



Client: PNK Properties Ltd

Assessment of Daylight and Sunlight
Provision – 12 Harpsfield Broadway,
Hatfield

October 2018

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Template Rev – September 18

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Contents Amendment Record

This report has been issued and amended as follows:

Revision	Description	Date	Written by	Checked by
0	Draft Issue	31 st October 2018	KB	SPH
1	Final Issue	16 th November 2018	KB	SPH

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1 Background and Scope of Appraisal

Herrington Consulting has been commissioned by PNK Properties Ltd to analyse and quantify the provision of natural daylight and sunlight to the habitable rooms within the proposed development at 12 Harpsfield Broadway, Hatfield, Hertfordshire AL10 9TF.

2 The Site and Development Proposals

2.1 Site Location

The site is situated in the town of Hatfield in Hertfordshire and is located within the Borough Council of Welwyn Hatfield. The location of the site is shown in Figure 2.1 and the site plan included in Appendix A.1 of this report gives a more detailed reference to the site location and layout.

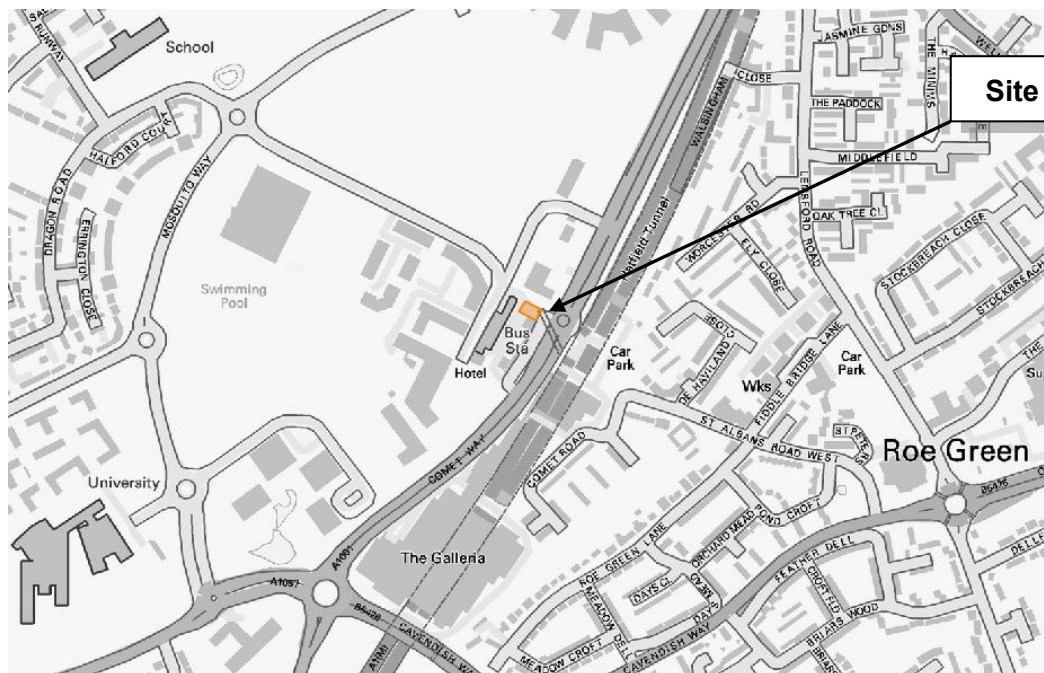


Figure 2.1 – Location map (Contains Ordnance Survey data © Crown copyright and database right 2011)

2.2 The Development

The proposal for development is to convert the existing building into 10 flats (4x1 bed and 6x studio) and construct a rear extension and mansard roof with dormer windows. Drawings of the proposed scheme are included in Appendix A.1 of this report.

3 Policy and Guidance

3.1 National Planning Policy

National Planning Policy Framework (Revised July 2018)

Paragraph 123 on 'Achieving appropriate densities' states that "*c) local planning authorities should refuse applications which they consider fail to make efficient use of land, taking into account the policies in this Framework. In this context, when considering applications for housing, authorities should take a flexible approach in applying policies or guidance relating to daylight and sunlight, where they would otherwise inhibit making efficient use of a site (as long as the resulting scheme would provide acceptable living standards).*"

3.2 Regional Planning Policy

Hertfordshire County Council

Currently, there is no relevant regional planning policy related to daylight and sunlight.

