



# Daylight, Sunlight and Overshadowing Assessment

## Park View Extra-Care Home

For the London Borough of Hillingdon

August 2015

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# Daylight, Sunlight and Overshadowing

## Contents

|                               |    |
|-------------------------------|----|
| Executive Summary .....       | 3  |
| Introduction .....            | 4  |
| Site .....                    | 5  |
| Methodology .....             | 6  |
| Daylight Assessment.....      | 8  |
| Sunlight Assessment.....      | 16 |
| Overshadowing Assessment..... | 20 |
| Conclusion .....              | 22 |

### About us:

XCO2 Energy are a low-carbon consultancy working in the built environment. We are a multi-disciplinary company consisting of both architects and engineers, with specialists including CIBSE low carbon consultants, Code for Sustainable Homes, EcoHomes and BREEAM assessors, BRE trained daylight consultants and LEED accredited professionals.

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# Daylight, Sunlight and Overshadowing

## Executive Summary

A daylight and sunlight analysis was carried out for the proposed Park View Extra-Care Home, which is located within the London Borough of Hillingdon.

This report outlines the results of the analysis for the planning application, assessing the daylight and sunlight impacts on the surrounding properties.

The methodology set out in this report is in accordance with BRE's *"Site Layout Planning for Daylight and Sunlight, A Guide to Good Practice"* by PJ Littlefair (2011).

The following assessments were carried out:

- Daylight: 25 and 45 Degree Line Projections
- Daylight: Vertical Sky Component
- Sunlight: Sunlight Access
- Sunlight: Sunlight Overshadowing

Computer modelling software was used to carry out the daylight and sunlight impact assessment.

### Daylight Assessment

The daylight analysis indicates that the impact on surrounding properties arising from the proposed development will be acceptable. A total number of 31 windows were assessed for daylight access. The daylight assessment results are as follows:

- 9 of the 31 windows have passed the 25 degree line test;
- 17 of the assessed windows have passed the 45 degree planes projections test; and
- The 5 remaining windows have achieved a VSC of greater than 27%.

Therefore, the proposed development is unlikely to result in a significant adverse impact on daylight received by the surrounding properties.

### Sunlight Assessment

A total of 21 windows within 90 degrees of south on surrounding properties were assessed for annual and winter sunlight hours. The sunlight assessment results are as follows:

- 9 of the assessed windows passed the 25 degree line test; and
- The remaining 12 windows will receive probable annual sunlight hours and probable winter sunlight hours more than 0.8 times their former values.

Therefore, it can be deemed that the proposed development is considered to have no significant adverse impact on the sunlight hours received by the surrounding properties.

### Overshadowing Assessment

3 residential amenity zones were identified to be in close proximity to the proposed development and have been included in the overshadowing assessment.

The results have indicated that over 50% of amenity areas A1 and A2 will receive at least 2 hours of sunlight (between 11am and 1pm) on 21 March, while amenity area A3 will be unaffected in terms of overshadowing by the proposed development during this time on 21 March.

Therefore, it can be concluded that the proposed development will not have a negative impact on sunlight access to the adjacent amenity spaces.

### Summary

In summary, the BRE daylight and sunlight access results for the assessed windows on the surrounding properties, and the amenity spaces adjacent to the proposed scheme, are satisfactory as they comply with the criteria within the BRE guide.



# Daylight, Sunlight and Overshadowing

## Introduction

This report assesses the daylight and sunlight impacts the proposed building may have on the properties and amenity spaces surrounding the site. The proposed scheme will replace the existing one storey building with a three and four storey building including the Park View Extra-Care Home.

The assessment methodology is based on the BRE's "Site Layout Planning for daylight and sunlight, a Guide to good practice" PJ Littlefair 2011, which is generally accepted as good practice by Town and Country Planning authorities.

It should be noted that although the numerical values stated in the BRE provide useful guidance to designers, consultants and planning officials, these are purely advisory and may vary depending on context. Dense urban areas, for example, may often experience greater site constraints when compared to low-rise suburban areas, and thus a high degree of obstruction is often unavoidable.



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## Daylight, Sunlight and Overshadowing

### Site

The proposed site is situated off Farrier Close and adjacent to Stockley Road, within the London Borough of Hillingdon. The building location is shown in the image below.

The proposed scheme will replace the existing Park View Day Centre, with a three to four storey building consisting of the Park View Extra-Care Home. The extra care home will include purpose built one and two bedroom apartments for those with an assessed care need.

Site analysis was carried out to identify any potential daylight and sunlight impacts on the existing buildings adjacent to the proposed scheme at Park View as shown in the image below.

All assessed surrounding properties are annotated in the figure below.



Aerial view of properties surrounding the proposed scheme at Park View - Site area highlighted in purple.

## Methodology

The following methodology was used to carry out the daylight, sunlight and overshadowing assessments. The methodology is based on the guidelines set out in the BRE *"Site Layout Planning for Daylight and Sunlight, A Guide to Good Practice"* (2011).

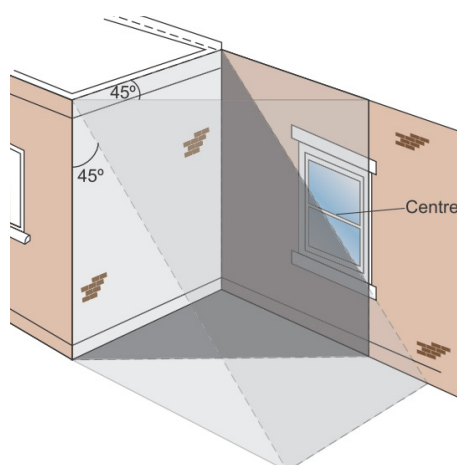
### Daylight

#### 1. Daylight to Surrounding Windows

A plane is drawn at 25 degrees from the horizontal, at the centre of an existing window. If the new development intersects with this plane, the internal daylight levels of the surrounding windows may be reduced.

