Hydrock

Himley Village

Daylight and Sunlight Assessment

For Countryside Properties

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Himley Village

Hydrock Consultants has been appointed by Countryside Properties to provide a daylight and sunlight assessment for the proposed residential development in Bicester

1. INTRODUCTION

1.1 Purpose of Report

This report provides the results of a daylight and sunlight assessment that has been undertaken for the proposed development including any adverse impact assessment on surrounding buildings.

The development and impact has been assessed using the criteria set out in the Building Research Establishment's (BRE) 'Site layout planning for daylight and sunlight - a guide to good practice' (BR 209) (Littlefair, 2011). Whilst the guide itself states that its guidelines are not mandatory, they are those predominately referenced for daylight and sunlight standards in the UK.

1.2 Project Description

The proposed Himley Village development consists of 500 dwellings and forms part of the wider Himley Village masterplan.

The wider masterplan will provide up to 1,500 homes, schools, and community facilities. The site itself is classified as an EcoTown and will seek to provide a zero-carbon ready development on the outskirts of Bicester.

The site falls within the remit of Cherwell District Council (CDC).

1.3 Policy Requirements

There are currently no specific policies relating to daylight and sunlight within the Cherwell local plan.

1.4 Study

Figure 1 shows the area of the development which has been assessed. This compromises of a total of 21 dwellings. This is believed to give an overview of what other areas of the site should expect.

Figure 1: Assessment Sample.

Methodology

This second section of the report discusses the relevant daylight and sunlight assessment methods for both the proposed new development, and impact assessment on existing buildings

2. BACKGROUND

Overshadowing occurs when buildings are in close proximity relative to their size. This results in reduced levels of daylight and sunlight in part, or all, of the affected buildings. Daylight refers to the level of diffuse natural light coming from the surrounding sky or reflected off adjacent surfaces, whereas sunlight refers to direct sunshine. A key difference between the two is that sunlight is highly dependent on orientation, whereas orientation has no effect on daylight.

The potential for daylight at a particular point may be quantified by assessing the proportion of the sky that is 'visible' from that point, i.e. not obscured by objects such as buildings. For points located on vertical surfaces such as walls, this proportion of visible sky is termed the 'vertical sky component' or VSC.

After the VSC, the no sky line can also be used to assess daylight performance. The no sky line is the point on the working plane at which no sky can be viewed. This is often expressed as the percentage of working plane from which the sky can be viewed such as 80% or 0.8.

However, if the details of the building are known, then daylight can be more accurately quantified by calculating the average daylight factor (ADF). This gives a more precise measure of daylight, the results of which can in effect over-ride the VSC results. The ADF is generally only used to calculate daylight in new buildings.

Further, climate-based modelling (CBM) techniques can be utilised to provide a more accurate assessment of predictive visual comfort within buildings. These techniques include spatial daylight autonomy (SDA), which considers percentage of time across a given year where appropriate illuminance levels are achieved, in addition to glare risk assessment.

These CBM techniques require more complex modelling and are more appropriate where the usage and task requirement of the space are known in more detail. For this reason, and the relative modern emergence of CBM modelling techniques, assessment at planning is rare.

Direct sunlight can be calculated by testing the 'annual probable sunlight hours' that a point receives. This is achieved by considering both the complete annual shading variation at the point, and the statistical sunshine averages for the location in question.

The average daylight factor, vertical sky component, no sky line and number of annual probable sunlight hours form the basis of the overshadowing assessment methodology used in the analysis. The average daylight factor is generally only relevant when the internal room layout and use is known.

To achieve objectivity in quantifying daylight and sunlight, the guidelines laid down in the widely accepted BRE guidebook 'Site layout planning for daylight and sunlight: a guide for good practice', 2nd edition, 2011 by P J Littlefair are adhered to.

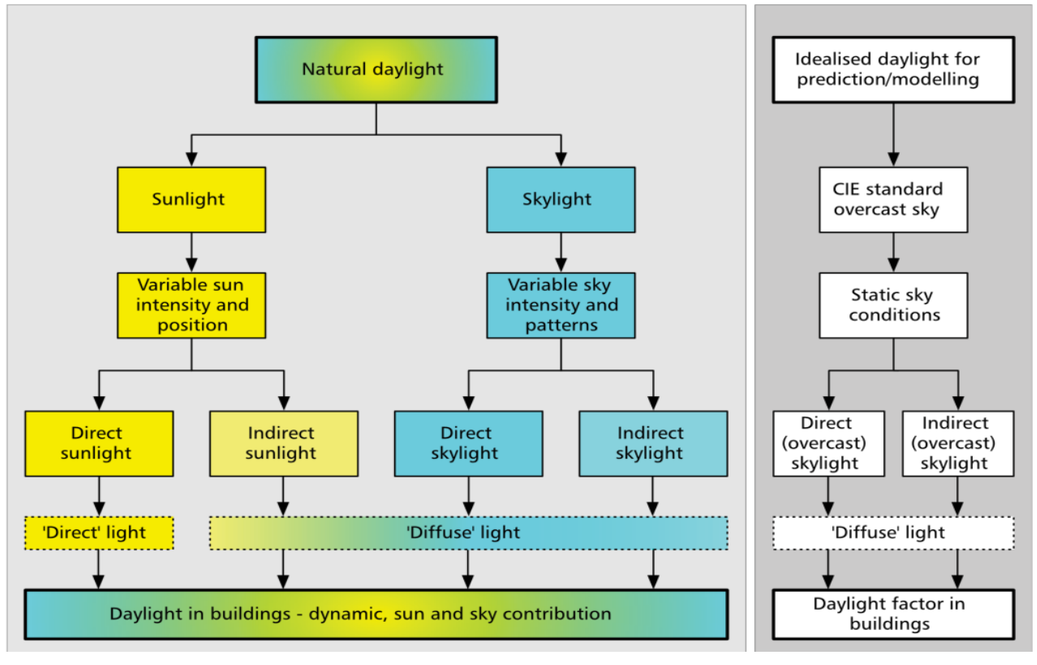

Figure 2 - Natural daylight categories

3. EXISTING BUILDINGS

3.1 Desktop Assessment

The BRE recommend that daylight is safeguarded to nearby buildings to avoid making adjoining properties appear gloomy or unattractive.

Following the recommendations contained in the BRE guide, an initial desktop assessment can be undertaken to confirm which existing dwellings require assessment. This assessment is shown in Figure 3.

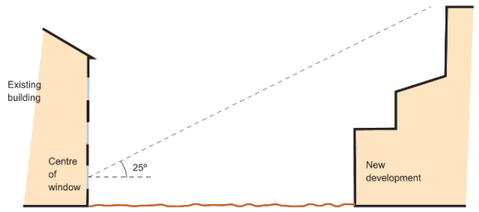

Figure 3: Existing buildings 25° check.

A section is drawn in plane perpendicular to each potential affected window wall of the existing building. The angle to the horizontal subtended by the new development at the level of the centre of the lowest window is drawn.

If this angle is less than 25° for the whole of the development, then it is unlikely to have a significant effect on the daylight enjoyed by the existing building. If for any part of the new development, this angle is greater than 25°, a more detailed check is needed to find the loss of skylight to the existing building. Both the total amount of skylight and its distribution within the building are important.

3.2 Detailed Assessment

If the proposed development is deemed to have a significant impact on existing buildings, or adjoining developments, a more detailed assessment of daylight is required. In this case, the existing buildings should be tested using the VSC criteria in the first instance, then the NSL, and finally ADF as the final option. It should be noted the NSL and ADF can only be used if internal room layouts are known.

3.2.1 Daylight Access

The BRE guidelines provide three different methods for assessing daylight for existing residential accommodation: The Vertical Sky Component (VSC) method, No Sky Line (NSL) and the Average Daylight Factor (ADF) method. In the first instances the VSC is tested, and if required the NSL and ADF can then be tested. The BRE states that for the effect of the proposed building to be minimal, the VSC including the new development needs to be greater than 27%. If the VSC is less than 27% this is acceptable so long as the VSC with the new development is not less than 0.8 of the VSC without the proposed development.

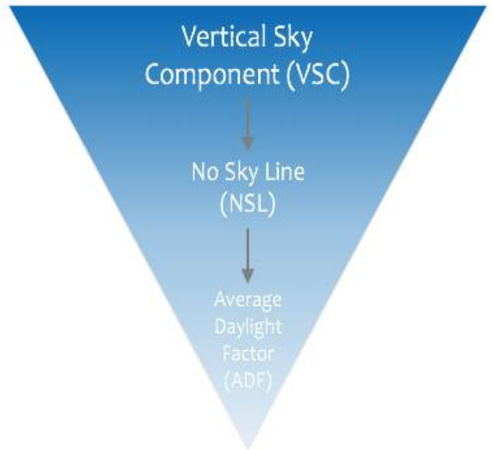

Figure 4 - Sequential testing for daylight

4. CALCULATING DAYLIGHT IN NEW DEVELOPMENT

4.1 Dwellings

The BRE guide cites the recommendations in BS 8206-02 Code of Practice for Daylighting as the minimum values for the ADF in each room of a dwelling. They are shown in **Error! Reference source not found.**.

Table 1: BRE recommended ADF (domestic).

Zone	Recommended Minimum ADF
Kitchen	2.0%
Living Room, dining room, study	1.5%
Bedroom	1.0%

4.2 Non-Domestic Buildings

There is a clear link between adequate daylight access and increased occupant visual comfort for working environments.

In addition, suitable provision of daylight will mean that the use of artificial lighting can be reduced and consequently energy consumption. CIBSE estimate (LG10) that if a daylight factor of 5% is achieved in the space then it is commonly found that electric lighting is not needed during the day time. An ADF of between 2% and 5% will result in reduced artificial lighting usage and daylight controls will be suitable as a means to achieve this end.

Climate Based Modelling techniques, such as useful illuminance and spatial daylight autonomy provide a more accurate assessment of the potential for design of daylight and glazing systems and these may be utilised at the next design stage. Initially, the VSC, NSL and ADF metrics will be utilised to approximate daylight performance of each space.