3.3 Local Planning Policy

Welwyn Hatfield District Plan (2005)

In the Policies for Urban Areas document in Policy H5 'Conversion of Commercial or Vacant Buildings to Residential Accommodation' it states that "*The Council will support the change of use of B1 offices to residential in town and local centres. ... The council will also support the change of use of other commercial and vacant buildings in existing residential areas where conversion would benefit the local community*".

Welwyn Hatfield Supplementary Planning Guidance (2005)

Paragraph 3.18 states that '*all new developments should be designed and built to ensure that there is a satisfactory level of sunlight and daylight to both the new development and surrounding developments and/or open spaces*'.

3.4 Best Practice Guidance

In the absence of official national planning guidance / legislation on daylight and sunlight, the most recognised guidance document is published by the Building Research Establishment and entitled 'Site Layout Planning for Daylight and Sunlight – A Guide to Good Practice', Second Edition, 2011; herein referred to as the 'BRE Guidelines'.

The BRE Guidelines are not mandatory and themselves state that they should not be used as an instrument of planning policy, however in practice they are heavily relied upon as they provide a good guide to approach, methodology and evaluation of daylight and sunlight impacts.

In conjunction with the BRE Guidelines further guidance is given within the British Standard (BS) 8206-2:2008: 'Lighting for buildings - Part 2: Code of practice for daylighting'.

In this assessment, the BRE Guidelines have been used to establish the extent to which the Proposed Development meets current best practice guidelines. In cases where the Development is likely to reduce light to key windows the study has compared results against the BRE criteria.

Whilst the BRE Guidelines provide numerical guidance for daylight, sunlight and overshadowing, these criteria should not be seen as absolute targets since, as the document states, the intention of the guide is to aid rather than constrain the designer. The Guide is not an instrument of planning policy, therefore whilst the methods given are technically robust, it is acknowledged that some level of flexibility should be applied where appropriate.

4 Assessment Techniques

4.1 Background

Natural light refers to both daylight and sunlight. However, a distinction between these two concepts is required for the purpose of analysis and quantification of natural light in buildings. In this assessment, the term '*Daylight*' is used for natural light where the source is the sky in overcast conditions, whilst '*Sunlight*' refers specifically to the light coming directly from the sun.

4.2 Average Daylight Factor

The Average Daylight Factor (ADF) method calculates the average illuminance within a room as a proportion of the illuminance available to an unobstructed point outdoors under a sky of known luminance and luminance distribution. This is the most detailed of the daylight calculations and considers the physical nature of the room behind the window, including; window transmittance, room area and surface reflectivity.

This method of quantifying the availability of daylight within a room does, however, require the internal layout to be known and is generally only used for establishing daylight provision in new rooms. The BRE Guide sets out the following guidelines for the assessment of the ADF:

If a predominantly daylit appearance is required, then the ADF should be 5% or more if there is no supplementary electric lighting, or 2% or more if supplementary electric lighting is provided. In dwellings, the following minimum average daylight factors should be achieved: 1% in bedrooms, 1.5% in living rooms and 2% in kitchens.

4.3 No Sky Line

The No Sky Line (NSL), or sometimes referred to as No Sky View or Daylight Distribution method, describes the distribution of daylight within rooms by calculating the area of the 'working plane', which will have a direct and unobstructed view of the sky. The working plane height is generally set at 850mm above floor level within a residential property and 700mm within a commercial property.

If a significant area of the working plane lies beyond the NSL, i.e. this area of the room has no view of the sky at the working plane height, there is likely to be a poor distribution of daylight within the room. However, this test is relatively simplistic and base purely on geometric parameters. Consequently, no account is taken of the reflectance of light within the room.

The BRE Guidelines do recommend that the NSL test is applied alongside the ADF test, and this is primarily to provide an indication of how well the daylight within the room is distributed. The determination of the level of adequacy of natural daylighting is, however, still predominantly driven by the ADF target values. Notwithstanding this, the NSL test does provide useful information on the way that the daylight is distributed within a room and this is often useful to the designer. The NSL test has therefore been undertaken alongside the ADF analysis and the

graphical and numerical outputs are included within the appendix to this report. These results are, however, only used in a qualitative and informative way, rather than a quantitative pass/fail manner.

4.4 Room Depth Criteria

The BRE Guidelines do include advice for determining recommended room depths to proposed new rooms under specific circumstances using the Room Depth Criteria (RDC). This is more of a rule-of-thumb test that can be used to plan building layouts etc at an early conceptual stage, rather than providing quantitative outputs at the more detailed stage of a development.

