PRICE&MYERS

Consulting Engineers

30 Newman Street
London W1T 1LT
T 020 7631 5128
F 020 7462 1390
sustainability@pricemyers.com
www.pricemyers.com

Buckingham Hotel, Buxton SK17 9AS

Daylight and Sunlight Assessment

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Prepared by: Nikiforos Papatheodorou
Reviewed by: Jessica Gray
Project number: 22415

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Executive Summary

Price & Myers have been instructed by Boyarsky Murphy Architects to carry out a daylight and sunlight impact assessment in order to support the planning application of the proposed Buckingham Hotel in Buxton within the High Peak Borough.

This report is an assessment of the impact of the proposed development on the availability of daylight and sunlight of the existing surrounding buildings and amenity spaces. The purpose of this report is to determine whether the proposed design meets the criteria set out in the Building Research Establishment Report 'Site layout planning for daylight and sunlight- A guide to good practice' (2011).

A 3D model was developed for the purpose of assessment that included all the surrounding buildings that are likely to be affected. Site analysis indicated the adjacent residential property at 29 St. John's Road, former care home at 34 St. John's Road and nursery and residential property at 3 Burlington Road to be the sensitive receptors for daylight and sunlight assessment. All other developments in the vicinity of the site were found to be located outside the limit of the spacing guideline set by the BRE and therefore will not have any impact from the proposed development.

The daylight assessment was carried out by determining the Vertical Sky Component at the centre of surrounding windows for both existing and proposed scenarios, to ascertain the magnitude of impact on the potential receptors from the proposed building. The result indicated that the VSC values for 33 out of 35 tested windows of the identified neighbouring properties met the BRE criteria which mean the habitable rooms of these properties will continue to receive good daylight levels with the proposed development in place. The only exceptions were windows associated with the study room of the residence at 29 St. John's Road. However the room is dual aspect and is likely to achieve a good level of daylight. The assessment also showed that these windows fail to receive the recommended VSC value even in the existing scenario and the effect cannot be attributed to the proposed development alone. Therefore the proposed scheme is likely to have an impact of minor significance on the property.

The sunlight assessment was carried out for the receptors facing 90° of due south and lying to the north orientation of the site, as described in the BRE guide. Annual Probable Sunlight Hours (APSH) values and Winter Probable Sunlight Hours (WPSH) values at the centre of surrounding windows for both existing and proposed scenarios were calculated, to ascertain the magnitude of impact on the potential receptors from the proposed building. The result of assessment indicated that 25 out of 27 tested windows of the identified neighbouring properties met the BRE criteria for minimum sunlight hours in winters and throughout the year. The only exceptions were 2 windows associated with the study room of the residence at 29 St. John's Road. The assessment showed that in winter, these windows fail to receive any sunlight. This effect is caused by the garage located on the south orientation of the property and cannot be attributed to the proposed development. It should also be noted that a study room is relatively less sensitive to the availability of sunlight based on the functions associated with it. Therefore it may be concluded that the proposed development will have an impact of minor significance on the sunlight availability within the property.

The shadow analysis confirmed that more than half of the amenity areas lying on the north and east orientation of the site will receive unobstructed sunlight for at least 2 hours on 21st March. This indicates that the amount of sunlight received by the adjacent amenity area meets the BRE requirement and the impact of the proposed building is insignificant.

1 Introduction

Price & Myers has been instructed by Boyarsky Murphy Architects to carry out a daylight and sunlight impact assessment in order to support the planning application of the Buckingham Hotel. The site is located at the junction of St. John's road and Burlington road in Buxton within the High Peak Borough.

The proposal comprises demolition of the four storey existing hotel on site and construction of a six storey hotel with a multi-storey basement. The total footprint area of the proposed development is approximately 917m2. The ground floor houses reception plus eating and drinking facilities while the guest bedrooms are located on first floor and above. The basement comprises kitchen, utility rooms, plant rooms and facilities for onsite energy generation. The façade is proposed to have sandstone rain screen cladding on the north and east orientation and a living wall on the south and west orientations (Figure 1-1).

Figure 1-1 East and west elevations of the proposed building

daylight and sunlight of the adjacent building and amenities. The purpose of this report is to determine whether the proposed design meets the criteria set out in the Building Research Establishment Report 'Site layout planning for daylight and sunlight- A guide to good practice' (2011).

The assessment is based on drawings provided by the architect for the proposed development including information on the adjacent building. Street views and site photos were also used to model the surroundings of the project site.

2 Site Analysis

2.1 The existing development

The site is located within the High Peak Borough. The existing property on site was built in 1876 and comprises four storeys above ground level and a single storey basement. The building has a footprint of about 560m^2. The existing hotel has a mansard roof and a brick clad façade.