5. SUNLIGHT FOR BOTH EXISTING BUILDINGS AND THE NEW DEVELOPMENT

Window sunlight availability is assessed using the APSH and WPSH. For full details on how this is calculated see Appendix B. The sunlighting 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 21st September and 21st March; and
- Receives **less than 0.8 times** its former sunlight hours during either period; and
- Has a reduction in sunlight received over the whole year **greater than 4%** of annual probable sunlight hours.

For amenity spaces it is recommended that for it to appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive at least two hours of sunlight on 21st March. If as a result of new development an existing garden or amenity area does not meet the above, and the area which can receive two hours of sun on 21st March is less than 0.8 times its former value, then the loss of sunlight is likely to be noticeable.

6. SUMMARY

6.1 Existing Buildings

The existing buildings surrounding the development will be assessed using the criteria detailed in Table . As the site development is on a greenfield site, there is currently no existing buildings which are at risk of being negatively impacted for daylight and sunlight. Therefore, no assessment will be done on existing buildings.

6.2 New Development

The proposed development will be assessed against the criteria detailed in Table 3.

Table 2: BRE testing criteria for existing developments.

Criteria	Further Testing
25° rule	If angle from new development to existing is greater than 25 degrees additional testing of the VSC will be required.
43° rule	If angle from new development to proposed adjoining development is above 43 degrees, additional testing of VSC will be required.

Table 3: BRE daylight, sunlight and overshadowing criteria for new developments.

Parameter	Criteria	Acceptability Criteria	Source
Daylight	Angle to sky from horizontal (existing dwellings)	Maximum 25°	BRE (Littlefair)
	Vertical sky component (existing dwellings)	Greater than 27%	BRE (Littlefair)
	No sky line (new dwellings)	80% of rooms receive direct light from the sky	BRE/BS 806 and Code for Sustainable Homes
	Average daylight factor (new dwellings)	Greater than 1-2% depending on room use	BRE/BS 806 and Code for Sustainable Homes
Sunlight	Annual probable sunlight hours	Window receives at least 25%	BRE (Littlefair)
	Winter probable sunlight hours	Window receives at least 5%	BRE (Littlefair)
Overshadowing	Area of amenity space receiving 2 hours of sunlight no March 21st	50% of space	BRE (Littlefair)

Daylight and Sunlight Model

To carry out the daylight and sunlight assessment, a 3D computer model has been generated based on information provided by the Architect

7. COMPUTER SIMULATION DETAILS

7.1 Accuracy

It is important to note that with any modelling exercise there are assumptions and approximations made. While building performance modelling techniques include detailed hourly simulations, they are predictive methods only, and should not be relied upon as a measure of final building performance. The latter is subject to detailed design, installation, commissioning and operational profiles which are all subject to development. As far as possible, details of all assumptions and approximations used are supplied as part of the report. These should be read and considered carefully.

7.2 Software

The calculations have been carried out using IES Virtual Environment 2019, an accredited Building Performance Modelling (BPM) tool in accordance with CIBSE Guide AM11 (CIBSE, 2015).

IES uses a Radiance based calculation simulation for daylight. This predicts the transport of light in a virtual 3D scene using physically based models for the emission, transmission, reflection and scattering of light. The output, therefore, can inform on how the building might perform; for example, in terms of visual impression and predicted illuminance levels for particular sky conditions. Radiance is capable of producing highly accurate predictions, within 10% of measured illuminance values.

In practical terms however, there are a number of factors that will affect the accuracy and reliability of modelling predictions:

- Model geometry;
- Physical properties;
- Luminous environment;
- Sensor grid/points;
- Simulation parameters; and
- Data output.

7.3 Geometry

Three-dimensional numerical models suitable for daylight/sunlight analysis were constructed to represent the current site conditions and the proposed development. The models included a representation of buildings adjacent to the development site up to a distance judged to have an influence on the availability of natural light. In addition:

All existing glazing levels have been measured from architect's drawings issued on 11th January 2021 and existing asset information.

7.4 Weather

In accordance with BRE guidelines, the ADF has been assessed based on a uniform overcast sky in line with BS 8206 and CIE guidelines.

Solar calculations, for the purpose of sunlight availability, have been carried out based on the most suitable local weather file at the development.

7.5 Glazing and Room Layout

Glazing properties have been assigned in accordance with BS 8206:

- Light transmittance (T) = 0.6 (typical new double-glazed casement);
- Internal Reflectance (R) = 0.80 (pale);
- Room grid margin – 0.5m (in line with CIBSE AM11). This is to avoid artificially high ADF calculation due to high point daylight factor near to windows.