This test has numerous limitations when being applied to anything but a simplistic room layout and does not take into account external obstructions. It is therefore not considered to provide any meaningful data on the level or distribution of daylight that is not already provided by the ADF and NSL tests. Consequently, it is only applied in very particular situations.

4.5 Annual Probable Sunlight Hours

It is also possible to quantify the amount of sunlight available to a new development and the recognised methodology for undertaking this analysis is the Annual Probable Sunlight Hours (APSH) method. The meaning of 'probable sun hours' is the total number of hours that the sun is expected to shine on unobstructed ground, allowing for average levels of cloudiness.

For a typical development to be considered as having very good levels of direct sunlight, the centre point of the window would ideally need to receive more than 25% of APSH for the year, including at least 5% in the winter months between 21st September and the 21st March. The BRE Guidelines also recommend having at least one main window of the proposed development facing within 90 degrees of due south, with priority given to living rooms where sunlight is especially appreciated in the afternoon. Bedrooms and kitchens are generally viewed as less important, where occupants normally prefer sunlight in the mornings.

For new development and especially where existing buildings are being re-developed, it is important to acknowledge that these are aspirational targets intended to aid and not constrain the designer.

4.6 Overshadowing

The BRE Guidance suggests that where new development is served by amenity areas, then analysis can be undertaken to quantify the amount of sunlight these amenity areas will enjoy. Typical examples of areas that could be considered as open spaces or amenity areas are main back gardens of houses, allotments, parks and playing fields, children's playgrounds, outdoor swimming pools, sitting-out areas, such as in public squares and focal points for views, such as a group of monuments or fountains.

Sun Hours on Ground

The BRE Guidelines recommend that for a garden or amenity area to appear adequately sunlit throughout the year, at least 50% of an amenity area should receive at least 2 hours of sunlight on 21st March.

When undertaking this analysis, sunlight from an altitude of 10° or less has been ignored as this is likely to be obscured by planting and undulations in the surrounding topography. Driveways and hard standing for cars is also usually left out of the area used for this calculation. Fences or walls less than 1.5 metres high are also ignored. Front gardens which are relatively small and visible from public footpaths are omitted with only main back gardens needing to be analysed.

The Guidelines also state that “normally, trees and shrubs need not be included, partly because their shapes are almost impossible to predict, and partly because the dappled shade of a tree is more pleasant than a deep shadow of a building”. This is especially the case for deciduous trees, which provide welcome shade in the summer whilst allowing sunlight to penetrate during the winter months.

5 Assessment Methodology

5.1 Method of Baseline Data Collation

The following data and information has been used to inform this study:

- OS Mastermap mapping
- Scheme drawings in AutoCAD format (Provided by ASAI Construction Ltd October 2018)
- Aerial photography (Google Maps and Bing)
- Photographic information (Provided by ASAI Construction Ltd, October 2018)

5.2 Numerical Modelling

The numerical analysis used in this assessment has been undertaken using the Waldrum Tools (Version 4.0.0.5) software package.

5.3 Calculation Assumptions

The following assumptions have been made when undertaking the analysis:

- When assessing the ADF for internal rooms and in the absence of specific information, the following parameters are assumed:
 - Glazing type is assumed to be double glazing (Pilkington K Glass 4/16/4 Argon filled) with a light transmittance value of 0.78 (value for double glazed unit not per pane).
 - For obscured glass windows, a glazing transmittance value of 0.45 has been used.
 - Correction factor for frames and glazing bars = 0.8
 - Where information from the designer is not available, the following values are used to derive the Maintenance Factor applied to the transmittance values.

Location / setting	Building type (Residential – good maintenance)	Exposure (normal)	Special exposure	Maintenance Factor
Urban	8%	x 1.0	x 1.0	0.92
Rural / suburban	4%	x 1.0	x 1.0	0.96

Table 5.1 – Parameters used for deriving Maintenance Factor (refer to BS 8206-2:2008 Tables A3, A4 and A5)

The reflectance values used in the ADF analysis of the proposed new buildings are shown in table 5.2 below and are used unless specified otherwise by the designer:

Surface	Value
Internal walls (painted pale cream)	81%
Internal ceiling (painted white)	85%
Internal flooring	30%

Table 5.2 – Reflectance values used in ADF analysis

6 Daylight Provision to Proposed New Rooms

6.1 Overview

As discussed in Section 4, the primary test for daylight is the Average Daylight Factor (ADF) test and this is discussed in detail in the following section. The No Sky Line (NSL) analysis has also been carried out to provide supporting information on the distribution of daylight within each of the habitable rooms. The NSL results are processed by the computational model in both graphical and numerical formats and these are included in the appendix to this report.