Figure 2-1 View of the Existing Buckingham hotel, Buxton

2.2 Site surrounding buildings

The site is located at the junction of St. John's road and Burlington road in Buxton. The adjacent properties along St. John's road are mostly residential developments. The site has a nursery and residential flats on the south orientation and a former care home on the north orientation. Car parking for the Pavilion gardens is located opposite the property on the east orientation. Site analysis indicates that there is an amenity area on the north orientation of the site associated with the property at 34 St. John's road which may have some overshadowing from the proposed building. The site is surrounded by mature trees on all sides which are mostly deciduous in nature.

Figure 2-2 Site surrounding buildings

2.3 Site Model

A three-dimensional model was built in AutoCAD using the drawings provided by the architect for the proposed development and the adjacent residential properties. Other surrounding buildings were modelled on the basis of information available from site photographs and internet mapping.

The proposed building is expected to have some level of impact on the daylight and sunlight availability through the windows of the adjacent residential property at 29 St. John's Road, former care home at 34 St. John's Road and children nursery and flats at 3 Burlington road. Minor impacts are expected to the rest of the surrounding buildings, due to their distance from the proposed development. This has been further investigated in later sections.

The properties are expected to experience some overshadowing from the adjacent trees. However in order to ascertain clear impact of the proposed building, trees and other landscape features were not included in the assessment model as shown in Figure 2-3 and Figure 2-4. This is in line with the best practice guidelines to represent the worst case scenario.

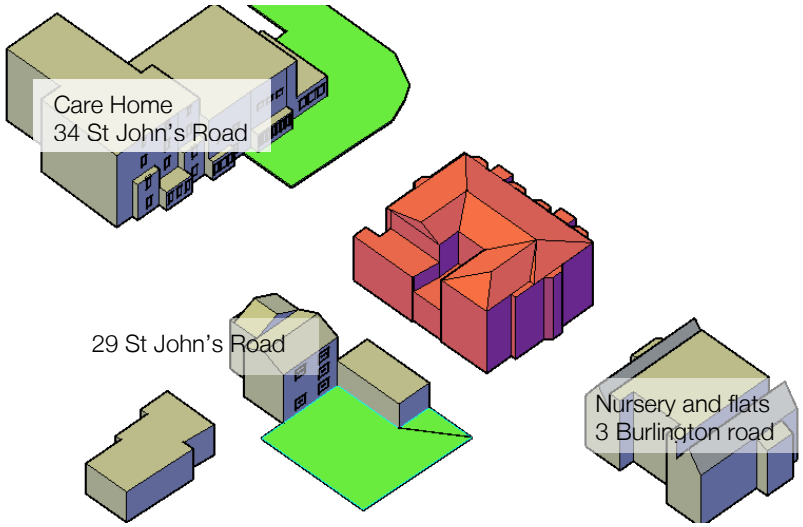

Figure 2-3 3D Model of the Existing building on site and surrounding buildings

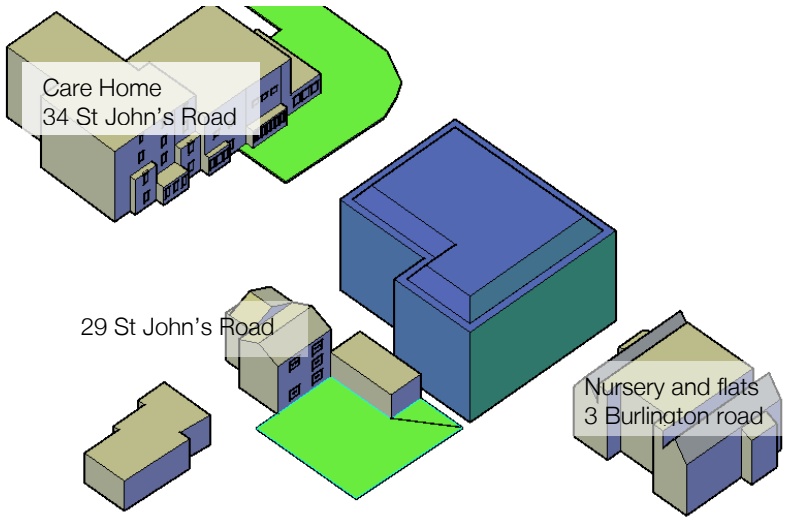

Figure 2-4 3D Model of the proposed building and surrounding buildings

3 Daylight and Sunlight Assessment

The BRE guide is intended to aid designers in considering the relationship between new and existing buildings to ensure that each retains the potential to achieve good daylighting and sunlight levels. The author of the guide, Dr Paul Littlefair states in the introduction that:

"The guide is intended for building designers and their clients, consultants and planning officials. The advice given here is not mandatory and should not be used as an instrument of planning policy. Its aim is to help rather than constrain the designer. Although it gives numerical guidelines, these should be interpreted flexibly because natural lighting is only one of many factors in site layout design".