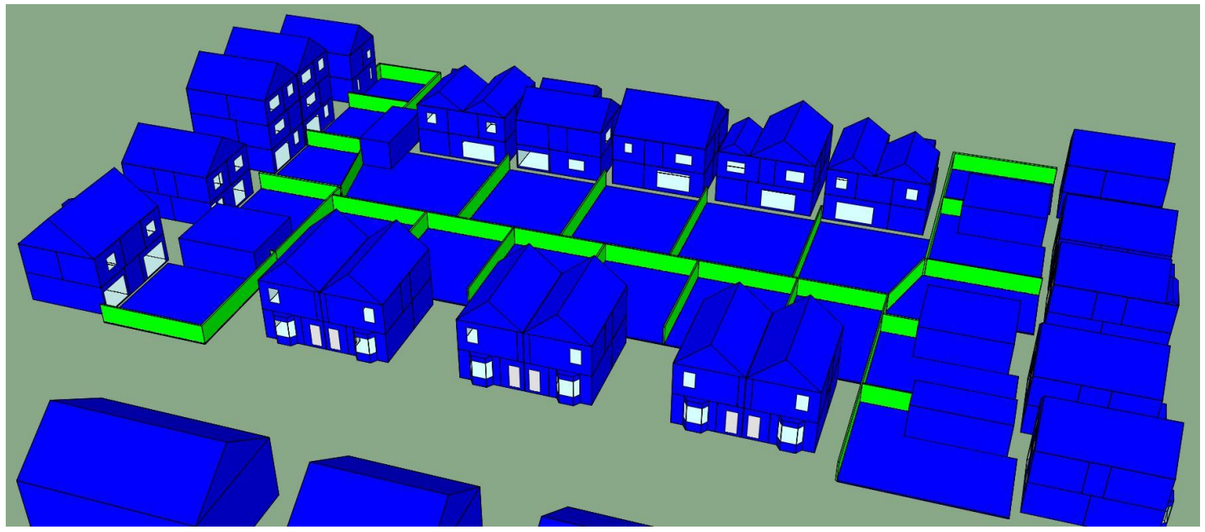

Figure 5 - Proposed development from the South

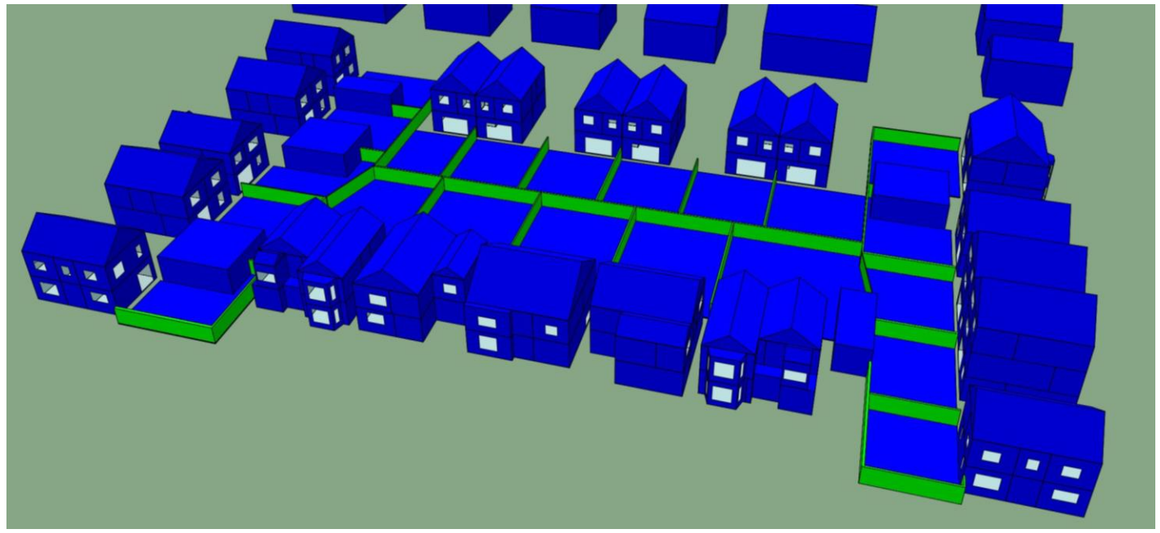

Figure 6 - Proposed development from the North

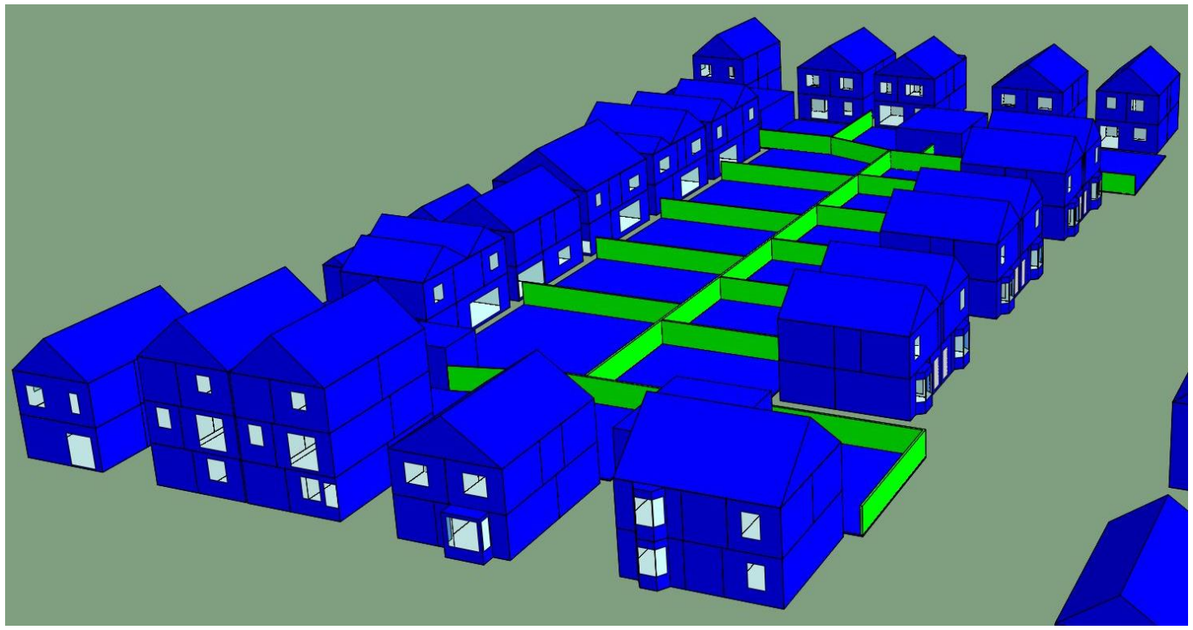

Figure 7 - Proposed development from the West

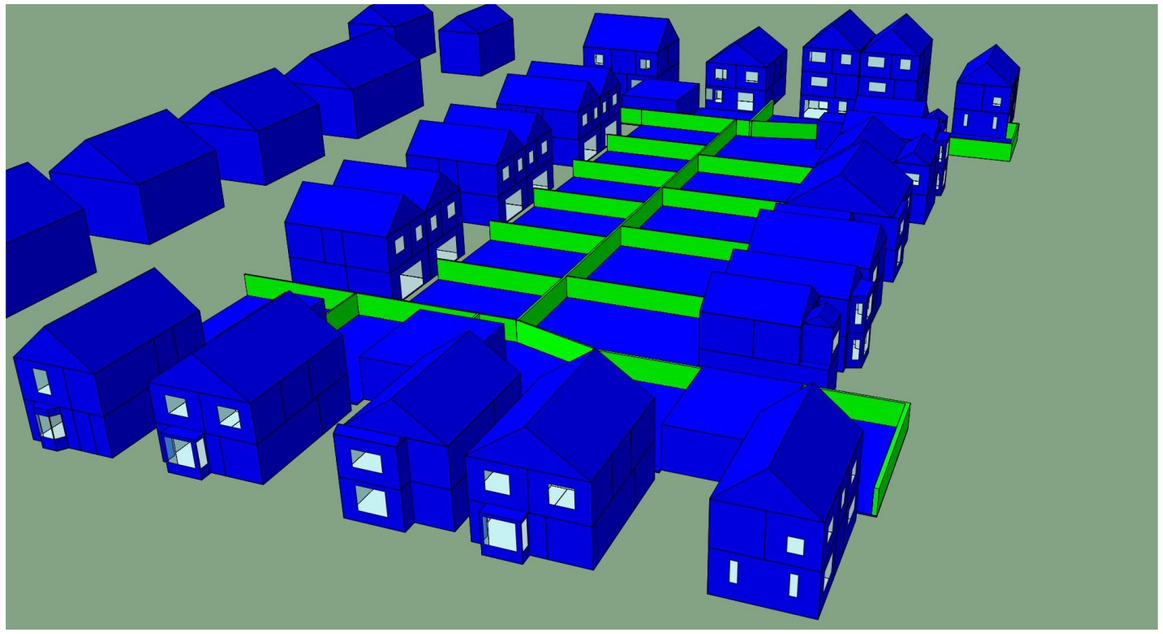

Figure 8 - Proposed development from the East

Proposed Development Daylight Analysis

This section of the report will provide an analysis of the proposed development daylight performance. This will be quantified in terms of vertical sky component (VSC), no sky line (NSL) and average daylight factor (ADF). To carry out this assessment a representative sample of units have been tested to provide an overview of the building's daylight performance

8. VERTICAL SKY COMPONENT

Majority of all kitchen, living spaces and bedroom spaces assessed within the proposed development are currently meeting the recommended VSC level. Of the spaces which are failing, most of them are close to meeting the BRE 209 requirements.

Table 4 - VSC results for assessed units

	VSC Pass	VSC Fail	Pass Rate
Kitchen	15	0	100%
Bedrooms	71	3	96%
Living room	20	3	87%
Study	2	0	100%

9. NO SKY LINE

All of units assessed are achieving the NSL criteria with 80% of the room receiving direct light from the sky.

Table 5 - NSL results for assessed units

	NSL Pass	NSL Fail	Pass Rate
Kitchen	15	0	100%
Bedrooms	74	0	100%
Living room	23	0	100%
Study	2	0	100%

10. AVERAGE DAYLIGHT FACTOR

The average daylight factor for each modelled unit has been calculated and assessed against the BRE criteria as follows:

- Kitchens - 2%
- Living rooms - 1.5%
- Bedrooms - 1%

All rooms modelled are currently achieving the BRE recommended ADF.

Table 6 - ADF results for assessed units

	ADF Pass	ADF Fail	Pass Rate
Kitchen	15	0	100%
Bedrooms	74	0	100%
Living room	23	0	100%
Study	2	0	100%

11. OBSERVATIONS

The overall daylight performance of the proposed development can be deemed to be acceptable.

All of the dwellings assessed are meeting the recommended ADF, NSL and VSC for kitchens and living spaces.

Proposed Development - Sunlight Analysis

This section of the report provides an analysis of the development performance in terms of access to sunlight. This will be quantified in terms of amenity sunlight hours and window sunlight. As with the daylight assessment, a representative sample of dwellings have been assessed

12. AMENITY SUNLIGHT

All communal amenity areas provide as part of the development have been assessed for compliance with the BRE guidelines. This states that amenity spaces should receive at least 2 hours of sunlight on March 21st in 50% of the space.

Each house has a garden which will be assessed under the amenity space criteria.

12.1 Amenity Sunlight Results

The results of the amenity sunlight analysis for the gardens on 21st March are shown in Figure 9.

The coloured areas in the graph represent 1m grid squares that are receiving more than 2 hours of sunlight on the BRE test day. 71% of the gardens are meeting the requirements set out by BRE, the results which are failing are only failing by a small amount.

Figure 9 shows the worst performing garden. This particular garden is failing due to the location of the garage. However, the north side of the garden is still receiving some sunlight hours.

To improve the failing results. It is recommended to reduce the height/location of the garages or extend the length of the north facing gardens. However, this may not be feasible at this stage. For a full breakdown of the results see Appendix F.

Table 7 - Amenity Sunlight Results

	Amenity Sunlight Pass	Amenity Sunlight Fail	Pass Rate
Garden	15	6	71%

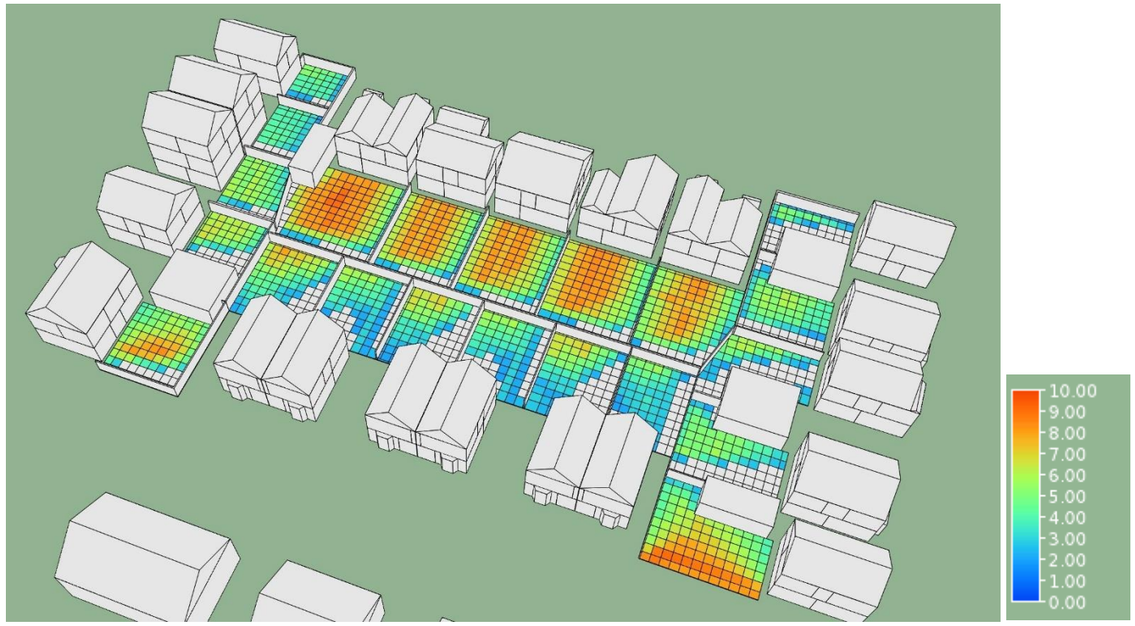

Figure 10 - Amenity sunlight hours on 21st March

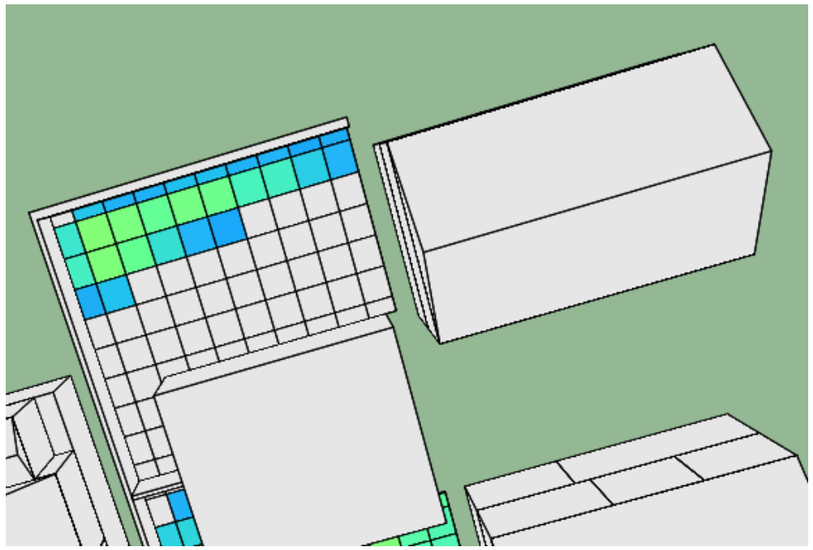

Figure 9 - Worst case garden amenity space

13. WINDOW SUNLIGHT

13.1 Annual Probable Sunlight Hours

North facing units have been minimised as far as practicable and all dwellings have a window to a main living space that is situated within 90 degrees to the south. The BRE recommend that all dwellings have at least one window to a main living space that achieves at least 25% of annual probable sunlight hours (APSH).