For proposed schemes positioned perpendicularly to an existing building, 45 degree planes are drawn both in elevation and in plan from the outer-most adjacent corner of a proposed building, towards the existing windows assessed as shown in the image below. If the centre of the assessed window intersects with both 45 degree planes there may be an impact on the daylight received.

When an obstruction of the 25 or 45 degree planes occur, a more detailed assessment involving the Vertical Sky Component of the affected window needs to be carried out.



Application of the 45 degree plane - from the BRE's *"Site Layout Planning for Daylight and Sunlight, A Guide to Good Practice"* by PJ Littlefair (2011).

#### 2. Absolute Vertical Sky Component

The Vertical Sky Component is the ratio of the direct sky illuminance falling on the vertical wall at a reference point, to the simultaneous horizontal illuminance under an unobstructed sky. To maintain good levels of daylight, the Vertical Sky Component of a window needs to be 27% or greater.

### Sunlight

#### Access to sunlight (APSH & WPSH)

The BRE test relates mainly to existing living room windows, although care should be taken to ensure that kitchens and bedrooms receive reasonable amounts of sunlight. An Annual Probable Sunlight Hour (APSH) assessment is carried when:

- There is an obstruction within the 25 degree line, calculated from the centre of the window
- The proposed development is situated within 90 degrees due south of the window

The APSH assessment states that the existing living room window should receive at least:

- 25% of annual probable sunlight hours throughout the year and 5% of annual probable sunlight hours during the winter months; or
- The difference between the APSH is not less than 0.8 times its former value; or
- Reduction in sunlight received over the whole year is greater than 4% of annual probable sunlight hours.

The term 'annual probable sunlight hours' refers to the long-term average of the total of hours during a year in which direct sunlight reaches the unobstructed ground (when clouds are taken into account). The 'winter probable sunlight hours' is used to mean the same but only for the winter period (21 September – 21 March). In order for the windows to receive adequate sunlight access, it must achieve at least 372 hours of annual probable sunlight during the year and 22 hours of winter probable sunlight. Note that the BRE guidance expects the above to be met for living room windows only.

## Daylight, Sunlight and Overshadowing

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### Overshadowing

#### Sunlight to Amenity Spaces

Open spaces should retain a reasonable amount of sunlight throughout the year. The BRE states that for an amenity space to “appear adequately sunlit throughout the year, at least half of the area should receive at least two hours of sunlight on 21 March”.

Furthermore, the BRE guide also states that, “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 21 March is less than 0.8 times its former value, then the loss of sunlight is likely to be noticeable.”

The following sections presents the daylight and sunlight assessment results for the proposed development at Park View.

## Daylight, Sunlight and Overshadowing

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### Daylight Assessment

#### Analysed windows

A total of 24 windows from buildings surrounding the site were highlighted as being in close proximity to the proposed development.

The assessed surrounding buildings include:

- 9-10 Farrier Close (window nos. 1-6);
- 20-21 Farrier Close (window nos. 7-17);
- 17-47 Horseshoe Drive (window nos. 18-28); and
- Dwellings off Chapel Lane (window nos. 29-31)

The results are presented for each building group on the following pages.

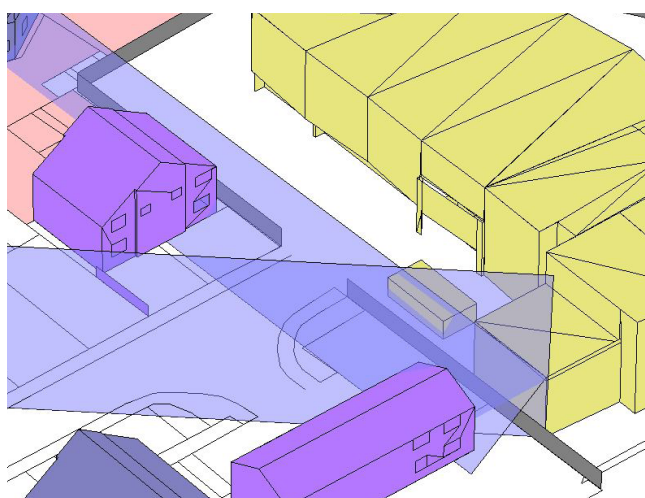
## Daylight, Sunlight and Overshadowing

### 9-10 Farrier Close

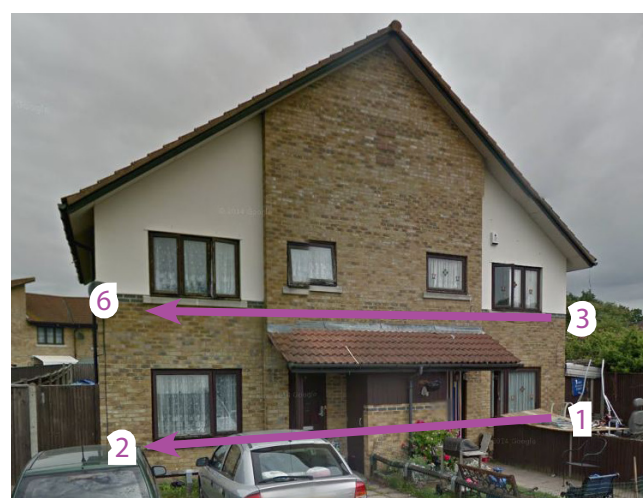
9-10 Farrier Close are two residential buildings situated adjacent to the proposed site. 6 windows on these buildings have been identified as being potentially impacted upon by the proposed development, as shown in the images below.

