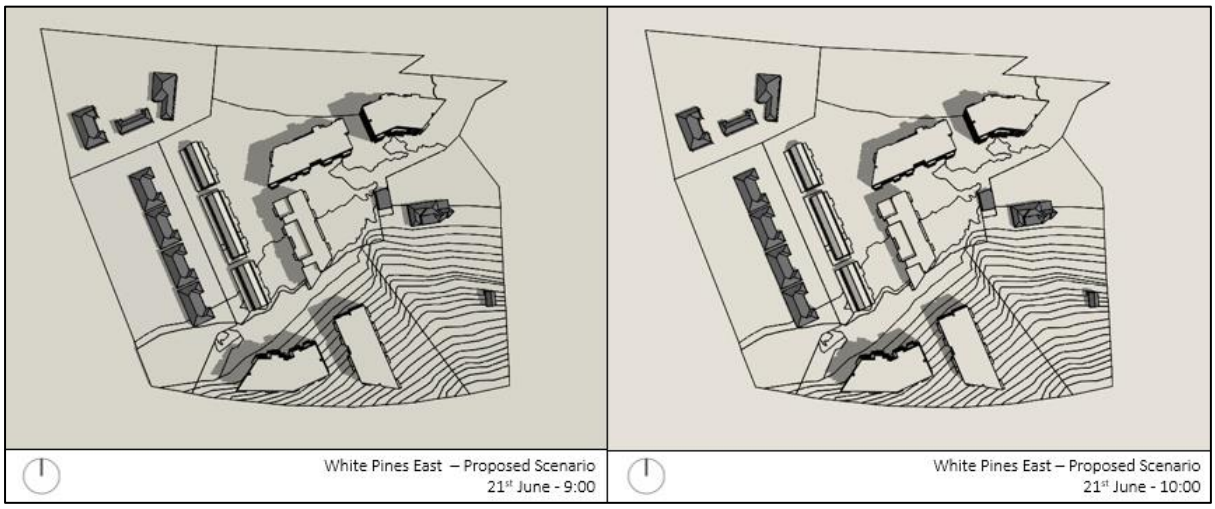


Figure B.1 – Overshadowing Image on June 21st at 9 a.m. and 10 a.m.

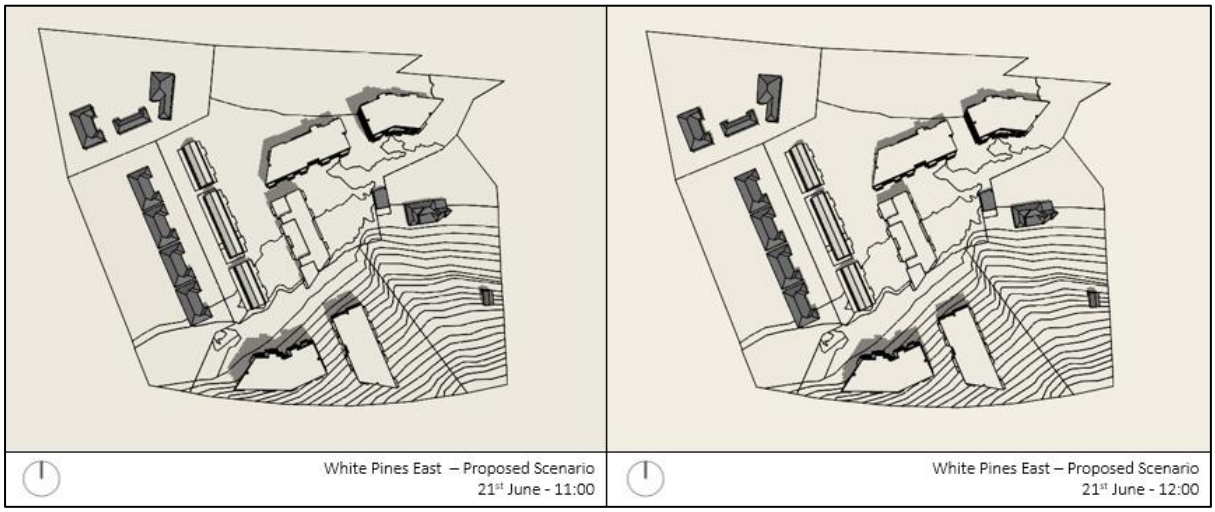


Figure B.2 – Overshadowing Image on June 21st at 11 a.m. and 12 p.m.

