Daylight and Sunlight and Overshadowing Assessment

Oak Grove

For Pocket Living

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XCO2 energy

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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 and LEED accredited professionals.

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Executive Summary

Sunlight and daylight analysis was carried out for the proposed development at Oak Grove, located within the London Borough of Camden.

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

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) which is accepted as good practice by Planning Authorities.

The following assessments were carried out:

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

Specialist 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 within acceptable limits. A total number of 27 windows were assessed for daylight access. The assessment results are as follows:

- 13 out of the 27 windows passed the 25 degree line test;
- 9 windows achieved a VSC of greater than 27%;
- 3 windows achieved the recommended relative VSC value of 0.8 of their former value;
- 2 windows on 19 and 19a Richborough Road had relative VSC values of 0.6 and 0.7 respectively, which is close to the recommended value of 0.8.

For the 2 windows that did not achieve relative VSC ratios of 0.8, it is important to take into account that the site is currently empty, which means that the windows under the existing site condition receive more than their fair share of daylight for an urban environment. In addition, BRE's 27% VSC target relates to daylight access to two storey terrace houses which are located at least 12m apart, and therefore should not be used as strict targets for this site. The 2 windows would receive VSCs of over 20% under the proposed condition, which is considered to be satisfactory at an urban setting within London.

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

Sunlight Assessment

A total of 8 south facing windows (within 90 degrees of south) on surrounding properties were assessed for annual and winter sunlight hours. Sunlight assessment results are as follows:

- 3 windows pass the 25 degree line test;
- all of the remaining 5 windows achieved 25% of probable annual sunlight hours and 5% of probable winter sunlight hours.

The results are within the BRE guidelines and show that the proposed development is considered to have no significant adverse impact on sunlight hours received by the surrounding properties.

Overshadowing

Three private gardens were identified to be in proximity to the proposed development, and have been included in the overshadowing assessment. All the assessed spaces receive at least 2 hours or more of sunlight on 21 March for at least 50% of their area under the proposed condition, which meets the BRE's target for sunlight access.

The proposed development does not have a significant impact on sunlight access to the existing amenity spaces.

Summary

In summary, the majority of the existing windows on properties surrounding the proposed development meet the daylight and sunlight targets set out in the BRE Guide. Two windows located to the immediate south of the site had relative VSC marginally below the BRE criteria for daylight access. Although these windows do not meet the BRE criteria for daylight access, they are not considered to be significantly impacted by the proposed development as the VSC levels received by these windows were over 20%. This is a fair result for buildings within an urban environment such as the area surrounding the proposed development.

Overall, the proposed development is not expected to cause a significant negative impact to daylight and sunlight access for surrounding properties and amenity spaces.

Introduction

This report assesses the daylight, sunlight and overshadowing impacts the proposed new build residential development at Oak Grove may have on the existing properties and open spaces surrounding the site.

The approach 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 by 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. Appendix G of the BRE document is dedicated to the use of alternative values and it also demonstrates the manner in which the criteria for skylight was determined for the summary given above, i.e. the need for 27% vertical sky component for adequate daylighting.

This figure of 27% was achieved using the following methodology: a theoretical road was created with two storey terraced houses upon either side, approximately 12 metres apart. The houses have windows at ground and first floor level, and a pitched roof with a central ridge. Thereafter, a reference point was taken at the centre of a ground floor window of one of the properties and a line was drawn from this point to the central ridge of the property on the other side of the road.