In accordance with the BRE methodology, the windows have been tested for the 45 degree plane

projections, as they are positioned perpendicular to the proposed scheme. The daylight analysis results indicate that all 6 windows will not be within both the 45 degree projection planes from the proposed building, thereby meeting the BRE criteria for daylight access.



45° planes emanating from the proposed scheme (shown in blue)



Assessed windows on 9-10 Farrier Close

### Results Summary

| Window No. | 45 degree plane projections test            | VSC test                         |                |                                | Comments                         |
|------------|---------------------------------------------|----------------------------------|----------------|--------------------------------|----------------------------------|
|            |                                             | Proposed VSC % (BRE target >27%) | Existing VSC % | Relative VSC (BRE target >0.8) |                                  |
| 1 - 6      | Not within both 45 degree projection planes | -                                | -              | -                              | Good levels of daylight received |

|                                                  |   |
|--------------------------------------------------|---|
| Number of windows                                | 6 |
| Windows passing 45 degree plane projections test | 6 |

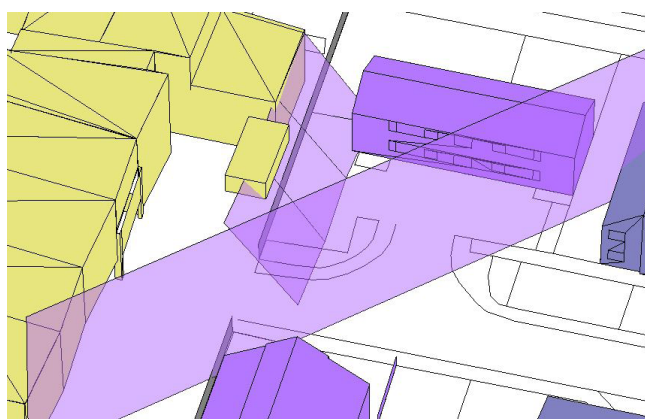
## Daylight, Sunlight and Overshadowing

### 20-21 Farrier Close

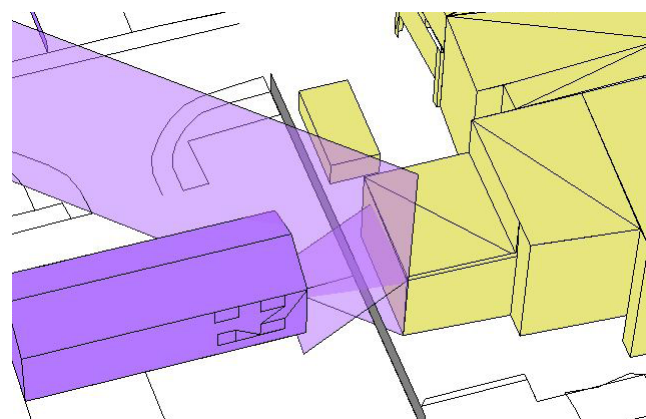
20-21 Farrier Close is a residential building situated adjacent to the proposed site. 11 windows on this building (1 window on its south facade and 10 windows on its north facade) have been identified as being potentially impacted upon by the proposed development, as shown in the images below.

The daylight analysis for these dwellings indicate that the assessed 1 window on the south facade and 10 windows on the north facade of the building will not be within both the 45 degree projection planes from the proposed building.

Therefore, it can be concluded that all the assessed windows at 20-21 Farrier Close will meet the BRE criteria for daylight access.



45° planes emanating from the proposed scheme towards the north facade of 20-21 Farrier Close



45° planes emanating from the proposed scheme towards the south facade of 20-21 Farrier Close



Assessed windows on the north facade of 20-21 Farrier Close



Assessed windows on the south facade of 20-21 Farrier Close

## Results Summary

| Window No. | 45 degree plane projections test            | VSC test                         |                |                                | Comments                         |
|------------|---------------------------------------------|----------------------------------|----------------|--------------------------------|----------------------------------|
|            |                                             | Proposed VSC % (BRE target >27%) | Existing VSC % | Relative VSC (BRE target >0.8) |                                  |
| 7 - 17     | Not within both 45 degree projection planes | -                                | -              | -                              | Good levels of daylight received |

|                                                  |    |
|--------------------------------------------------|----|
| Number of windows                                | 11 |
| Windows passing 45 degree plane projections test | 11 |



## Daylight, Sunlight and Overshadowing

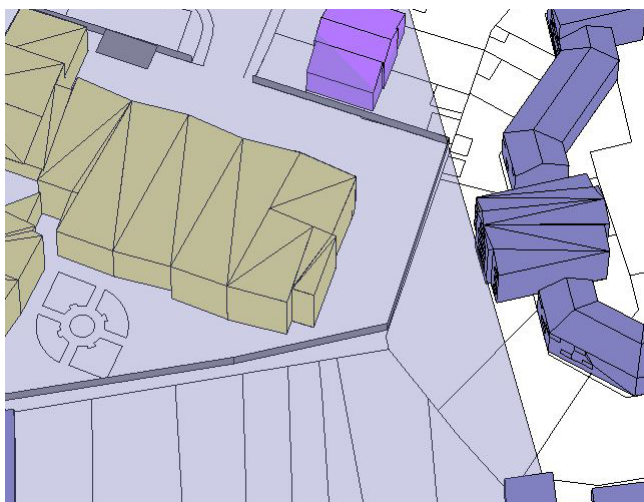
### 17-47 Horseshoe Drive

17-47 Horseshoe Drive is a residential building facing the proposed site. 11 windows on the ground floor of this building have been identified as being potentially impacted upon by the proposed development, as shown in the images below.