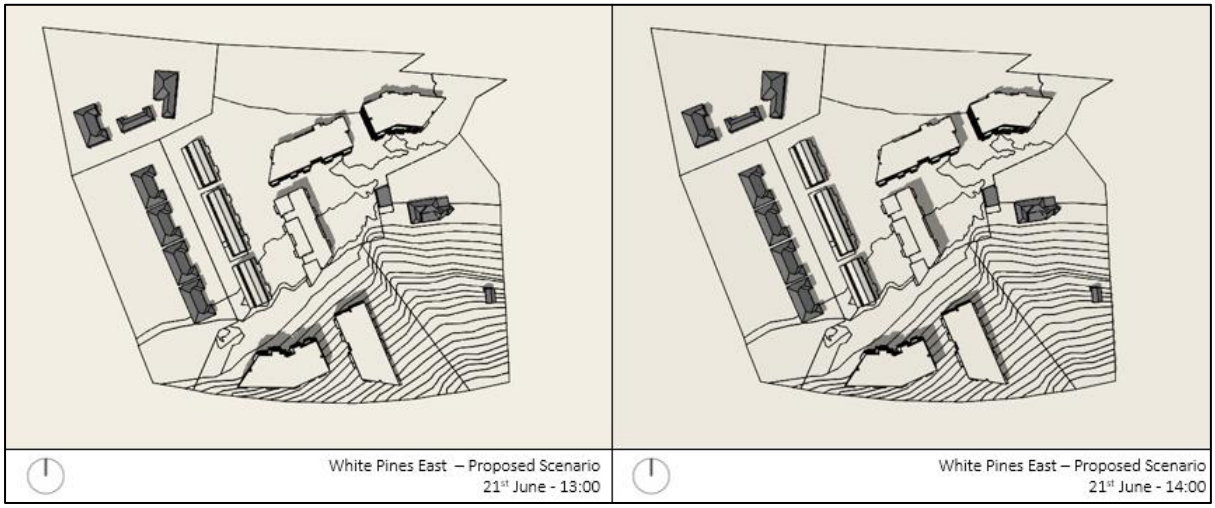


Figure B.3 – Overshadowing Image on June 21st at 1 p.m. and 2 p.m.