In designing a new development or extension to a building, care should be taken to safeguard the access to daylight and sunlight for existing buildings. The guidelines given in the BRE guide are intended for use for rooms in adjoining dwellings where daylight and sunlight is required, including living rooms, kitchens and bedrooms. Windows to bathrooms, toilets, storerooms, circulation areas and garages need not be analysed. The guidelines may also be applied to any existing non-domestic building where the occupants have a reasonable expectation of daylight and sunlight, like schools, hospital and offices.

Loss of light to existing windows need not be analysed if the distance of each part of the new development from the existing window is three or more its height about the centre of the existing window. According to the spacing guidelines, only those existing developments that are situated within 60m offset from the proposed development (within the shaded area) might have daylight and sunlight potentially impacted. The residential property at 29 St. John's Road, former care home at 34 St. John's Road and children nursery and flats at 3 Burlington Road, fall within the assessment range. All other developments in the vicinity are located outside the limits of the spacing guidelines and are therefore not tested.

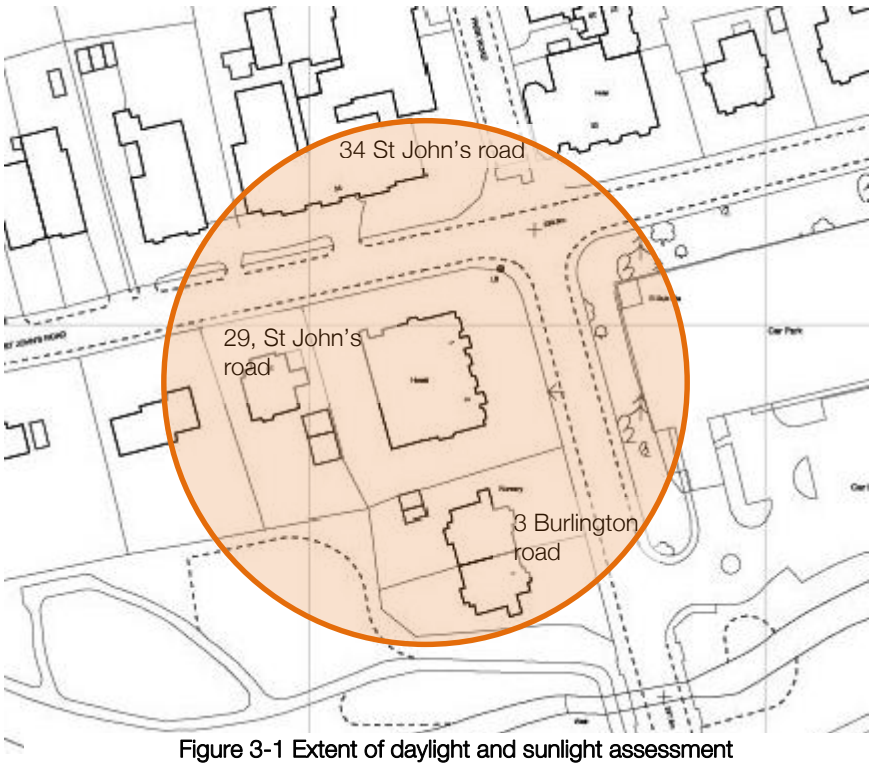

Figure 3-1 Extent of daylight and sunlight assessment

3.1 Daylight

Daylight can be described as the diffused light from the sky. It is assumed to be uniform and non-directional in nature. There are various methods of measuring and assessing daylight in buildings and the choice of test depends upon the circumstances of each particular window.

Vertical Sky Component (VSC)

A quantitative indicator of the amount of daylight available at the window wall requires the calculation of the Vertical Sky Component (VSC). The VSC is the ratio of the direct sky illuminance falling on a vertical wall at a reference point to the simultaneous horizontal illuminance under an unobstructed sky. The maximum value is almost 40% for a completely unobstructed vertical wall.

The VSC has been calculated using the Waldram tools through MBS Survey in AutoCAD. A Waldram diagram has azimuth angle on the horizontal scale and altitude on vertical scale. As explained in the BRE guide, for each vertical plane obstructions from the surrounding buildings should be plotted on the Waldram diagram. The remaining area on the diagram is then proportional to the sky component value on that plane. The software plots a Waldram diagram for each of the identified window and thus gives the VSC value for both the existing and the proposed scenario.