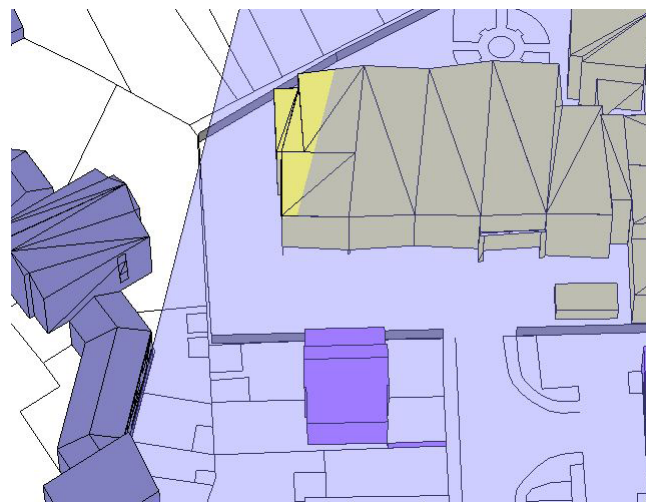
It was deemed that if these windows meet the BRE criteria then those on the upper levels would achieve the same, as the window positions are similar on the floors above.

The daylight analysis for these dwellings indicate that 6 windows will pass the 25 degree line test, while 5 of the assessed windows will achieve VSC's greater than 27%.

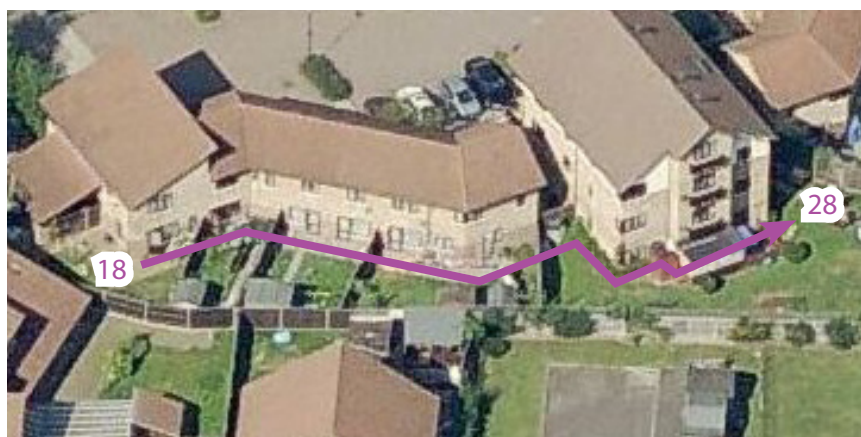
Therefore, it can be deemed that all windows at 17-47 Horseshoe Drive will meet the BRE criteria for daylight access.



25° plane emanating from the proposed scheme



25° plane emanating from the proposed scheme



Assessed windows on 17-47 Horseshoe Drive

## Results Summary

| Window No. | 25 degree line test                                                              | VSC test                          |                |                                 | Comments                         |
|------------|----------------------------------------------------------------------------------|-----------------------------------|----------------|---------------------------------|----------------------------------|
|            |                                                                                  | Proposed VSC % (>27% recommended) | Existing VSC % | Relative VSC (>0.8 recommended) |                                  |
| 18 -19     | 25 degree line unobstructed                                                      | -                                 | -              | -                               | Good levels of daylight received |
| 20         | Does not pass 25 degree line test                                                | 32.67                             |                |                                 |                                  |
| 21         |                                                                                  | 32.98                             |                |                                 |                                  |
| 22         |                                                                                  | 32.94                             |                |                                 |                                  |
| 23         | Further quantitative VSC testing undertaken                                      | 32.82                             |                |                                 |                                  |
| 24         | 25 degree line unobstructed                                                      | -                                 |                |                                 |                                  |
| 25         | Does not pass 25 degree line test<br>Further quantitative VSC testing undertaken | 29.54                             |                |                                 |                                  |
| 26 - 28    | 25 degree line unobstructed                                                      | -                                 |                |                                 |                                  |

|                                     |    |
|-------------------------------------|----|
| Number of windows                   | 11 |
| Windows passing 25 degree line test | 6  |
| Windows with a VSC greater than 27% | 5  |



# Daylight, Sunlight and Overshadowing

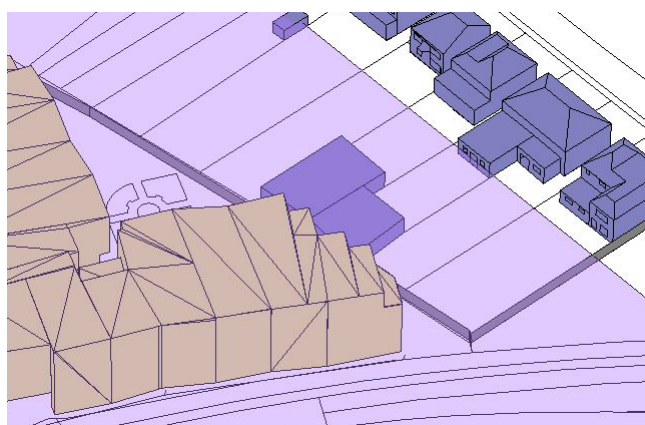
## Dwellings off Chapel Lane

70 Chapel Lane is a building located to the east of the proposed site at Park View. 3 windows on the ground floor extension of this building have been assessed, as they have been identified as potentially being the most affected by the proposed development.

The daylight analysis indicates that all 3 assessed windows will pass the 25 degree line test, thereby meeting the BRE criteria for daylight access. As the assessed windows are positioned closest to the

proposed scheme, it has been deemed that if they pass the 25 degree line test then all ground floor windows facing the proposed scheme on the line of dwellings off Chapel Lane will meet this criteria.