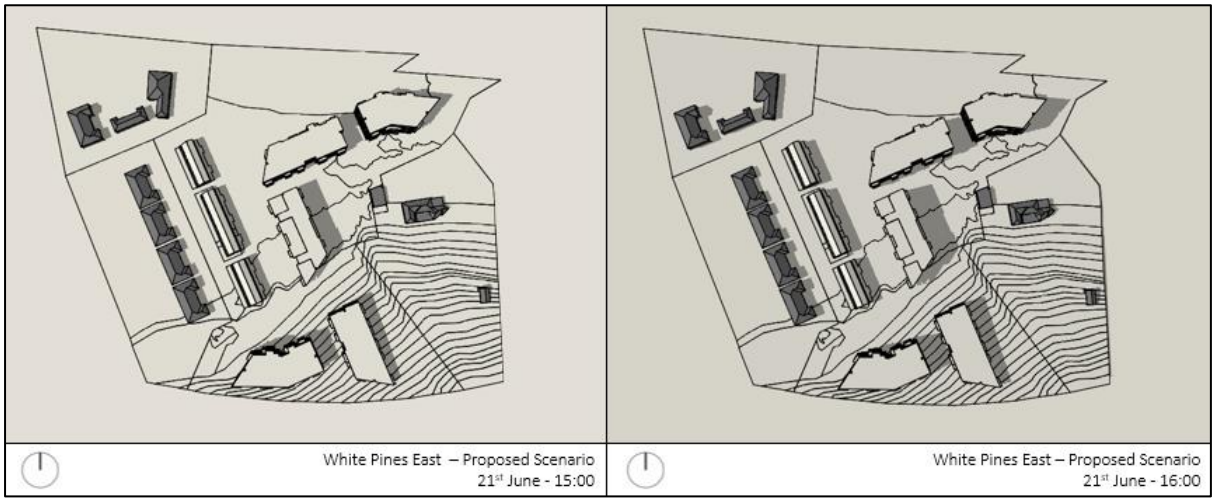


Figure B.4 – Overshadowing Image on June 21st at 3 p.m. and 4 p.m.

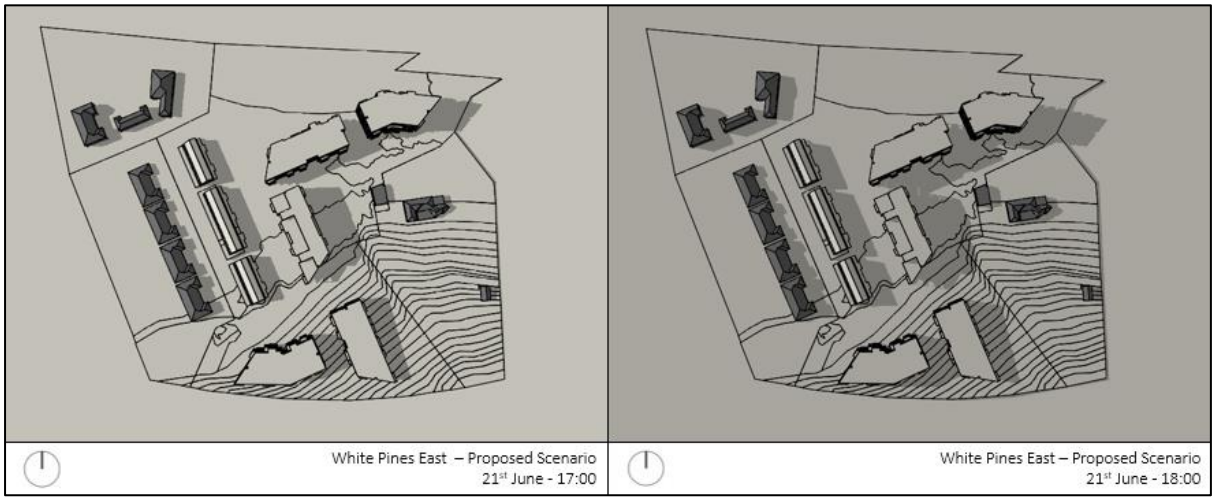


Figure B.5 – Overshadowing Image on June 21st at 5 p.m. and 6 p.m.