The BRE guide states that if the VSC is greater than 27% with the proposed development, then enough daylight should still be reaching the existing windows. If the VSC calculated at the centre of the windows is less than 27% with the proposed development, then the BRE guide suggests that the former VSC (that is, the VSC without the proposed development) should be calculated. If the VSC with the proposed development in place is both less than 27% and less than 0.8 times its former value, then occupants of the existing building will notice the reduction in daylight and electric lighting will be needed more often.

VSC calculations have been carried out on the windows illustrated in Figure 3-2, Figure 3-3 and Figure 3-4 for the three identified properties – residence at 29 St. John's Road, former care home at 34 St. John's Road and children nursery and flats at 3 Burlington Road,. According to the guidelines, the ground floor windows represent the worst-case scenario and should be tested first. It is assumed that if the lowest windows receive adequate levels of daylight, the windows further up do not require to be tested.

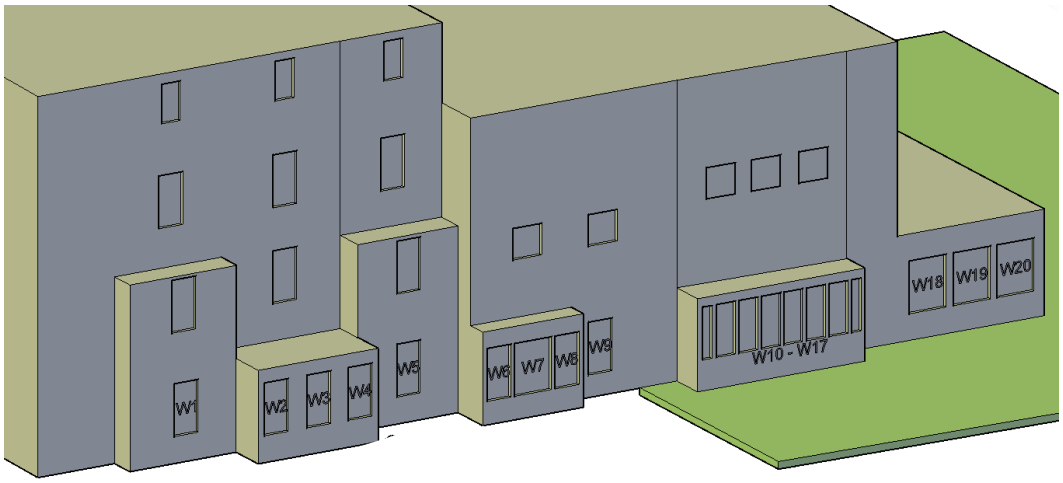

Figure 3-2 Windows assessed for daylight, 34 St John's road)

The calculated values of VSC measured at the identified windows are shown in the following table.

Table 3-1 VSC Results (34 St. John's road)

Tested windows			Vertical Sky Component (VSC) BRE minimum recommended value of 27%			BRE Criteria Met?
			VSC % (proposed case)	VSC % (existing case)	% of existing case (80% and above acceptable)	
Former care home at 34 St. John's road	GF	W1	30.95			Yes
		W2	32.4			Yes
		W3	32.24			Yes
		W4	32.1			Yes
		W5	27.44			Yes
		W6	31.65			Yes
		W7	31.62			Yes
		W8	31.6			Yes
		W9	28.21			Yes
		W10	31.74			Yes
		W11	31.8			Yes
		W12	31.87			Yes
		W13	31.96			Yes
		W14	32.06			Yes
		W15	32.19			Yes
		W16	32.33			Yes
		W17	32.45			Yes
		W18	32.95			Yes
		W19	33.6			Yes
		W20	33.86			Yes