Therefore, the proposed scheme is not shown to have any adverse impact on the daylight received by the windows on the dwellings off Chapel Road



25° line emanating from 60-62 Queens Road



Assessed windows on 60-62 Queens Road

## Results Summary

| Window No. | 25 degree line test         | VSC test                          |                |                                 | Comments                         |
|------------|-----------------------------|-----------------------------------|----------------|---------------------------------|----------------------------------|
|            |                             | Proposed VSC % (>27% recommended) | Existing VSC % | Relative VSC (>0.8 recommended) |                                  |
| 29-31      | 25 degree line unobstructed | -                                 | -              | -                               | Good levels of daylight received |

|                                     |   |
|-------------------------------------|---|
| Number of windows                   | 3 |
| Windows passing 25 degree line test | 3 |

# Daylight, Sunlight and Overshadowing

## Summary of Daylight Results

The daylight levels for the surrounding windows potentially affected by the proposed site of the Park View Extra-Care Home were found to be acceptable. All of the assessed windows on the surrounding properties passed the 25 and 45 degree line projections tests or one of VSC tests.

In summary of the windows assessed,

- 9 passed the 25 degree line test;
- A further 17 windows passed the 45 degree plane projections test; and
- The remaining 5 windows achieved VSC's greater than 27%.

Therefore, it can be concluded that the proposed development of the Park View Extra-Care Home will not result in a significant adverse impact on daylight received by the surrounding properties.

## Summary of Daylight Results for Surrounding Windows

| Total no. of windows | Test 1: 25 & 45 degree projections |                                                  | VSC tests                       |                           |
|----------------------|------------------------------------|--------------------------------------------------|---------------------------------|---------------------------|
|                      | Windows passing 25 degree line     | Windows passing 45 degree plane projections test | Test 2: Windows passing 27% VSC | Test 3: Relative VSC test |
| 31                   | 9                                  | 17                                               | 5                               | -                         |



## Sunlight Assessment

### Sunlight Assessment

A sunlight assessment was carried out on the existing neighbouring facades to determine acceptable sunlight levels. The sunlight tests only apply to those windows which face within 90 degrees of due south. A total of 21 windows were analysed for sunlight access.

This test calculates the amount of sunlight hours the window receives across a whole year and over the winter period (21 September - 21 March), allowing for average levels of cloudiness for the location. The following criteria should be met to ensure good levels of sunlight:

- The 25 degree line plan emanating from the window is not obstructed; or
- Windows should receive at least 25% of annual probable sunlight hours (APSH) and at least 5% of probable sunlight hours in the winter (WPSH); or
- Windows under proposed conditions should receive annual and winter probable sunlight hours (APSH and WPSH) of more than 0.8 times their former values during either periods; or
- The reduction in annual probable sunlight hours (APSH) received over the whole year is less than 4%.

The term 'annual probable sunlight hours' (APSH) refers to the long-term average of the total of hours during a year in which direct sunlight reaches the unobstructed ground. The 'winter probable sunlight hours' (WPSH) is used in the same way but only for the winter period (21 September – 21 March).



# Daylight, Sunlight and Overshadowing

## Assessed Facades

All potentially affected windows that have been identified as being within 90 degrees of due south have been included within the sunlight assessment in this report. The assessed window facades are marked on the image below.

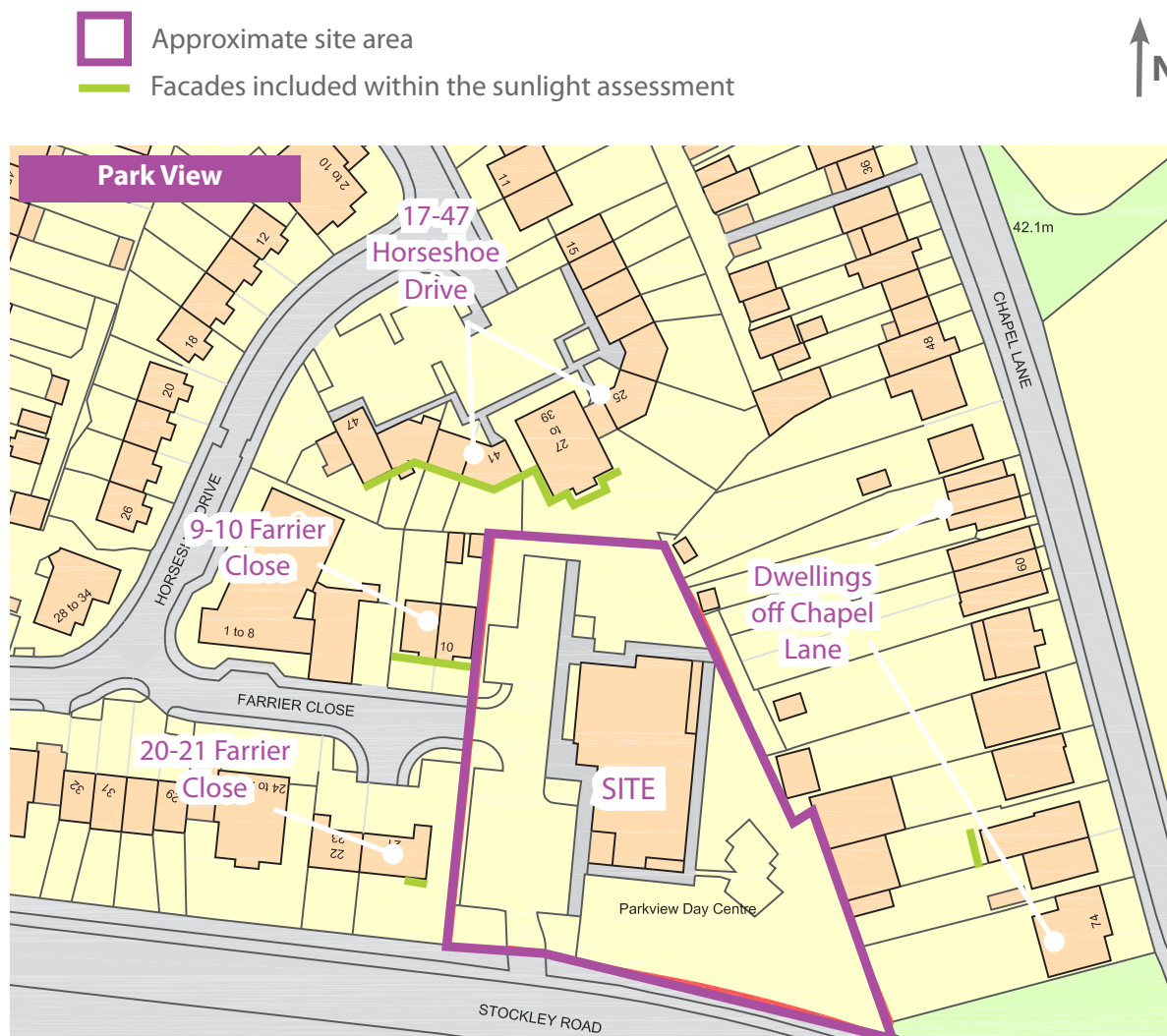
A total of 21 windows have been included in the analysis, and the results of these are presented in the following pages.