It is the intention of the BRE Guidelines to aid, rather than constrain the designer and as such a range of qualitative and quantitative tests are outlined, which vary in complexity. During the early stages of design, it is often appropriate to use the more simplistic rule-of-thumb tests. However, when assessing a final design at the planning application stage for example, it is more appropriate to rely upon the more detailed and quantitative analysis techniques. These allow window size and position, glazing type, room layout and dimensions etc to be taken into consideration. Consequently, the assessment of natural daylight provision has been based primarily on the results of the ADF test, although reference to the NSL results is made when deemed necessary.

6.2 Average Daylight Factor (ADF)

Using the analytical techniques discussed in Sections 4 and 5, the daylighting tests have been applied for the habitable rooms within the proposed development.

In accordance with the guidance set out in both the BRE Guidelines and the BS 8206-2:2008 document, rooms that have a dual use, i.e. an open plan kitchen and lounge, are assessed as a single room and assessed against the room use with the highest daylighting requirement. For example, where a room includes both living and kitchen spaces, then the higher daylighting requirement of the kitchen is adopted as the threshold target.

The results are summarised in Table 6.1.

Floor	Unit	Room	ADF	Minimum Recommended ADF	Meets BRE Guidelines?
First	Unit A	Room 1 - Bedroom	3.55%	1.00%	Yes
		Room 2 - Bedroom	3.60%	1.00%	Yes
		Room 3 - Bedroom	2.18%	1.00%	Yes
		Room 4 - Bedroom	2.29%	1.00%	Yes
		LKD	2.22%	2.00%	Yes
	Communal	Lounge	2.02%	1.50%	Yes
	Unit B	Room 1 - Bedroom	4.85%	1.00%	Yes
		Room 2 - Bedroom	3.13%	1.00%	Yes
	Unit C	Room 1 - Bedroom	3.98%	1.00%	Yes
		Room 2 - Bedroom	3.46%	1.00%	Yes
Second	Unit D	Room 1 - Bedroom	2.68%	1.00%	Yes
		Room 2 - Bedroom	2.40%	1.00%	Yes
		Room 3 - Bedroom	1.36%	1.00%	Yes
		Room 4 - Bedroom	2.18%	1.00%	Yes
		LKD	2.61%	2.00%	Yes
	Communal	Lounge	2.28%	1.00%	Yes
	Unit E	Room 1 - Bedroom	4.90%	1.00%	Yes
		Room 2 - Bedroom	4.52%	1.00%	Yes
	Unit F	Room 1 - Bedroom	3.05%	1.00%	Yes
		Room 2 - Bedroom	4.97%	1.00%	Yes
Third	Unit G	Room 1 - Bedroom	4.11%	1.00%	Yes
		Room 2 - Bedroom	2.52%	1.00%	Yes
		Room 3 - Bedroom	2.23%	1.00%	Yes
	Communal Area	Lounge	4.16%	1.50%	Yes
		Gymnasium	4.49%	1.50%	Yes
	Unit H	Kitchen	3.56%	2.00%	Yes
		Room 1 - Bedroom	2.90%	1.00%	Yes
		Room 2 - Bedroom	4.91%	1.00%	Yes
Kitchen		8.57%	2.00%	Yes	

Table 6.1 – Calculated ADF values

From the results in Table 6.1 it can be seen that all rooms within the proposed development exceed the minimum required ADF target values prescribed by the BRE Guidelines. Furthermore, the results of the NSL test included in Appendix A.4. indicate that all of the rooms will enjoy excellent levels of daylight distribution.

Therefore, it can be concluded that all of the proposed rooms will be well daylit throughout the year and consequently, will have a reduced reliance on supplementary electric lighting.

7 Sunlight Provision to Proposed Development

7.1 Annual Probable Sunlight Hours Assessment (APSH)

The BRE Guidelines provide guidance in respect of sunlight quality for new developments stating: *“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. Sunlight is also required in conservatories. It is viewed as less important in bedrooms and in kitchens where people prefer it in the morning rather than the afternoon.”*

The assessment criteria set out within the BRE document are discussed in Section 4.3 of this report, but in general terms the overall objective sought by the guidelines is as follows: *“In general, a dwelling or non-domestic building which has a particular requirement for sunlight, will appear reasonably sunlit provided that at least one main window faces within 90 degrees of due south; and the centre of at least one window to a main living room can receive 25% of annual probable sunlight hours, including at least 5% of annual probable sunlight hours in the winter months between 21st September and 21st March.*

It is also worth noting that in paragraph 3.1.11 of the BRE guidance it is suggested that if a room faces significantly north of due east or west it is unlikely to meet the recommended levels of sunlight. A further observation from paragraph 5.3 of the BS 8206-2 is that with regards to sunlight duration, the degree of satisfaction is related to the expectation of sunlight. Therefore, if a room is 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.