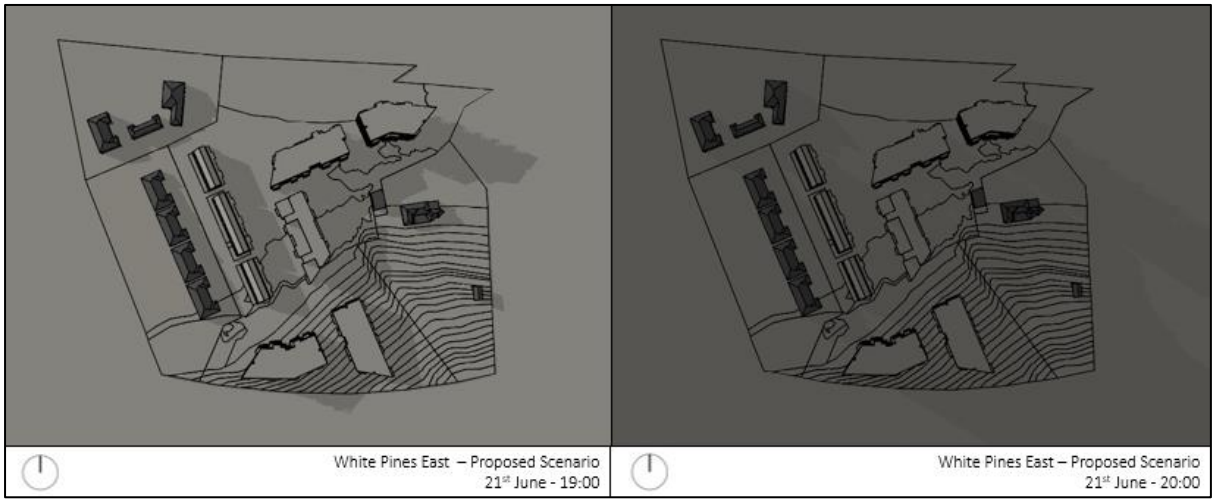


Figure B.6 – Overshadowing Image on June 21st at 7 p.m. and 8 p.m.

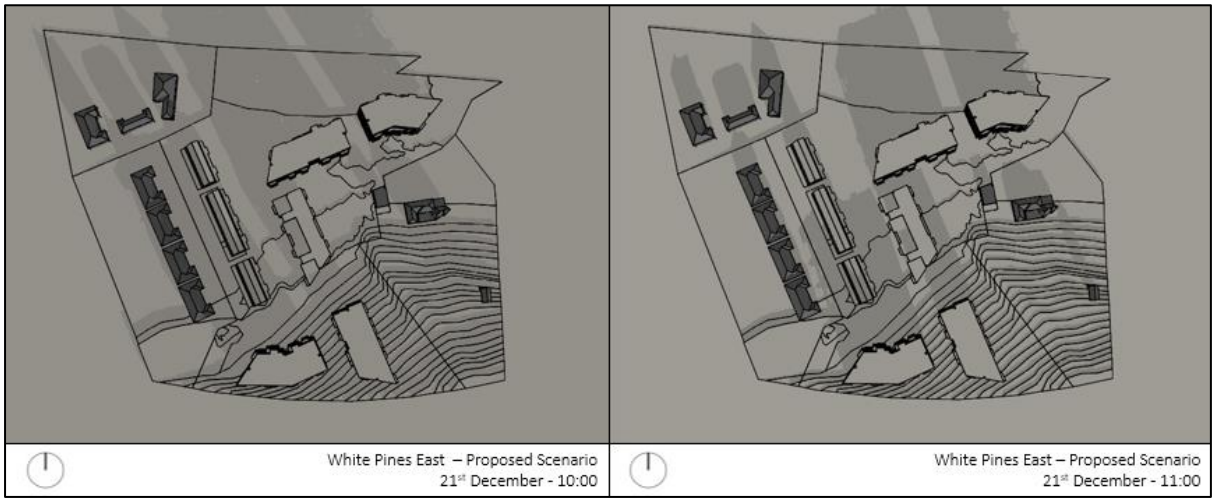


Figure B.7 – Overshadowing Image on December 21st at 10 a.m. and 11 a.m.