## Analysed windows

The assessed surrounding buildings include:

- 9-10 Farrier Close (window nos. 1-6);
- 20-21 Farrier Close (window no. 7);
- 17-47 Horseshoe Drive (window nos. 18-28); and
- Dwellings off Chapel Lane (window nos. 29-31)

The results for all assessed windows are presented on the following pages.



Sunlight Access Assessment: surrounding building facades assessed.

## Sunlight Results for Surrounding Windows

| Win-<br>dow<br>No. | 25 degree<br>line test                     | Annual Probable Sunlight Hours |                                        |                                            | Winter Probable Sunlight Hours |                                       |                                            | Comments                                      |
|--------------------|--------------------------------------------|--------------------------------|----------------------------------------|--------------------------------------------|--------------------------------|---------------------------------------|--------------------------------------------|-----------------------------------------------|
|                    |                                            | Existing<br>APSH               | Proposed<br>APSH<br>(>372<br>required) | Ratio of<br>existing &<br>proposed<br>APSH | Existing<br>WPSH               | Proposed<br>WPSH<br>(>22<br>required) | Ratio of<br>existing &<br>proposed<br>WPSH |                                               |
| 1                  | Does not pass<br>25 degree<br>test         | 82                             | 75                                     | 0.91                                       | 27                             | 23                                    | 0.85                                       | Good levels of<br>sunlight access<br>achieved |
| 2                  |                                            | 82                             | 78                                     | 0.95                                       | 29                             | 26                                    | 0.90                                       |                                               |
| 3                  |                                            | 85                             | 80                                     | 0.94                                       | 30                             | 27                                    | 0.90                                       |                                               |
| 4                  |                                            | 87                             | 85                                     | 0.98                                       | 29                             | 27                                    | 0.93                                       |                                               |
| 5                  |                                            | 87                             | 85                                     | 0.98                                       | 29                             | 27                                    | 0.93                                       |                                               |
| 6                  |                                            | 83                             | 81                                     | 0.98                                       | 29                             | 27                                    | 0.93                                       |                                               |
| 7                  |                                            | 87                             | 84                                     | 0.97                                       | 30                             | 30                                    | 1.00                                       |                                               |
| 8-17               | Windows not within 90 degrees of due south |                                |                                        |                                            |                                |                                       |                                            |                                               |
| 18-19              | 25 degree<br>line<br>unobstructed          | -                              | -                                      | -                                          | -                              | -                                     | -                                          |                                               |
| 20                 | Does not pass<br>25 degree<br>test         | 76                             | 75                                     | 0.99                                       | 27                             | 26                                    | 0.96                                       |                                               |
| 21                 |                                            | 76                             | 75                                     | 0.99                                       | 26                             | 25                                    | 0.96                                       |                                               |
| 22                 |                                            | 77                             | 76                                     | 0.99                                       | 26                             | 25                                    | 0.96                                       |                                               |
| 23                 |                                            | 76                             | 74                                     | 0.97                                       | 25                             | 23                                    | 0.92                                       |                                               |
| 24                 | 25 degree<br>line<br>unobstructed          | -                              | -                                      | -                                          | -                              | -                                     | -                                          |                                               |
| 25                 | Does not pass<br>25 degree<br>test         | 56                             | 54                                     | 0.96                                       | 22                             | 20                                    | 0.91                                       |                                               |
| 26-28              | 25 degree<br>line<br>unobstructed          | -                              | -                                      | -                                          | -                              | -                                     | -                                          |                                               |
| 29-31              |                                            | -                              | -                                      | -                                          | -                              | -                                     | -                                          |                                               |

# Daylight, Sunlight and Overshadowing

## Summary of Sunlight Results

The sunlight assessment was carried out for 21 windows within 90 degrees of due south. The sunlight assessment results are as follows:

- 9 of the windows were within the 25 degree line; and
- The remaining 12 windows will receive probable annual sunlight hours and probable winter sunlight hours more than 0.8 times their former values.

Therefore, it can be concluded that the assessed windows will have access to sunlight in line with the BRE criteria. Thus, it can be deemed that the proposed development of the Park View Extra-Care Home will not have a significant impact on the sunlight hours received by the surrounding properties.