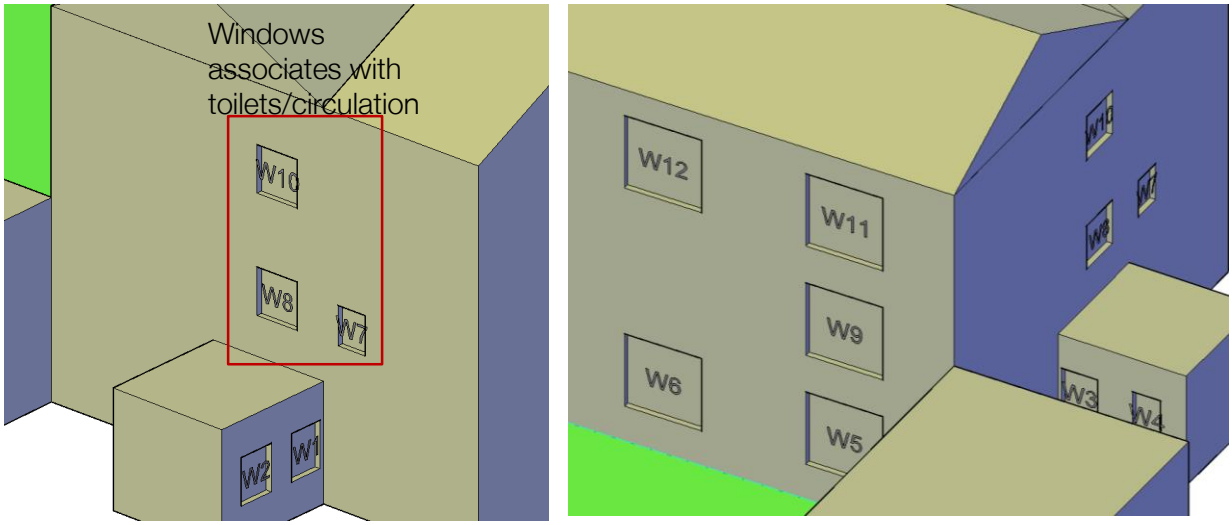

Figure 3-3 Windows assessed for daylight (29 St John's road)

It should be noted that windows W7, W8 and W10 are associated with circulation spaces or toilets and therefore have been excluded from the assessment.

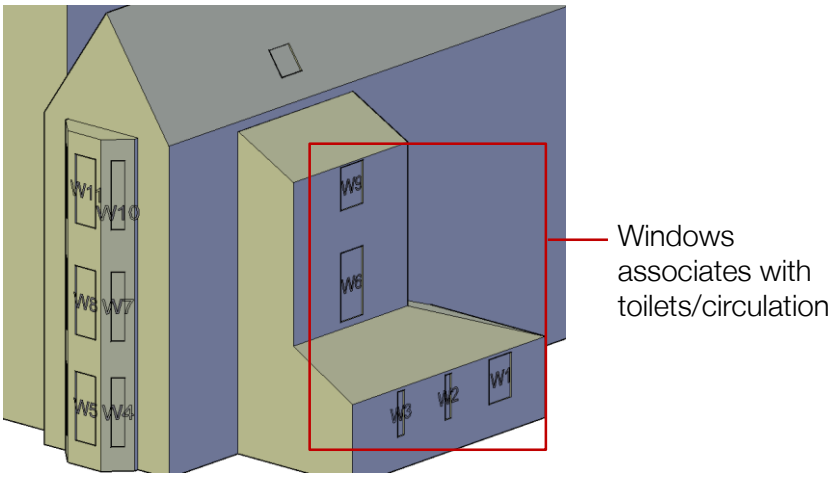

Figure 3-4 Windows assessed for daylight (Nursery and residences at 3 Burlington Road)

Windows W1, 2, 3, 6 and W9 are associated with circulation spaces and toilets and therefore have been excluded from the assessment. The calculated values of VSC measured at the centre of each identified window is shown in the table below.

Table 3-2 VSC Results (Residence at 29 St. John's Road and Nursery at 3 Burlington Road)

Tested windows			Vertical Sky Component (VSC) BRE minimum recommended value of 27%			BRE Criteria Met?
			VSC % (proposed case)	VSC % (existing case)	% of existing case (80% and above acceptable)	
	GF	W1	18.64			Yes
		W2	24.61			Yes

Tested windows			Vertical Sky Component (VSC) BRE minimum recommended value of 27%			BRE Criteria Met?
			VSC % (proposed case)	VSC % (existing case)	% of existing case (80% and above acceptable)	
Residence, 29 St. John's road		W3	6.55	10.43	62.8	No
		W4	8.73	13.33	65.49	No
		W5	30.1			Yes
		W6	33.84			Yes
	FF	W9	32.27			Yes
	SF	W11	33.57			Yes
		W12	35.74			Yes
Nursery and flats, 3 Burlington Road	LG	W4	34.55			Yes
		W5	39.62			Yes
	GF	W7	34.77			Yes
		W8	39.62			Yes
	FF	W10	35.26			Yes
		W11	39.62			Yes

The results indicate that all the tested windows of the former care home at 34 St. John's Road receive VSC level more than the minimum recommended value of 27%. Therefore the proposed development will have **no impact** on the property.