It should be noted that where rooms have more than one window, it is acceptable to sum the non-coincident sunlight hours to achieve a ‘room total’. This approach is acknowledged by the BRE Guidelines and facilitates a greater understanding of the sunlight received within a room by taking into account the fact that some windows will receive sunlight at different times during the day.

The results of this analysis are summarised in Table 7.1.

Floor	Unit	Room	Percentage APSH (Room Total)	
			All Year	Winter
First	Unit A	Room 1 - Bedroom	39	9
		Room 2 - Bedroom	65	22
		Room 3 - Bedroom	62	20
		Room 4 - Bedroom	32	8
		LKD	42	10
	Communal	Lounge	66	21
	Unit B	Room 1 - Bedroom	18	2
		Room 2 - Bedroom	18	2
	Unit C	Room 1 - Bedroom	76	27
		Room 2 - Bedroom	7	0
Second	Unit D	Room 1 - Bedroom	39	9
		Room 2 - Bedroom	65	22
		Room 3 - Bedroom	65	22
		Room 4 - Bedroom	34	8
		LKD	54	15
	Communal	Lounge	74	25
	Unit E	Room 1 - Bedroom	18	2
		Room 2 - Bedroom	18	2
	Unit F	Room 1 - Bedroom	79	27
		Room 2 - Bedroom	7	0
Third	Unit G	Room 1 - Bedroom	70	23
		Room 2 - Bedroom	69	23
		Room 3 - Bedroom	39	9
	Communal Area	Lounge	84	27
		Gymnasium	22	2
	Unit H	Kitchen	83	27
		Room 1 - Bedroom	83	27
		Room 2 - Bedroom	58	10
Kitchen		22	2	

Table 7.1 – Results of APSH analysis

The APSH results summarised above show that the vast majority of proposed rooms will receive well in excess of the aspirational target values for both annual and winter sunlight. Importantly, all of the main habitable rooms within the proposed development, either LKD rooms or communal lounge rooms are receiving a very high level of direct sunlight, vastly exceeding the BRE recommended level. These rooms will therefore be attractive, well sunlit spaces throughout the year and will provide an attractive amenity benefit to the future occupants.

In addition to the main habitable rooms, the majority of bedrooms will also receive a very high level of direct sunlight. Although there are seven bedrooms which are falling slightly short of this aspirational target value, the occupants of these bedrooms will have access to very well-lit communal lounge areas.

Overall, it can be concluded that the proposed units within the development will meet the aspirational target values for sunlight set out by the BRE Guidelines and as a consequence, will enjoy excellent levels of direct sunlight throughout the year.

8

Conclusions

The detailed analysis undertaken as part of this assessment has examined the provision of natural daylight and sunlight to the habitable rooms for the proposed development at No. 12 Harpsfield Broadway. Using detailed numerical modelling applications, the Average Daylight Factor (ADF) and Annual Probable Sunlight Hours (APSH) have been quantified for each room. In line with the assessment criteria prescribed by the BRE Guidelines, it has been shown that for all rooms, the provision of natural daylight will meet or exceed the minimum required threshold set out in both the BRE Guidelines and the British Standard (BS) 8206-2:2008: 'Lighting for buildings - Part 2: Code of practice for daylighting'.

It has also been possible to demonstrate that all of the main habitable LKD or lounge rooms within the development will receive in excess of the 'all year' and 'winter' target levels of direct sunlight. Therefore, the future occupants of the proposed units will all have access to well sunlit living rooms and as a consequence of the light and additional visual interest provided by this direct sunlight, the amenity value of these rooms will be enhanced.

A Appendices

A.1 Appendix A.1 – Scheme Drawings

A.2 Appendix A.2 – Graphical Model Outputs

A.3 Appendix A.3 – Average Daylight Factor Calculations

A.4 Appendix A.4 – No Sky Line Calculations

A.5 Appendix A.5 – APSH Calculations