## Summary of Sunlight to Existing Buildings Results

| Total no. of windows | Test 1: 25 degree line | Test 2: Minimum hours of sunlight |                             | Test 3: Relative APSH & WPSH - Proposed conditions with 0.8 times sunlight hours of existing condition during either period |
|----------------------|------------------------|-----------------------------------|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------|
|                      |                        | 25% of annual sunlight hours      | 5% of winter sunlight hours |                                                                                                                             |
| 21                   | 9                      | 0                                 | 0                           | 12                                                                                                                          |



## Daylight, Sunlight and Overshadowing

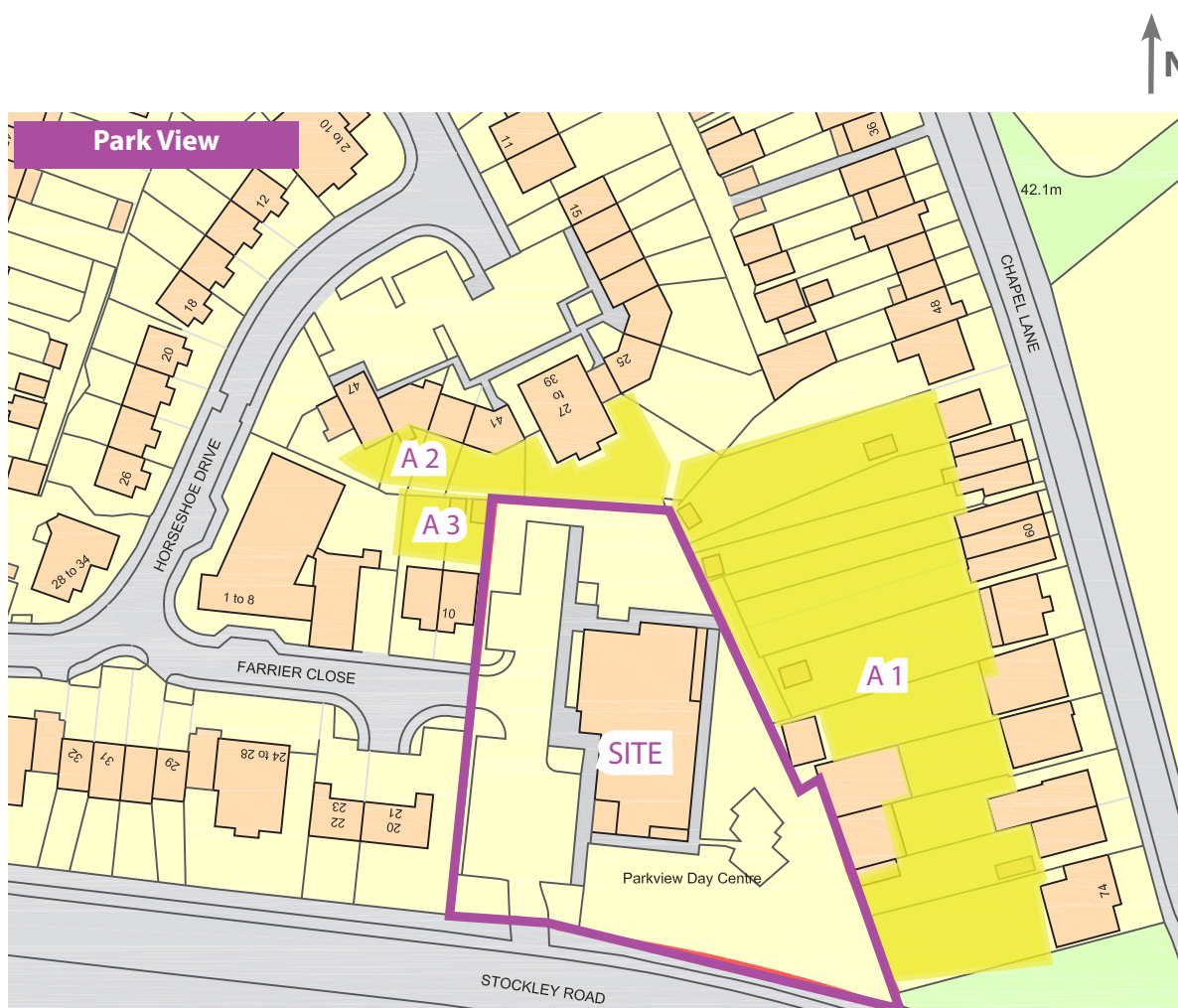
### Overshadowing Assessment

#### Overshadowing Assessment

A review of the site plan showed that there are three main amenity areas in close proximity to the proposed development, as shown in the figure below.

Solar Access Analysis was undertaken on these amenity areas for the full 24 hours on 21 March as set out by the BRE.

For the purposes of this assessment the area of A1 represents all the potentially affected amenity spaces of the line of dwellings off Chapel Lane, A2 represents the potentially affected amenity area of 17-47 Horseshoe Drive and A3 depicts the amenity areas of 9-10 Farrier Close.