All dwellings assessed have a main window to a living space that is receiving the recommended 25% APSH.

Table 8 - APSH Results

	APSH Pass	APSH Fail	Pass Rate
Dwellings	21	0	100%

13.2 Winter Probable Sunlight Hours

In addition to APSH, the BRE also recommend that developments receive at least 5% of winter probable sunlight hours (WPSH).

All dwellings on site have a window within a main living space that is receiving at least 5% of winter probable sunlight hours.

Table 9 - WPSH Results

	WPSH Pass	WPSH Fail	Pass Rate
Dwellings	21	0	100%

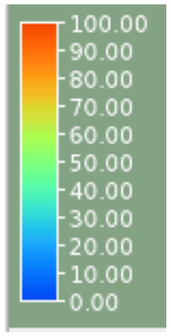

Figure 12 - Key to show percentage of APSH

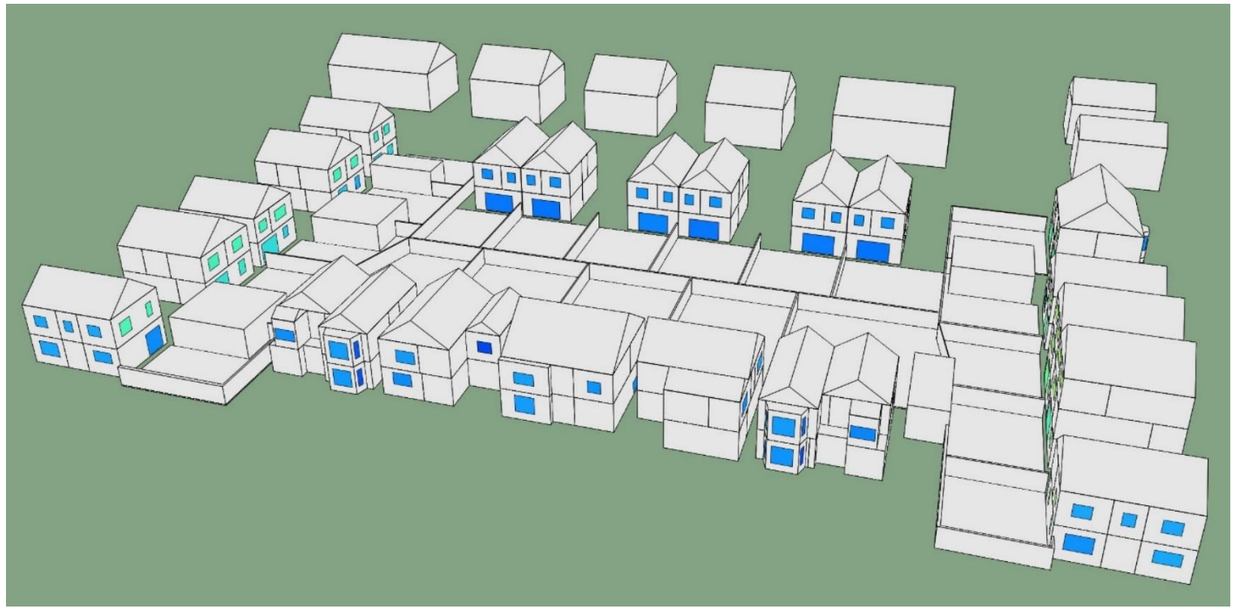

Figure 11 – Percentage of APSH from the North

Figure 13 – Percentage of APSH from the South

Conclusions

Summary

The design team have carried out an assessment of site layout planning for daylight and sunlight. The team have sought to maximise opportunities for daylight access and sunlight availability in accordance with BRE good practice guidance whilst also taking into account other site requirements and objectives.

The development is generally performing well in terms of daylight and sunlight with the majority of spaces meeting the recommended daylight or sunlight metrics. No specific guidelines or targets are provided in relation to target or thresholds for compliance and while the BRE guidelines have been utilised, these are informative only and should be read in conjunction with other site design requirements.

A summary of the overall performance of the assessed dwellings is shown below.

*Table 10 - Summary of daylight and sunlight performance (*Note that daylight and sunlight modelling calculations are based on a representative sample of dwellings from across the development). APSH and WPSH values are excluding North facing units.*

Daylight Variable	Percentage of Assessed Dwellings Achieving Guidelines
ADF	100%
NSL	100%
VSC	81%

Sunlight Variable	Percentage of Assessed Areas Achieving Guidelines
Amenity Space	71%
APSH	100%
WPSH	100%

Daylight

The daylight performance of a representative sample of dwellings has been assessed across the site. All of the kitchens, living rooms and bedrooms contained within these dwellings are passing the BRE guidelines for daylight.

Based on the above the daylight performance is deemed to be acceptable, particularly in relation to other site design requirements, objectives and constraints such as:

- Proximity to proposed adjoining development and existing buildings;
- Internal layouts to reduce number of north facing living spaces;
- Development density requirements limiting access to daylight in certain areas; and
- Balanced fabric design criteria to maximise daylight whilst limited winter heat loss and risk of summertime overheating.

Sunlight

Overshadowing of amenity space has been considered and tested in detail. Although a 29% are considered to be failing, the majority of these are very close to meeting the requirements. To improve upon the failing results, it is recommended that the garages connected to these gardens are moved to the north side of the garden.

Window sunlight has also been assessed and all assessed dwellings are meeting the required APSH and WPSH levels.

Appendix A: Vertical Sky Component

Vertical Sky Component

The vertical sky component (VSC) is defined in BR 209 (Littlefair, 2011) as follows:

'Ratio of that part of illuminance, at a given point on a given vertical plane, that is received directly from a CIE Standard Overcast Sky, to illuminance on a horizontal plane due to an unobstructed hemisphere of this sky '

(CIE = Commission internationale de l'Eclairage or the International Commission on Illumination).

Sky Distributions

On a sunny day, clearly most of the available light comes from the direction of the sun and the area immediately around it. On a perfectly overcast day the majority of light comes from the zenith of the sky straight above you, which can be up to three times more than at the horizon. Under some conditions, however, the distribution is much more uniform.

To describe this variation the CIE have developed a number of standard sky distributions based on very specific mathematical formula, examples of which are shown immediately below.

As stated in the quote above, the VSC is defined for Overcast Sky Conditions, i.e. the image in the centre, for which the zenith is brighter than the horizon.

Calculating the VSC

The VSC for a point on a wall may be determined by considering all the objects which block a clear 'sight' of unobstructed sky. The wall itself will block out half of the sky hemisphere, so it would seem that the maximum theoretical value for a point on an isolated wall would be 50%. In fact, due to the assumed CIE Overcast Sky Condition, the maximum value attainable is 40% (Littlefair, 2011).

The VSC calculation may be achieved using pen-and-paper methods such as Waldram diagrams as suggested in BR 209 (Littlefair, 2011). However, the computer programme used here is more accurate, reliable and efficient. It performs the calculation by 'spraying' very many imaginary rays from the point and so determines the VSC from the percentage of these which reach the sky dome (with the assumed sky distribution taken into account).

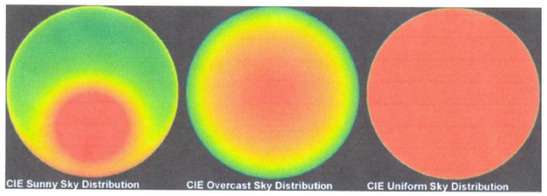

Figure 12 - CIE sky distributions.

Appendix B: Annual Probable Sunlight Hours

To calculate the probable sunlight hours that each reference point receives, the first stage is to quantify the number of hours per day for which each point can potentially receive unobstructed sunlight. This task involves considering each of the 365 days per year in turn, and determining the number of hours between sunrise and sunset on each day that each reference point is in sunlight. One way of performing this task would be to visually inspect shadow cast images for each hour of each day of the year.

In practice, this process would be far too labour-intensive to be contemplated, and even if it were attempted, it would inevitably lead to the probability of human error. However, the computer programme used for the analysis in this report carries out this task automatically and thereby completely eliminates the risk of human error.

The steps listed below are then followed to determine the number of annual probable sunlight hours for each reference point:

- For each month, sum the daily number of hours of potential unobstructed sunlight.
- For each month, sum the daily number of hours between sunrise and sunset.
- Express the monthly sum of potential unobstructed sunlight from 1 as a fraction of total potential hours, by dividing by the answer to 2.
- For each month, multiply the above fraction by the hourly sunshine averages for the location as determined by weather statistics for the area (from MET office data). This gives the number of monthly probable sunlight hours.
- Calculate the number of annual probable sunlight hours by summing all the monthly probable sunlight hours from 2 above. This may be expressed as a percentage by dividing by the total hourly sunshine averages for the location. This percentage may then be compared with the 25% criterion suggested in BR 209 (Littlefair, 2011).
- Calculate the number of probable sunlight hours during the winter months by summing all the monthly probable sunlight hours between October and March (inclusive) from 2 above. This may be expressed as a percentage by dividing by the total hourly sunshine averages for the location. This percentage may then be compared with the 5% criterion suggested in BR 209 (Littlefair, 2011).