The daylight assessment of the residential property at 29 St. John's Road indicates that most of the windows located on the affected façades receive the recommended VSC values; therefore the rooms will receive acceptable daylight levels. The only exceptions are windows W3 and W4. These windows are associated with the study room which is dual aspect and therefore is likely to achieve good daylight level. The assessment also shows that these windows fail to receive the recommended VSC value in the existing scenario also. This indicates that the light level experienced in the room is already low and the actual perceived impact would be minimal. Based on the analysis it may be concluded that the proposed development will have an impact of **minor significance** on the property.

The result of the daylight assessment for the Nursery and residences at 3 Burlington Road indicates that all of the tested windows receive the recommended VSC values which would mean that the associated rooms will receive adequate daylight levels with the proposed development in place. Therefore it may be concluded that the proposed development will have a **negligible impact** on the property.

Detailed floor plans and internal layouts for these properties were not available at the time of this assessment therefore no-sky line calculations, to further ascertain the impact on the daylight distribution within these spaces, were not carried out.

3.2 Sunlight

Unlike daylight, sunlight is dependent upon direction. The UK lies in the northern hemisphere and we receive our sun from a southerly direction- with the sun rising in the east and setting in the west. The availability of sunlight is therefore dependent upon the orientation of the window or area in question relative to the position of due south.

Sunlight assessment is only applicable where some part of the new development is situated within 90° of due south of a main window wall of an existing building and if any part of the new development subtends an angle of more than 25° to the horizontal measured from the centre of the window in a vertical section perpendicular to the window. In this case the proposed extension lies to the east of the identified receptor and therefore may impact sunlight from that direction.

Annual Probable Sunlight Hours (APSH) and Winter Probable Sunlight Hours (WPSH)

The criterion to assess sunlight suggests that an interior space appears reasonably sunlit when a window serving these spaces receives at least 25% of the Annual Probable Sunlight Hours (APSH) and at least 5% of the Winter Probable Sunlight Hours (WPSH) during the winter months of 21st September to 21st March.

The APSH and WPSH have been calculated using MBS Survey in AutoCAD. Sunlight availability can also be represented on a Waldram diagram. The software calculates the shading patterns from the surrounding buildings on a vertical plane and based on unobstructed area of the Waldram diagram calculates the percentage of total sunlight hours reaching the plane, annually and in winter.

The BRE guide suggests minimum figures of 25% and 5% respectively. If a window fails this test then the BRE guide states that the former values of APSH and WPSH (i.e. the values without the proposed development) should be calculated. If the values with the proposed development in place are less than 0.8 times their former value then occupants of the existing building will notice the loss of sunlight.

Following the BRE guidelines, APSH and WPSH calculations have been carried out on the facades illustrated in the figure below that are located 90° of due south of the proposed development and that are expected to be affected.

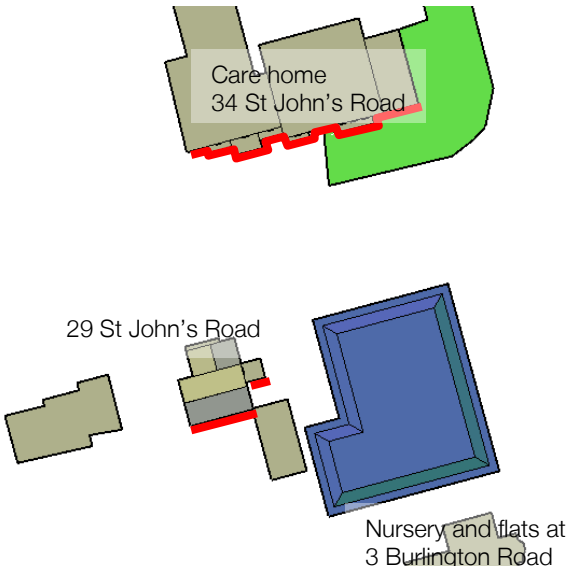

Figure 3-5 Windows assessed for sunlight

The calculated values of APSH and WPSH for the windows (Figure 3-2, Figure 3-3 and Figure 3-4) located on the identified facades are shown in Table 3-3 and Table 3-4

Table 3-3 APSH results

Property / Façade/Tested windows			Annual Probable Sunlight Hours (APSH %) BRE minimum recommended value 25%			BRE Criteria Met?
			APSH % (proposed case)	APSH % (existing case)	% of existing case (80% and above acceptable)	
Former care home at 34 St. John's road	GF	W1	74			Yes
		W2	83			Yes
		W3	83			Yes
		W4	80			Yes
		W5	64			Yes
		W6	82			Yes
		W7	82			Yes
		W8	79			Yes
		W9	58			Yes
		W10	81			Yes
		W11	81			Yes
		W12	80			Yes
		W13	80			Yes
		W14	81			Yes
		W15	80			Yes
		W16	79			Yes
		W17	80			Yes
		W18	79			Yes
		W19	79			Yes
		W20	82			Yes
Residence, 29 St. John's road	GF	W3	10	24	42	No
		W4	13	31	42	No
		W5	63			Yes
		W6	70			Yes
	FF	W9	67			Yes
	SF	W11	68			Yes
		W12	77			Yes