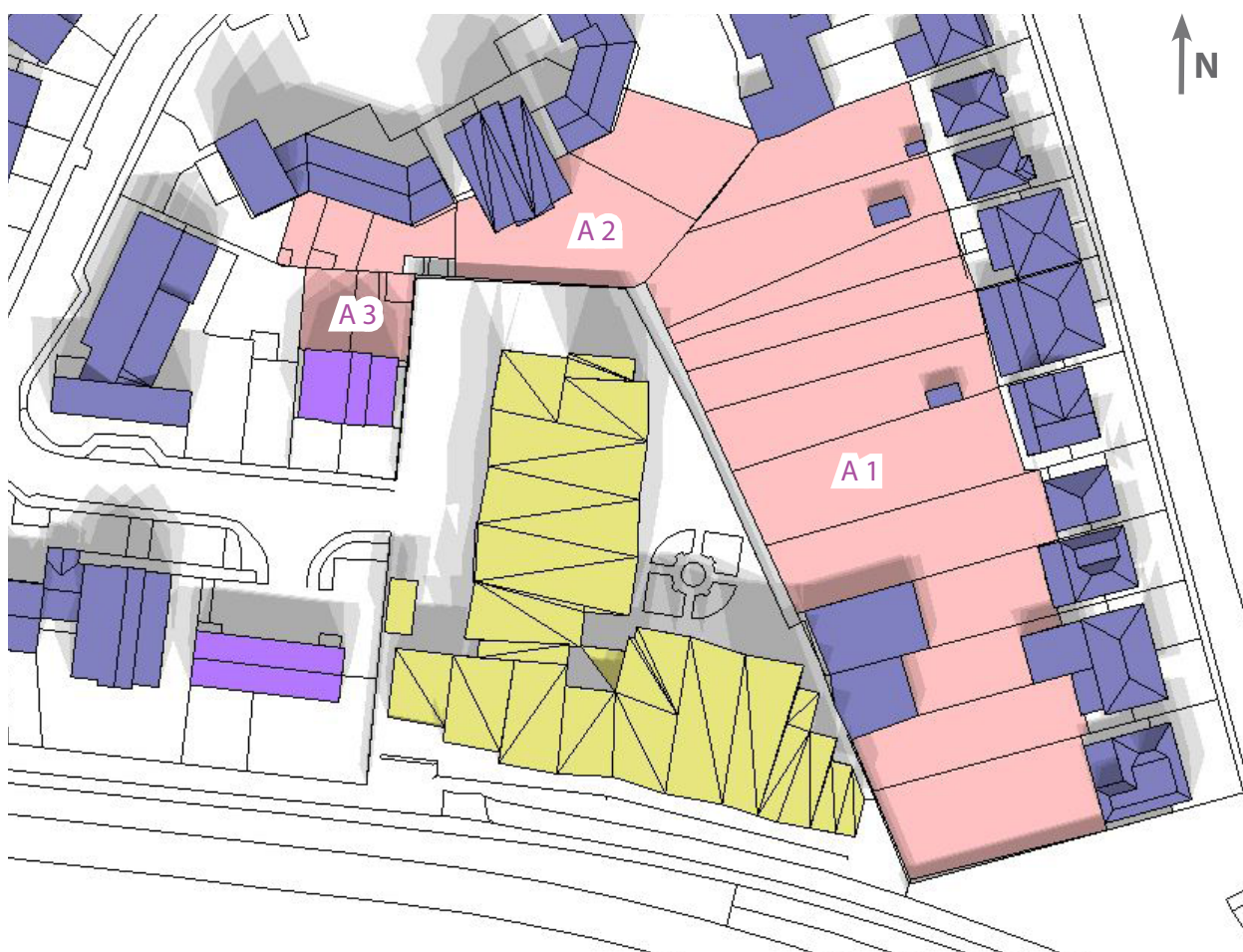
Aerial view of amenity spaces (highlighted in yellow) surrounding the proposed development at Park View (approximate site area outlined in purple).

## Daylight, Sunlight and Overshadowing

The image below shows that more than 50% of amenity spaces A1 and A2 will receive at least 2 hours of direct sunlight on 21 March (between 11am and 1pm) under proposed condition.

Amenity space A3 will be overshadowed by the existing residential building at 9-10 Farrier Close at this time, however it will not be affected by the proposed scheme of the Park View Extra-Care Home.

Therefore, it can be deemed that the proposed development is not considered to have an adverse impact on the sunlight access to amenity spaces A1, A2 and A3 and will be meeting the BRE criteria for the reduction of overshadowing.



Overshadowing of amenity spaces A1, A2 and A3 from 11am - 1pm on 21st March.

# Daylight, Sunlight and Overshadowing

## Conclusion

The daylight and sunlight analysis indicates that the impact on surrounding properties arising from the proposed development of the Park View Extra-Care Home will be within the BRE recommendations.

### Daylight Assessment

A total number of 31 windows were assessed for daylight access. The daylight assessment results are as follows:

- 9 windows have passed the 25 degree line test;
- 17 windows have passed the 45 degree planes projection test; and
- The 5 remaining windows achieved a VSC of greater than 27%.

Therefore, the proposed development is not likely to result in a significant adverse impact on the daylight received by the surrounding properties.

### Sunlight Assessment

A total of 21 windows within 90 degrees of south on surrounding properties were assessed for annual and winter sunlight hours. The sunlight assessment results are as follows:

- 9 windows were found to pass the 25 degree line test; and
- The remaining 12 windows will receive probable annual sunlight hours and probable winter sunlight hours more than 0.8 times their former values.

Therefore, the results presented indicates that the proposed development is considered to have no significant negative impact on the sunlight hours received by the surrounding properties.

### Overshadowing Assessment

3 amenity zones were identified to be in close proximity to the proposed development, and have been included in the overshadowing assessment.

Amenity spaces A1 and A2 were shown to receive at least 2 hours of sunlight (between 11am and 1pm) on 21 March over at least 50% of their areas under proposed condition. Amenity space A3 was shown to be unaffected by the proposed building, in terms of overshadowing, between 11am and 1pm on the 21st of March.

Therefore, the proposed development is not shown to have an adverse impact on the sunlight access to existing surrounding amenity spaces.

### Summary

In summary, all assessed windows on properties surrounding the proposed development will receive good levels of daylight and sunlight, and the assessed amenity spaces will receive adequate amounts of sunlight, as per the BRE guidance.

Therefore, it can be concluded that the proposed building of the Park View Extra-Care Home is not likely to have an adverse impact on the daylight and sunlight access to the surrounding buildings and amenity spaces within its vicinity.