Appendix C: ADF and Sky View Results

Room Name	Room Type	Sky View	Pass / Fail	ADF	Pass / Fail
NT Living 0001 2	Living Room, Dinning Room, Study	100%	Pass	5.39%	Pass
NT Kitchen 0001 2	Kitchen	100%	Pass	5.97%	Pass
NT Bed 0102 2	Bedroom	100%	Pass	2.87%	Pass
NT Living 0101 2	Living Room, Dinning Room, Study	100%	Pass	2.48%	Pass
NT Study 0101 2	Living Room, Dinning Room, Study	100%	Pass	4.79%	Pass
NT Bed 0203 2	Bedroom	100%	Pass	2.59%	Pass
NT Bed 0201 2	Bedroom	100%	Pass	1.30%	Pass
NT Bed 0204 2	Bedroom	100%	Pass	2.63%	Pass
NT Living 0001 1	Living Room, Dinning Room, Study	100%	Pass	5.39%	Pass
NT Kitchen 0001 1	Kitchen	100%	Pass	6.71%	Pass
NT Bed 0102 1	Bedroom	100%	Pass	2.87%	Pass
NT Living 0101 1	Living Room, Dinning Room, Study	100%	Pass	2.32%	Pass
NT Study 0101 1	Living Room, Dinning Room, Study	100%	Pass	4.79%	Pass
NT Bed 0203 1	Bedroom	100%	Pass	2.59%	Pass
NT Bed 0201 1	Bedroom	100%	Pass	1.30%	Pass
NT Bed 0204 1	Bedroom	100%	Pass	2.63%	Pass
SF Kitchen 0001	Kitchen	100%	Pass	3.72%	Pass
SF Living 0001	Living Room, Dinning Room, Study	100%	Pass	3.75%	Pass
SF Bed 0101	Bedroom	100%	Pass	3.03%	Pass
SF Bed 0104	Bedroom	100%	Pass	3.00%	Pass
SF Bed 0102	Bedroom	100%	Pass	1.54%	Pass
SF Bed 0103	Bedroom	100%	Pass	2.48%	Pass
NW Bed 0102 6	Bedroom	100%	Pass	1.90%	Pass
NW Bed 0103 6	Bedroom	100%	Pass	2.66%	Pass
NW Living 0001 6	Living Room, Dinning Room, Study	100%	Pass	3.30%	Pass
NW Bed 0101 6	Bedroom	100%	Pass	1.95%	Pass
NW Bed 0102 5	Bedroom	100%	Pass	1.90%	Pass
NW Bed 0103 5	Bedroom	100%	Pass	2.64%	Pass
NW Living 0001 5	Living Room, Dinning Room, Study	100%	Pass	3.19%	Pass
NW Bed 0101 5	Bedroom	100%	Pass	1.95%	Pass
NW Bed 0102 4	Bedroom	100%	Pass	1.90%	Pass
NW Bed 0103 4	Bedroom	100%	Pass	2.66%	Pass
NW Living 0001 4	Living Room, Dinning Room, Study	100%	Pass	3.30%	Pass
NW Bed 0101 4	Bedroom	100%	Pass	1.95%	Pass
NW Bed 0102 3	Bedroom	100%	Pass	1.90%	Pass
NW Bed 0103 3	Bedroom	100%	Pass	2.64%	Pass
NW Living 0001 3	Living Room, Dinning Room, Study	100%	Pass	3.19%	Pass
NW Bed 0101 3	Bedroom	100%	Pass	1.95%	Pass
NW Bed 0102 2	Bedroom	100%	Pass	1.90%	Pass
NW Bed 0103 2	Bedroom	100%	Pass	2.66%	Pass
NW Living 0001 2	Living Room, Dinning Room, Study	100%	Pass	3.30%	Pass
NW Bed 0101 2	Bedroom	100%	Pass	1.95%	Pass
NW Bed 0102 1	Bedroom	100%	Pass	1.90%	Pass
NW Bed 0103 1	Bedroom	100%	Pass	2.64%	Pass
NW Living 0001 1	Living Room, Dinning Room, Study	100%	Pass	3.19%	Pass
NW Bed 0101 1	Bedroom	100%	Pass	1.95%	Pass

Room Name	Room Type	Sky View	Pass / Fail	ADF	Pass / Fail
ASH Kitchen 0001	Kitchen	100%	Pass	3.13%	Pass
ASH Bed 0101	Bedroom	100%	Pass	2.12%	Pass
ASH Bed 0102	Bedroom	100%	Pass	2.55%	Pass
ASH BedOffice 0103	Living Room, Dinning Room, Study	100%	Pass	3.25%	Pass
ASH Living 0001	Living Room, Dinning Room, Study	100%	Pass	3.02%	Pass
AL Kitchen 0001 3	Kitchen	100%	Pass	2.73%	Pass
AL Living 0001 3	Living Room, Dinning Room, Study	100%	Pass	2.93%	Pass
AL Bed 0102 3	Bedroom	100%	Pass	2.53%	Pass
AL Bed 0103 3	Bedroom	100%	Pass	2.52%	Pass
AL Bed 0101 3	Bedroom	100%	Pass	3.35%	Pass
AL Bed 0104 3	Bedroom	100%	Pass	3.07%	Pass
BL Living 0001	Living Room, Dinning Room, Study	100%	Pass	2.33%	Pass
BL Bed 0102	Bedroom	100%	Pass	2.39%	Pass
BL Bed 0103	Bedroom	100%	Pass	2.42%	Pass
BL Bed 0101	Bedroom	100%	Pass	2.45%	Pass
BL Kitchen 0001	Kitchen	100%	Pass	2.90%	Pass
AL Kitchen 0001 2	Kitchen	100%	Pass	2.73%	Pass
AL Living 0001 2	Living Room, Dinning Room, Study	100%	Pass	2.93%	Pass
AL Bed 0102 2	Bedroom	100%	Pass	2.53%	Pass
AL Bed 0103 2	Bedroom	100%	Pass	2.52%	Pass
AL Bed 0101 2	Bedroom	100%	Pass	3.35%	Pass
AL Bed 0104 2	Bedroom	100%	Pass	3.07%	Pass
GT Living 0001 2	Living Room, Dinning Room, Study	100%	Pass	3.68%	Pass
GT Bed 0102 2	Bedroom	100%	Pass	4.98%	Pass
GT Bed 0101 2	Bedroom	100%	Pass	2.90%	Pass
GT Bed 0103 2	Bedroom	100%	Pass	3.71%	Pass
GT Kitchen 0001 2	Kitchen	100%	Pass	3.92%	Pass
OH Bed 0102 2	Bedroom	97%	Pass	1.07%	Pass
OH Bed 0103 2	Bedroom	100%	Pass	1.80%	Pass
OH Bed 0101 2	Bedroom	100%	Pass	3.53%	Pass
OH Bed 0104 2	Bedroom	100%	Pass	2.22%	Pass
OH Living 0001 2	Bedroom	100%	Pass	2.30%	Pass
OH Kitchen 0001 2	Kitchen	100%	Pass	3.12%	Pass
BH Living 0001 2	Living Room, Dinning Room, Study	100%	Pass	1.70%	Pass
BH Kitchen 0001 2	Kitchen	100%	Pass	3.44%	Pass
BH Bed 0101 2	Bedroom	96%	Pass	2.37%	Pass
BH Bed 0102 2	Bedroom	100%	Pass	2.30%	Pass
BH Bed 0103 2	Bedroom	100%	Pass	2.29%	Pass
BH Bed 0104 2	Bedroom	100%	Pass	3.08%	Pass
WR Living 0001	Living Room, Dinning Room, Study	100%	Pass	2.40%	Pass
WR Kitchen 0001	Kitchen	100%	Pass	4.22%	Pass
WR Bed 0102	Bedroom	100%	Pass	1.76%	Pass
WR Bed 0101	Bedroom	100%	Pass	1.69%	Pass
WR Bed 0103	Bedroom	100%	Pass	1.41%	Pass
WR Bed 0104	Bedroom	100%	Pass	1.31%	Pass

Room Name	Room Type	Sky View	Pass / Fail	ADF	Pass / Fail
BH Living 0001 1	Living Room, Dinning Room, Study	100%	Pass	1.85%	Pass
BH Kitchen 0001 1	Kitchen	100%	Pass	2.54%	Pass
BH Bed 0101 1	Bedroom	100%	Pass	2.28%	Pass
BH Bed 0102 1	Bedroom	100%	Pass	2.31%	Pass
BH Bed 0103 1	Bedroom	100%	Pass	2.31%	Pass
BH Bed 0104 1	Bedroom	100%	Pass	3.08%	Pass
OH Bed 0102 01	Bedroom	97%	Pass	1.07%	Pass
OH Bed 0103 01	Bedroom	100%	Pass	1.84%	Pass
OH Bed 0101 01	Bedroom	100%	Pass	3.52%	Pass
OH Bed 0104 01	Bedroom	100%	Pass	2.20%	Pass
OH Living 0001 01	Living Room, Dinning Room, Study	100%	Pass	2.15%	Pass
OH Kitchen 0001 01	Kitchen	100%	Pass	3.12%	Pass
AL Kitchen 0001 1	Kitchen	100%	Pass	2.57%	Pass
AL Living 0001 1	Living Room, Dinning Room, Study	100%	Pass	2.80%	Pass
AL Bed 0102 1	Bedroom	100%	Pass	3.18%	Pass
AL Bed 0103 1	Bedroom	100%	Pass	2.25%	Pass
AL Bed 0101 1	Bedroom	100%	Pass	2.38%	Pass
AL Bed 0104 1	Bedroom	100%	Pass	3.81%	Pass
GT Living 0001 1	Living Room, Dinning Room, Study	100%	Pass	3.68%	Pass
GT Bed 0102 1	Bedroom	100%	Pass	4.98%	Pass
GT Bed 0101 1	Bedroom	100%	Pass	2.91%	Pass
GT Bed 0103 1	Bedroom	100%	Pass	3.80%	Pass
GT Kitchen 0001 1	Kitchen	100%	Pass	3.92%	Pass