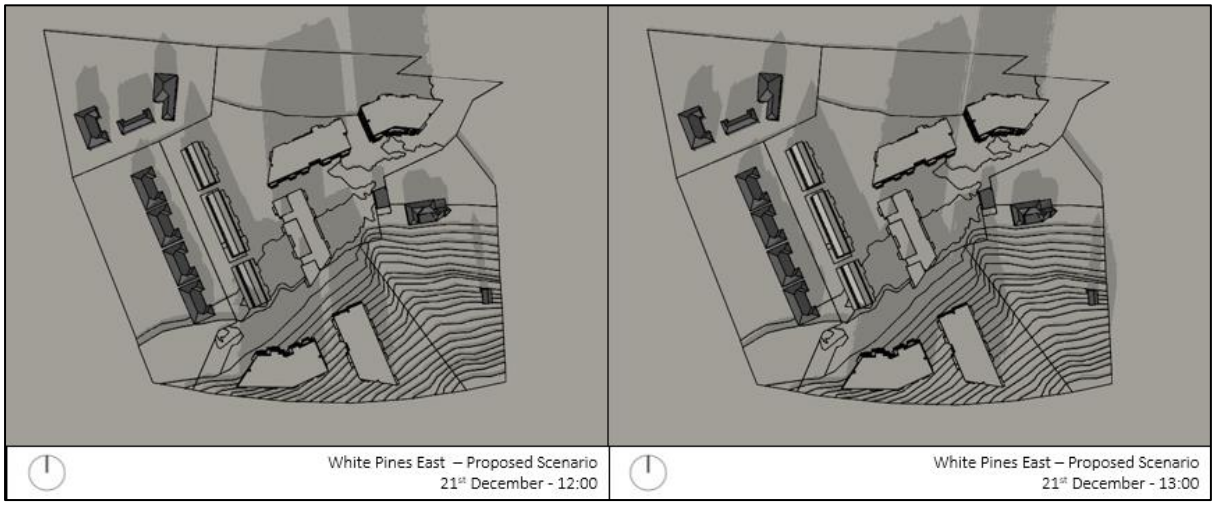


Figure B.8 – Overshadowing Image on December 21st at 12 p.m. and 1 p.m.

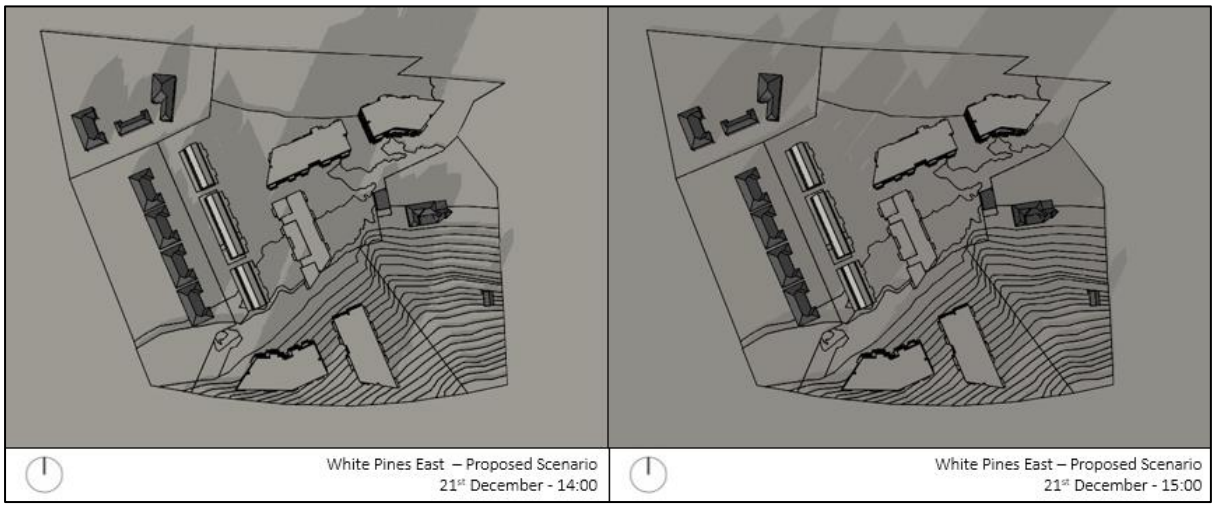


Figure B.9 – Overshadowing Image on December 21st at 2 p.m. and 3 p.m.

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