Table 3-4 WPSH results

Property / Façade/Tested windows			Winter Probable Sunlight Hours (WPSH %) BRE minimum recommended value 5%			BRE Criteria Met?
			WPSH % (proposed case)	WPSH % (existing case)	% of existing case (80% and above acceptable)	
Former care home at 34 St. John's road	GF	W1	25			Yes
		W2	24			Yes
		W3	24			Yes
		W4	22			Yes
		W5	18			Yes
		W6	23			Yes
		W7	23			Yes
		W8	22			Yes
		W9	17			Yes
		W10	22			Yes
		W11	22			Yes
		W12	21			Yes
		W13	21			Yes
		W14	22			Yes
		W15	21			Yes
		W16	20			Yes
		W17	21			Yes
		W18	21			Yes
		W19	20			Yes
		W20	23			Yes
Residence, 29 St. John's road	GF	W3	0	0	-	No
		W4	0	0	-	No
		W5	24			Yes
		W6	27			Yes
	FF	W9	25			Yes
	SF	W11	25			Yes
		W12	27			Yes

For the identified buildings and facades, both APSH and WPSH values for most of the tested window are above the 25% and 5% minimum recommended values respectively. The only exceptions are windows W3 and W4 located on the ground floor of the residence at 29 St. John's Road. The assessment also shows that the percentage reduction in APSH is more than the recommended value and therefore the proposed development is likely to have an adverse effect of moderate significance on the sunlight availability within the associated room. The room associated with the affected windows is a study room. A study room is relatively less sensitive to the availability of sunlight as compared to a living room based on the functions associated with them. Therefore it may be concluded that the proposed development will have an impact of **minor significance** on the annual sunlight availability within the property.

The assessment for sunlight availability in winter indicates that windows W3 and W4 fail to receive any sunlight. This effect is caused by the garage located on the south orientation of the property which completely blocks lower angle of sun during winter months. The proposed development therefore has no adverse effect on the sunlight availability within the building. It will have an impact of **negligible significance** on the property.

Gardens and Open Spaces

Good site layout planning for daylight and sunlight should not limit itself to providing good natural lighting inside buildings. Sunlight in amenity spaces between buildings has an important impact on the overall appearance and ambience of a development.

According to the BRE Guide, it is recommended that for a garden or amenity area to appear adequately sunlit throughout the year, at least half of the area should receive at least two hours of sunlight on 21st March. If as a result of a 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.

The amenity areas in the vicinity of site that may be overshadowed by the proposed development is the rear garden of adjacent residence at 29 St. John's Road and front garden of the former care home at 34 St. john's Road. The purpose of other open spaces are not known.

The shadow diagram in Figure 3-6 shows that even with the proposed building in place more than 50% of the area of identified amenity areas get unobstructed sunlight between 09:00 and 11:00 hrs on 21st March. Therefore the BRE criterion is met as more than half of the amenity areas receives sunlight for more than 2 hours on 21st of March.

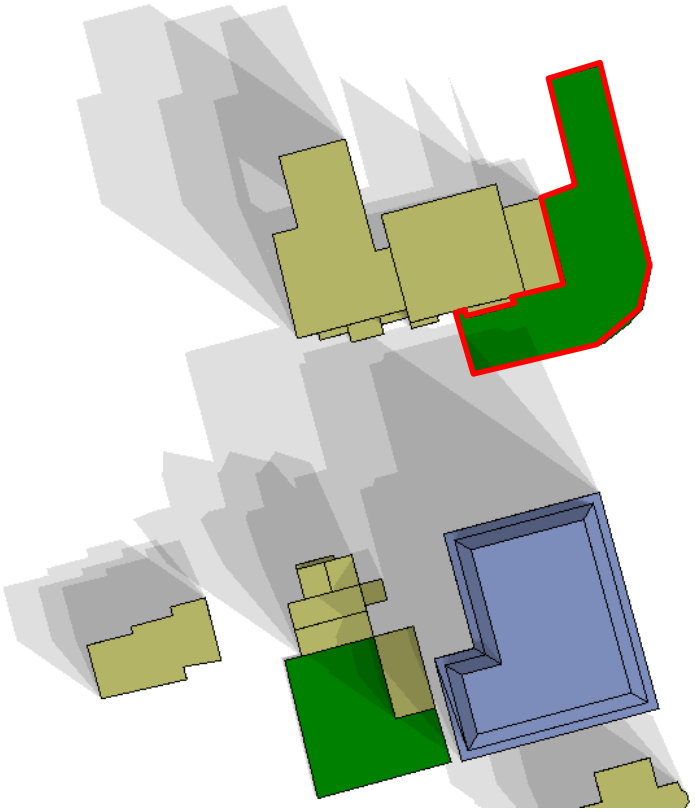

Figure 3-6 Overshadowing analysis for the amenity areas between 9:00 and 11:00 hrs