Appendix D: VSC Results

Zone Name	Proposed VSC
NT Living 0001 2	Pass
NT Living 0001 2	Pass
NT Kitchen 0001 2	Pass
NT Bed 0102 2	Pass
NT Living 0101 2	Pass
NT Study 0101 2	Pass
NT Bed 0203 2	Pass
NT Bed 0201 2	Pass
NT Bed 0204 2	Pass
NT Living 0001 1	Pass
NT Living 0001 1	Pass
NT Kitchen 0001 1	Pass
NT Kitchen 0001 1	Pass
NT Kitchen 0001 1	Pass
NT Bed 0102 1	Pass
NT Living 0101 1	Pass
NT Study 0101 1	Pass
NT Bed 0203 1	Pass
NT Bed 0201 1	Pass
NT Bed 0204 1	Pass
SF Kitchen 0001	Pass
SF Kitchen 0001	Pass
SF Living 0001	Pass
SF Living 0001	Pass
SF Living 0001	Pass
SF Living 0001	Pass
SF Bed 0101	Pass
SF Bed 0101	Pass
SF Bed 0101	Pass
SF Bed 0104	Pass
SF Bed 0102	Pass
SF Bed 0103	Pass
NW Bed 0102 6	Pass
NW Bed 0103 6	Pass
NW Living 0001 6	Pass
NW 00 6	Pass
NW 00 6	Pass
NW 00 6	Pass
NW Bed 0101 6	Pass
NW Bed 0102 5	Pass
NW Bed 0103 5	Pass
NW Living 0001 5	Pass
NW 00 5	Pass
NW 00 5	Pass
NW 00 5	Pass

Zone Name	Proposed VSC
NW Bed 0101 5	Pass
NW Bed 0102 4	Pass
NW Bed 0103 4	Pass
NW Living 0001 4	Pass
NW 00 4	Pass
NW 00 4	Pass
NW 00 4	Pass
NW Bed 0101 4	Pass
NW Bed 0102 3	Pass
NW Bed 0103 3	Pass
NW Living 0001 3	Pass
NW 00 3	Pass
NW 00 3	Pass
NW 00 3	Pass
NW Bed 0101 3	Pass
NW Bed 0102 2	Pass
NW Bed 0103 2	Pass
NW Living 0001 2	Pass
NW 00 2	Pass
NW 00 2	Pass
NW 00 2	Pass
NW Bed 0101 2	Pass
NW Bed 0102 1	Pass
NW Bed 0103 1	Pass
NW Living 0001 1	Pass
NW 00 1	Pass
NW 00 1	Pass
NW 00 1	Pass
NW Bed 0101 1	Pass
ASH Kitchen 0001	Pass
ASH Kitchen 0001	Pass
ASH Bed 0101	Pass
ASH Bed 0102	Pass
ASH BedOffice 0103	Pass
ASH Living 0001	Pass
ASH Living 0001	Pass
ASH Living 0001	Pass
AL Kitchen 0001 3	Pass
AL Kitchen 0001 3	Pass
AL Living 0001 3	Fail
AL Living 0001 3	Fail
AL Living 0001 3	Fail
AL Bed 0102 3	Pass
AL Bed 0103 3	Pass
AL Bed 0101 3	Pass

Zone Name	Proposed VSC
AL Bed 0104 3	Pass
BL Living 0001	Pass
BL Bed 0102	Pass
BL Bed 0103	Pass
BL Bed 0101	Pass
BL Kitchen 0001	Pass
BL Kitchen 0001	Pass
AL Kitchen 0001 2	Pass
AL Kitchen 0001 2	Pass
AL Living 0001 2	Fail
AL Living 0001 2	Fail
AL Living 0001 2	Fail
AL Bed 0102 2	Pass
AL Bed 0103 2	Pass
AL Bed 0101 2	Pass
AL Bed 0104 2	Pass
GT Living 0001 2	Pass
GT Living 0001 2	Pass
GT Living 0001 2	Pass
GT Bed 0102 2	Pass
GT Bed 0102 2	Pass
GT Bed 0102 2	Pass
GT Bed 0101 2	Pass
GT Bed 0101 2	Pass
GT Bed 0101 2	Pass
GT Bed 0103 2	Pass
GT Kitchen 0001 2	Pass
GT Kitchen 0001 2	Pass
OH Bed 0102 2	Pass
OH Bed 0103 2	Pass
OH Bed 0101 2	Pass
OH Bed 0101 2	Pass
OH Bed 0101 2	Pass
OH Bed 0104 2	Pass
OH Living 0001 2	Pass
OH Living 0001 2	Pass
OH Living 0001 2	Pass
OH Kitchen 0001 2	Pass
BH Living 0001 2	Pass
BH Kitchen 0001 2	Pass
BH Bed 0101 2	Pass
BH Bed 0102 2	Pass
BH Bed 0103 2	Pass
BH Bed 0104 2	Pass
WR Living 0001	Pass
WR Kitchen 0001	Pass

Zone Name	Proposed VSC
WR Bed 0102	Pass
WR Bed 0101	Pass
WR Bed 0103	Pass
WR Bed 0104	Pass
BH Living 0001 1	Pass
BH Kitchen 0001 1	Pass
BH Bed 0101 1	Fail
BH Bed 0102 1	Fail
BH Bed 0103 1	Pass
BH Bed 0104 1	Fail
OH Bed 0102 01	Pass
OH Bed 0103 01	Pass
OH Bed 0101 01	Pass
OH Bed 0101 01	Pass
OH Bed 0101 01	Pass
OH Bed 0104 01	Pass
OH Living 0001 01	Pass
OH Living 0001 01	Pass
OH Living 0001 01	Pass
OH Kitchen 0001 01	Pass
AL Kitchen 0001 1	Pass
AL Kitchen 0001 1	Pass
AL Kitchen 0001 1	Pass
AL Kitchen 0001 1	Pass
AL Living 0001 1	Fail
AL Living 0001 1	Fail
AL Living 0001 1	Fail
AL Bed 0102 1	Pass
AL Bed 0102 1	Pass
AL Bed 0103 1	Pass
AL Bed 0101 1	Pass
AL Bed 0104 1	Pass
GT Living 0001 1	Pass
GT Living 0001 1	Pass
GT Living 0001 1	Pass
GT Bed 0102 1	Pass
GT Bed 0102 1	Pass
GT Bed 0101 1	Pass
GT Bed 0101 1	Pass

Appendix E: APSH Results

Surface	House Type	Room Name	Annual Probable sunlight hours			Winter Probable sunlight hours		
			#	%	Pass/Fail	#	%	Pass/Fail
NW000031_10_1	NW	Kitchen 00 1	2878	65.7%	Pass	263	24.0%	Pass
NW000031_11_1	NW	Kitchen 00 1	1831	41.8%	Pass	146	13.3%	Pass
NW000031_12_1	NW	Kitchen 00 1	2277	51.9%	Pass	252	23.0%	Pass
NW00002A_10_1	NW	Kitchen 00 2	2887	65.9%	Pass	265	24.2%	Pass
NW00002A_11_1	NW	Kitchen 00 2	2211	50.5%	Pass	265	24.2%	Pass
NW00002A_12_1	NW	Kitchen 00 2	1819	41.5%	Pass	143	13.0%	Pass
NW000023_10_1	NW	Kitchen 00 3	2848	65.0%	Pass	248	22.6%	Pass
NW000023_11_1	NW	Kitchen 00 3	1847	42.1%	Pass	141	12.9%	Pass
NW000023_12_1	NW	Kitchen 00 3	2184	49.8%	Pass	244	22.3%	Pass
NW00001C_10_1	NW	Kitchen 00 4	2903	66.2%	Pass	262	23.9%	Pass
NW00001C_11_1	NW	Kitchen 00 4	2131	48.6%	Pass	245	22.3%	Pass
NW00001C_12_1	NW	Kitchen 00 4	1914	43.7%	Pass	159	14.5%	Pass
NW000015_10_1	NW	Kitchen 00 5	2916	66.5%	Pass	265	24.2%	Pass
NW000015_11_1	NW	Kitchen 00 5	1886	43.0%	Pass	152	13.9%	Pass
NW000015_12_1	NW	Kitchen 00 5	2178	49.7%	Pass	242	22.1%	Pass
NW00000E_10_1	NW	Kitchen 00 6	2965	67.7%	Pass	277	25.3%	Pass
NW00000E_11_1	NW	Kitchen 00 6	2198	50.1%	Pass	261	23.9%	Pass
NW00000E_12_1	NW	Kitchen 00 6	1941	44.3%	Pass	172	15.7%	Pass
SF00000B_5_1	SF	Bed 0101	1887	43.1%	Pass	152	13.9%	Pass
SF00000B_7_1	SF	Bed 0101	670	15.3%	Fail	8	0.7%	Fail
SF00000B_8_1	SF	Bed 0101	2126	48.5%	Pass	180	16.5%	Pass
SH00000A_4_1	ASH	Bed 0101	2496	56.9%	Pass	266	24.3%	Pass
BL000003_4_1	BL	Bed 0101	2496	56.9%	Pass	266	24.3%	Pass
WR00000E_4_1	WR	Bed 0101	3359	76.6%	Pass	383	35.0%	Pass
HB00000A_1_1	OH	Bed 0101 01	790	18.0%	Fail	8	0.7%	Fail
HB00000A_6_1	OH	Bed 0101 01	291	6.6%	Fail	0	0.0%	Fail
HB00000A_7_1	OH	Bed 0101 01	865	19.7%	Fail	4	0.4%	Fail
NW000032_8_1	NW	Bed 0101 1	3218	73.4%	Pass	348	31.8%	Pass
BH000010_4_1	BH	Bed 0101 1	671	15.3%	Fail	93	8.5%	Pass
LB00000E_4_1	AL	Bed 0101 1	1887	43.1%	Pass	152	13.9%	Pass
GT00000D_4_1	GT	Bed 0101 1	1887	43.1%	Pass	152	13.9%	Pass
GT00000D_4_2	GT	Bed 0101 1	1887	43.1%	Pass	152	13.9%	Pass
GT00000D_5_1	GT	Bed 0101 1	883	20.1%	Fail	8	0.7%	Fail
NW00002B_8_1	NW	Bed 0101 2	3262	74.4%	Pass	359	32.7%	Pass
LB00000A_4_1	AL	Bed 0101 2	2470	56.4%	Pass	260	23.7%	Pass
GT000008_4_1	GT	Bed 0101 2	1705	38.9%	Pass	123	11.2%	Pass
GT000008_4_2	GT	Bed 0101 2	1670	38.1%	Pass	128	11.6%	Pass

Surface	House Type	Room Name	Annual Probable sunlight hours			Winter Probable sunlight hours		
			#	#	#	#	%	Pass/Fail
GT000008_5_1	GT	Bed 0101 2	883	20.1%	Fail	8	0.7%	Fail
HB000006_1_1	OH	Bed 0101 2	826	18.8%	Fail	1	0.1%	Fail
HB000006_6_1	OH	Bed 0101 2	1112	25.4%	Pass	12	1.1%	Fail
HB000006_7_1	OH	Bed 0101 2	231	5.3%	Fail	0	0.0%	Fail
BH00000A_4_1	BH	Bed 0101 2	792	18.1%	Fail	0	0.0%	Fail
NW000024_8_1	NW	Bed 0101 3	3290	75.1%	Pass	358	32.7%	Pass
LB000006_4_1	AL	Bed 0101 3	2394	54.6%	Pass	241	22.0%	Pass
NW00001D_8_1	NW	Bed 0101 4	3273	74.7%	Pass	354	32.3%	Pass
NW000016_8_1	NW	Bed 0101 5	3290	75.1%	Pass	358	32.7%	Pass
NW00000F_8_1	NW	Bed 0101 6	3372	76.9%	Pass	379	34.6%	Pass
SF00000D_4_1	SF	Bed 0102	2277	52.0%	Pass	248	22.6%	Pass
SH00000B_1_1	ASH	Bed 0102	1483	33.8%	Pass	102	9.3%	Pass
BL000001_4_1	BL	Bed 0102	1673	38.2%	Pass	121	11.1%	Pass
WR00000D_4_1	WR	Bed 0102	852	19.4%	Fail	8	0.7%	Fail
HB000008_2_1	OH	Bed 0102 01	623	14.2%	Fail	0	0.0%	Fail
NT00001D_3_1	NT	Bed 0102 1	2330	53.2%	Pass	261	23.9%	Pass
NW00002D_4_1	NW	Bed 0102 1	665	15.2%	Fail	0	0.0%	Fail
BH000011_4_1	BH	Bed 0102 1	896	20.5%	Fail	99	9.0%	Pass
LB00000C_2_1	AL	Bed 0102 1	2266	51.7%	Pass	236	21.5%	Pass
LB00000C_2_2	AL	Bed 0102 1	2238	51.1%	Pass	228	20.8%	Pass
GT00000C_3_1	GT	Bed 0102 1	883	20.1%	Fail	8	0.7%	Fail
GT00000C_4_1	GT	Bed 0102 1	2354	53.7%	Pass	231	21.1%	Pass
NT000015_3_1	NT	Bed 0102 2	2388	54.5%	Pass	259	23.6%	Pass
NW000026_4_1	NW	Bed 0102 2	721	16.4%	Fail	0	0.0%	Fail
LB000008_2_1	AL	Bed 0102 2	1674	38.2%	Pass	129	11.8%	Pass
GT000006_3_1	GT	Bed 0102 2	883	20.1%	Fail	8	0.7%	Fail
GT000006_4_1	GT	Bed 0102 2	2496	56.9%	Pass	266	24.3%	Pass
HB000004_2_1	OH	Bed 0102 2	698	15.9%	Fail	0	0.0%	Fail
BH00000B_4_1	BH	Bed 0102 2	3259	74.4%	Pass	358	32.7%	Pass
NW00001F_4_1	NW	Bed 0102 3	735	16.8%	Fail	8	0.7%	Fail
LB000004_2_1	AL	Bed 0102 3	1603	36.6%	Pass	123	11.2%	Pass
NW000018_4_1	NW	Bed 0102 4	731	16.7%	Fail	8	0.7%	Fail
NW000011_4_1	NW	Bed 0102 5	760	17.4%	Fail	8	0.7%	Fail
NW000007_4_1	NW	Bed 0102 6	732	16.7%	Fail	8	0.7%	Fail
SF00000E_3_1	SF	Bed 0103	1887	43.1%	Pass	152	13.9%	Pass
BL000002_3_1	BL	Bed 0103	1642	37.5%	Pass	121	11.1%	Pass
WR00000F_4_1	WR	Bed 0103	724	16.5%	Fail	3	0.3%	Fail
HB000009_1_1	OH	Bed 0103 01	3094	70.6%	Pass	378	34.5%	Pass
NW00002E_4_1	NW	Bed 0103 1	717	16.4%	Fail	0	0.0%	Fail
BH000012_4_1	BH	Bed 0103 1	1341	30.6%	Pass	13	1.2%	Fail
LB00000D_1_1	AL	Bed 0103 1	2259	51.5%	Pass	240	21.9%	Pass
GT00000E_3_1	GT	Bed 0103 1	883	20.1%	Fail	8	0.7%	Fail
NW000027_4_1	NW	Bed 0103 2	717	16.4%	Fail	0	0.0%	Fail
LB000009_1_1	AL	Bed 0103 2	1614	36.8%	Pass	129	11.8%	Pass
GT000009_3_1	GT	Bed 0103 2	883	20.1%	Fail	8	0.7%	Fail
HB000005_1_1	OH	Bed 0103 2	3152	71.9%	Pass	331	30.3%	Pass
BH00000C_4_1	BH	Bed 0103 2	30	0.7%	Fail	0	0.0%	Fail
NW000020_4_1	NW	Bed 0103 3	761	17.4%	Fail	8	0.7%	Fail
LB000005_1_1	AL	Bed 0103 3	1628	37.2%	Pass	122	11.1%	Pass
NW000019_4_1	NW	Bed 0103 4	742	16.9%	Fail	8	0.7%	Fail
NW000012_4_1	NW	Bed 0103 5	744	17.0%	Fail	8	0.7%	Fail
NW00000B_4_1	NW	Bed 0103 6	732	16.7%	Fail	8	0.7%	Fail
SF00000C_4_1	SF	Bed 0104	2266	51.7%	Pass	232	21.2%	Pass
WR000010_3_1	WR	Bed 0104	3331	76.0%	Pass	373	34.0%	Pass
HB00000B_2_1	OH	Bed 0104 01	3304	75.4%	Pass	385	35.1%	Pass
BH000013_3_1	BH	Bed 0104 1	661	15.1%	Fail	46	4.2%	Fail
LB00000F_4_1	AL	Bed 0104 1	1904	43.4%	Pass	152	13.9%	Pass
LB00000B_4_1	AL	Bed 0104 2	2496	56.9%	Pass	266	24.3%	Pass
HB000007_2_1	OH	Bed 0104 2	3239	73.9%	Pass	353	32.2%	Pass
BH00000D_3_1	BH	Bed 0104 2	3285	75.0%	Pass	365	33.3%	Pass
LB000007_4_1	AL	Bed 0104 3	2440	55.7%	Pass	252	23.0%	Pass
NT000021_4_1	NT	Bed 0201 1	1887	43.1%	Pass	152	13.9%	Pass
NT000019_4_1	NT	Bed 0201 2	1887	43.1%	Pass	152	13.9%	Pass
NT000020_3_1	NT	Bed 0203 1	2476	56.5%	Pass	266	24.3%	Pass
NT000018_3_1	NT	Bed 0203 2	2495	56.9%	Pass	266	24.3%	Pass
NT000022_4_1	NT	Bed 0204 1	2495	56.9%	Pass	266	24.3%	Pass
NT00001A_4_1	NT	Bed 0204 2	2496	56.9%	Pass	266	24.3%	Pass
SH00000C_1_1	ASH	BedOffice 0103	1524	34.8%	Pass	113	10.3%	Pass
SF000009_3_1	SF	Kitchen 0001	1796	41.0%	Pass	129	11.8%	Pass
SF000009_5_1	SF	Kitchen 0001	1923	43.9%	Pass	204	18.6%	Pass
SH000006_4_1	ASH	Kitchen 0001	1318	30.1%	Pass	63	5.8%	Pass
SH000006_4_2	ASH	Kitchen 0001	1190	27.2%	Pass	59	5.4%	Pass
BL000004_4_1	BL	Kitchen 0001	1374	31.4%	Pass	66	6.0%	Pass
BL000004_4_2	BL	Kitchen 0001	1259	28.7%	Pass	65	6.0%	Pass
WR00000C_4_1	WR	Kitchen 0001	3059	69.8%	Pass	317	28.9%	Pass
HK000002_2_1	OH	Kitchen 0001 01	2862	65.3%	Pass	322	29.4%	Pass