The overall impact of the proposed building on the adjacent amenity areas has been assessed as negligible. The tested model excludes trees, low height plantation, landscape features and boundary walls. This is in line with the industry standard and guidance to assess the clear impact of the proposed development, on its surroundings.

3.3 Summary of result

The result of the assessment indicates that the proposed development will have **no impact** on the daylight and sunlight availability of the former care home at 34 St. John's Road.

The overall impact of the proposed development on the daylight and sunlight availability of the adjacent residential property at 29 St. John's road is of **minor significance.** 2 out of 9 windows that were tested fail to meet the BRE criteria for daylight and sunlight. It was found that the room associated with these windows is dual aspect and therefore may still receive a good level of daylight. It should also be noted that the room is used as a study room which has less sensitivity to sunlight as compared to other living rooms.

The proposed development will have **no impact** on the daylight and sunlight availability of the adjacent nursery and residential property at 3 Burlington Road.

Property	No. of Windows Tested	Criteria	No. of windows passing/failing	Pass/Fail	Overall impact of the proposed development
Former care home at 34 St. John's road	20	Daylight	20	Pass	No Impact
			0	Fail	
	20	APSH	20	Pass	
			0	Fail	
		WPSH	20	Pass	
			0	Fail	
Residence, 29 St. John's road	9	Daylight	7	Pass	Minor
			2	Fail	
	7	APSH	5	Pass	
			2	Fail	
		WPSH	5	Pass	
			2	Fail	
Nursery and flats, 3 Burlington Road	6	Daylight	6	Pass	No Impact
			0	Fail	

4 Conclusion

An assessment of the daylight and sunlight impacts from the proposed building Buckingham Hotel on the existing surrounding buildings and amenities was carried out.

Site analysis indicated the adjacent residential property at 29 St. John's Road, former care home at 34 St. John's Road and nursery and residential property at 3 Burlington Road to be the sensitive receptors for daylight and sunlight assessment. All other developments in the vicinity of the site were found to be located outside the limit of the spacing guideline set by the BRE and therefore will not have any impact from the proposed development.

The daylight assessment was carried out by determining the Vertical Sky Component at the centre of surrounding windows for both existing and proposed scenarios, to ascertain the magnitude of impact on the potential receptors from the proposed building. The result indicated that the VSC values for 33 out of 35 tested windows of the identified neighbouring properties met the BRE criteria which mean the habitable rooms of these properties will continue to receive good daylight levels with the proposed development in place. The only exceptions were windows associated with the study room of the residence at 29 St. John's Road. However the room is dual aspect and is likely to achieve a good level of daylight. The assessment also showed that these windows fail to receive the recommended VSC value even in the existing scenario and the effect cannot be attributed to the proposed development alone. Therefore the proposed scheme is likely to have an impact of minor significance on the property.

The sunlight assessment was carried out for the receptors facing 90° of due south and lying to the north orientation of the site, as described in the BRE guide. Annual Probable Sunlight Hours (APSH) values and Winter Probable Sunlight Hours (WPSH) values at the centre of surrounding windows for both existing and proposed scenarios were calculated, to ascertain the magnitude of impact on the potential receptors from the proposed building. The result of assessment indicated that 25 out of 27 tested windows of the identified neighbouring properties met the BRE criteria for minimum sunlight hours in winters and throughout the year. The only exceptions were 2 windows associated with the study room of the residence at 29 St. John's Road. The assessment showed that in winter, these windows fail to receive any sunlight. This effect is caused by the garage located on the south orientation of the property and cannot be attributed to the proposed development. It should also be noted that a study room is relatively less sensitive to the availability of sunlight based on the functions associated with it. Therefore it may be concluded that the proposed development will have an impact of minor significance on the sunlight availability within the property.

The shadow analysis confirmed that more than half of the amenity areas lying on the north and east orientation of the site will receive unobstructed sunlight for at least 2 hours on 21st March. This indicates that the amount of sunlight received by the adjacent amenity area meets the BRE requirement and the impact of the proposed building is insignificant.