NT00001C_4_1	NT	Kitchen 0001 1	1857	42.4%	Pass	145	13.2%	Pass	GT00000B_4_1	GT	Living 0001 1	883	20.1%	Fail	8	0.7%	Fail
NT00001C_4_2	NT	Kitchen 0001 1	1837	41.9%	Pass	145	13.2%	Pass	GT00000B_5_1	GT	Living 0001 1	2199	50.2%	Pass	193	17.6%	Pass
NT00001C_4_3	NT	Kitchen 0001 1	1857	42.4%	Pass	145	13.2%	Pass	GT00000B_5_2	GT	Living 0001 1	2174	49.6%	Pass	186	17.0%	Pass
BH00000F_3_1	BH	Kitchen 0001 1	2980	68.0%	Pass	318	29.0%	Pass	NT000013_4_1	NT	Living 0001 2	1999	45.6%	Pass	207	18.9%	Pass
LK000003_2_1	AL	Kitchen 0001 1	1906	43.5%	Pass	175	16.0%	Pass	NT000013_4_2	NT	Living 0001 2	2100	47.9%	Pass	208	19.0%	Pass
LK000003_2_2	AL	Kitchen 0001 1	1498	34.2%	Pass	85	7.8%	Pass	NW000028_5_1	NW	Living 0001 2	507	11.6%	Fail	0	0.0%	Fail
LK000003_2_3	AL	Kitchen 0001 1	1727	39.4%	Pass	120	11.0%	Pass	LL000002_1_1	AL	Living 0001 2	1936	44.2%	Pass	252	23.0%	Pass
LK000003_2_4	AL	Kitchen 0001 1	1690	38.6%	Pass	112	10.2%	Pass	LL000002_2_1	AL	Living 0001 2	700	16.0%	Fail	8	0.7%	Fail
GT00000F_4_1	GT	Kitchen 0001 1	1883	43.0%	Pass	151	13.8%	Pass	LL000002_3_1	AL	Living 0001 2	2496	56.9%	Pass	266	24.3%	Pass
GT00000F_5_1	GT	Kitchen 0001 1	883	20.1%	Fail	8	0.7%	Fail	GT000002_4_1	GT	Living 0001 2	883	20.1%	Fail	8	0.7%	Fail
NT000014_4_1	NT	Kitchen 0001 2	1887	43.1%	Pass	152	13.9%	Pass	GT000002_5_1	GT	Living 0001 2	2465	56.3%	Pass	259	23.6%	Pass
LK000002_2_1	AL	Kitchen 0001 2	1440	32.9%	Pass	92	8.4%	Pass	GT000002_5_2	GT	Living 0001 2	2465	56.3%	Pass	259	23.6%	Pass
LK000002_2_2	AL	Kitchen 0001 2	1512	34.5%	Pass	95	8.6%	Pass	HL000001_1_1	OH	Living 0001 2	791	18.1%	Fail	0	0.0%	Fail
GT00000A_4_1	GT	Kitchen 0001 2	727	16.6%	Fail	30	2.7%	Fail	HL000001_7_1	OH	Living 0001 2	785	17.9%	Fail	3	0.2%	Fail
GT00000A_5_1	GT	Kitchen 0001 2	883	20.1%	Fail	8	0.7%	Fail	HL000001_8_1	OH	Living 0001 2	152	3.5%	Fail	0	0.0%	Fail
HK000001_2_1	OH	Kitchen 0001 2	2918	66.6%	Pass	274	25.1%	Pass	BH000008_4_1	BH	Living 0001 2	671	15.3%	Fail	0	0.0%	Fail
BH000009_4_1	BH	Kitchen 0001 2	3054	69.7%	Pass	307	28.0%	Pass	NW000021_5_1	NW	Living 0001 3	619	14.1%	Fail	0	0.0%	Fail
LK000001_2_1	AL	Kitchen 0001 3	1238	28.2%	Pass	47	4.3%	Fail	LL000001_1_1	AL	Living 0001 3	1885	43.0%	Pass	238	21.7%	Pass
LK000001_2_2	AL	Kitchen 0001 3	933	21.3%	Fail	26	2.4%	Fail	LL000001_2_1	AL	Living 0001 3	700	16.0%	Fail	8	0.7%	Fail
SF00000A_5_1	SF	Living 0001	1857	42.4%	Pass	145	13.2%	Pass	LL000001_3_1	AL	Living 0001 3	2495	56.9%	Pass	266	24.3%	Pass
SF00000A_7_1	SF	Living 0001	1731	39.5%	Pass	200	18.2%	Pass	NW00001A_5_1	NW	Living 0001 4	579	13.2%	Fail	1	0.1%	Fail
SF00000A_8_1	SF	Living 0001	670	15.3%	Fail	8	0.7%	Fail	NW000013_5_1	NW	Living 0001 5	571	13.0%	Fail	8	0.7%	Fail
SF00000A_9_1	SF	Living 0001	1898	43.3%	Pass	155	14.1%	Pass	NW00000C_5_1	NW	Living 0001 6	558	12.7%	Fail	8	0.7%	Fail
SH00000D_1_1	ASH	Living 0001	2388	54.5%	Pass	239	21.9%	Pass	NT00001E_4_1	NT	Living 0101 1	1885	43.0%	Pass	152	13.8%	Pass
SH00000D_9_1	ASH	Living 0001	1444	33.0%	Pass	102	9.3%	Pass	NT000016_4_1	NT	Living 0101 2	1886	43.0%	Pass	152	13.9%	Pass
SH00000D_10_1	ASH	Living 0001	2465	56.2%	Pass	255	23.3%	Pass	NT00001F_4_1	NT	Study 0101 1	1887	43.1%	Pass	152	13.9%	Pass
BL000000_4_1	BL	Living 0001	2496	56.9%	Pass	266	24.3%	Pass	NT000017_4_1	NT	Study 0101 2	1887	43.1%	Pass	152	13.9%	Pass
WR00000B_4_1	WR	Living 0001	822	18.8%	Fail	8	0.7%	Fail									
HL000002_1_1	OH	Living 0001 01	761	17.4%	Fail	8	0.7%	Fail									
HL000002_7_1	OH	Living 0001 01	122	2.8%	Fail	0	0.0%	Fail									
HL000002_8_1	OH	Living 0001 01	603	13.8%	Fail	4	0.4%	Fail									
NT00001B_4_1	NT	Living 0001 1	1980	45.2%	Pass	214	19.5%	Pass									
NT00001B_4_2	NT	Living 0001 1	2021	46.1%	Pass	226	20.6%	Pass									
NW00002F_5_1	NW	Living 0001 1	504	11.5%	Fail	0	0.0%	Fail									
BH00000E_3_1	BH	Living 0001 1	3053	69.7%	Pass	326	29.7%	Pass									
LL000003_1_1	AL	Living 0001 1	1882	42.9%	Pass	171	15.6%	Pass									
LL000003_2_1	AL	Living 0001 1	183	4.2%	Fail	0	0.0%	Fail									
LL000003_3_1	AL	Living 0001 1	1887	43.1%	Pass	152	13.9%	Pass									

Appendix F – Amenity Sunlight

Zone Name	% of area receiving sun											Hours over 50%	Pass/Fail
	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00		
GT Amenity Space 1	0	1.7	10.3	37.7	55.4	60.5	64.5	33.1	0	0	0	3	Pass
NT Amenity Space 2	0	0	2	30.5	46.1	57.7	68.2	42.7	5.4	0	0	2	Pass
NT Amenity Space 1	0	10.8	40.6	53.8	61.4	67	68.6	48	7.9	0	0	4	Pass
AL Amenity Space 1	0	18	39.2	43.3	47.3	47.8	50.3	38.6	16.1	0	4.5	1	Fail
SF Amenity Space	0	8.7	28.7	53.8	62.4	66.2	70	62.3	47.5	29.7	11.1	5	Pass
OH Amenity Space 01	0	42.7	59.4	66.7	71.2	74.4	75.9	70.3	61.6	41.5	0.7	7	Pass
NW Amenity Space 6	0	23.5	39	32.4	27.1	33.1	48.2	53.6	53.8	33.6	0	2	Pass
NW Amenity Space 2	0	17.6	36.6	30.7	27	25.4	42.3	49.3	44.4	0	0	0	Fail
NW Amenity Space 3	0	16.8	28.5	39.9	61	58	45	15.4	0.7	0.8	0	2	Pass
NW Amenity Space 4	0	16.7	36.3	30.6	26.9	24.4	41.5	48.6	43.6	0	0	0	Fail
NW Amenity Space 5	0	17	28.8	39.9	60.7	58.5	45.6	15.8	0.8	1	0	2	Pass
NW Amenity Space 1	0	0	42.3	56.4	58.7	52.1	38.6	6.7	0.9	1	0	3	Pass
BH Amenity Space 1	0	29.2	52	62.1	68.3	72.9	77	70.8	59.4	39.5	0	7	Pass
WR Amenity Space	0	30	52.5	62.5	68.6	73.2	77.2	71	59.7	38	2.1	7	Pass
BH Amenity Space 2	0	34.4	55.3	64.3	69.8	73.9	77.5	71.6	60.8	39.6	0	7	Pass
OH Amenity Space 2	0	3.9	48.1	61.3	67.7	72.5	76.6	73.2	62.5	44.2	0	6	Pass
GT Amenity Space 2	11.6	0	1.5	16	26.4	32.6	39	26.5	3.9	0	0	0	Fail
AL Amenity Space 2	1.6	5.3	0.8	12	34.3	52.8	68.9	59.2	44.5	27.8	0	3	Pass
BL Amenity Space	1.2	0	8.2	23.9	33	41.2	46.5	37.8	20.8	4.9	0	0	Fail
AL Amenity Space 3	1.7	3.5	7.7	27.6	40	47.1	53.2	44.4	21	0.3	0	1	Fail
ASH Amenity Space	0	20.3	41.9	69.7	84.6	94.1	99.2	93.5	83.7	58.7	0	7	Pass

Appendix G: Glossary of Terms

Average Daylight Factor

The average daylight factor is the average indoor illuminance (from daylight) on the working plane within a room, expressed as a percentage of the simultaneous outdoor illuminance on a horizontal plane. It is calculated based on a uniform overcast sky.

Glare

Glare is the sensation produced by bright areas within the visual field, such as lit surfaces, parts of the luminaires, windows and/or roof lights. Glare shall be limited to avoid errors, fatigue and accidents. Glare can be experienced either as discomfort glare or as disability glare. In interior work places disability glare is not usually a major problem if discomfort glare limits are met. Glare caused by reflections in specular surfaces is usually known as veiling reflections or reflected glare.

Illuminance

The amount of light falling on a surface per unit area, measured in lux.

Point daylight factor

A point daylight factor is the ratio between the illuminance (from daylight) at a specific point on the working plane within a room, expressed as a percentage of the illuminance received on an outdoor unobstructed horizontal plane.

Uniformity

The uniformity is the ratio between the minimum illuminance (from daylight) on the working plane within a room (or minimum daylight factor) and the average illuminance (from daylight) on the same working plan (or average daylight factor).

View of sky/no sky line

Areas of the working plane have a view of sky when they receive direct light from the sky, i.e. when the sky can be seen from working plane height. The no-sky line divides those areas of the working plane, which can receive direct skylight, from those that cannot.

Working plane

CIBSE LG10 defines the working plane as the horizontal, vertical or inclined plane in which a visual task lies. The working plane is normally taken as 0.7m above the floor for offices and 0.85 m for industry.