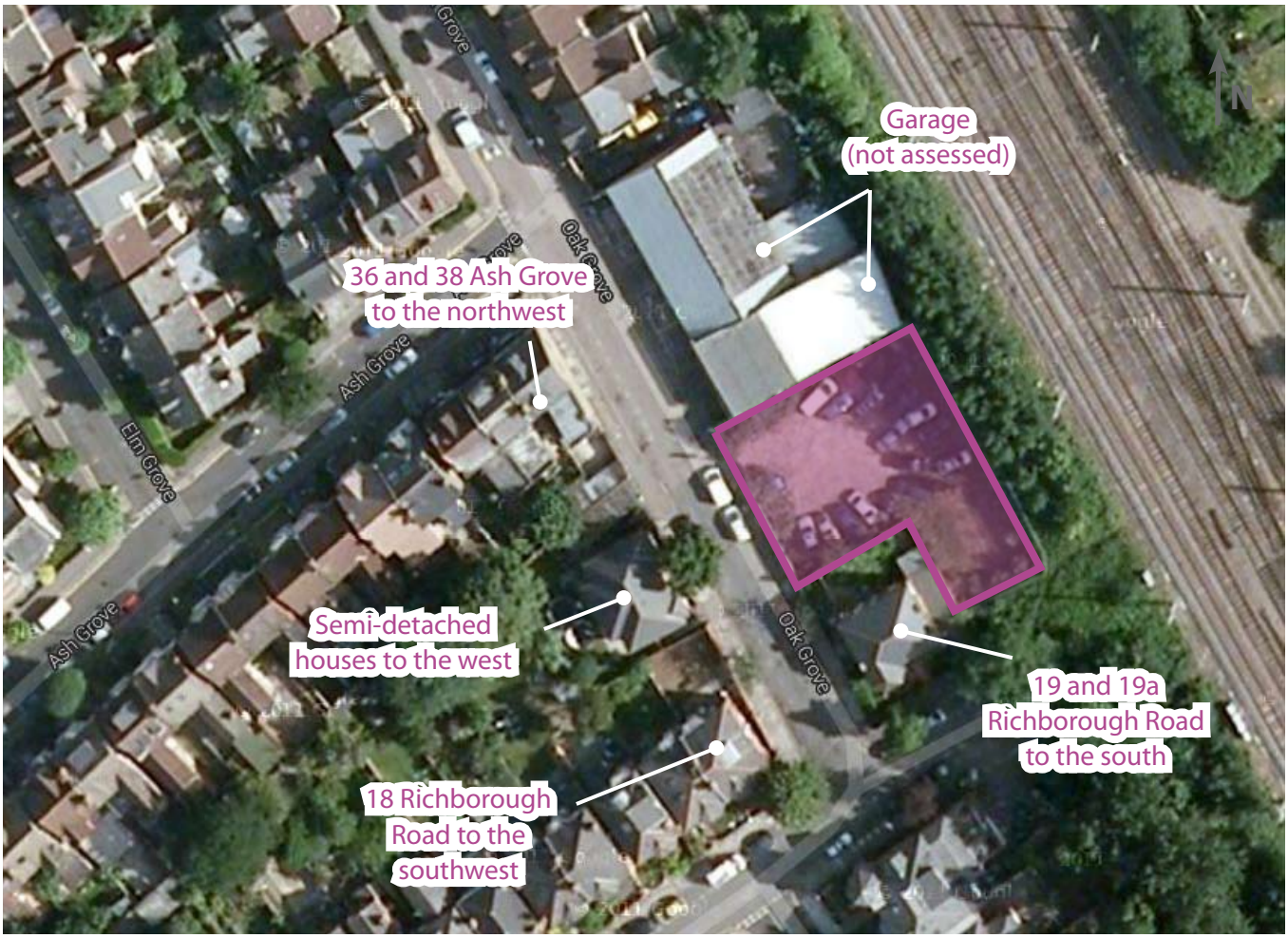
The angle of this line equated to 25 degrees (the 25 degrees referred to in the summaries given with reference to the criteria for skylight). This 25 degrees line obstructs 13% of the totally unobstructed sky available, leaving a resultant figure of 27% which is deemed to give adequate daylighting. This figure of 27% is the recommended criteria referred to in this report. It will be readily appreciated that for windows on a dwelling in the urban area that do not directly face onto a road which is twelve metres in width, the 27% target is impractical.

Therefore, given the layout of the site in relation to its neighbouring buildings, as well as its urban setting, it is important to take into account that although the 27% VSC target is the standard criterion recommended by the BRE, it is not fully applicable to the development and that a lower VSC target is considered to be acceptable.

Site

The proposed development is a three storey residential building located along Oak Grove in the London Borough of Camden. There are currently no buildings present on the site.

Site analysis was carried out to identify any potential daylight and sunlight impacts on the surrounding developments. Relevant properties that may be impacted by the proposed development are annotated in the figure below.



Plan of surrounding areas for proposed development at Oak Grove. Site area highlighted in pink.
(Image source: Google Maps 2014)

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. When an obstruction of the 25 degree plane occurs, a more detailed assessment involving the Vertical Sky Component of the affected window would need to be carried out.

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. If the VSC is less than 27%, then a comparison of existing and proposed levels of VSC level would need to be calculated.

3. Relative Vertical Sky Component

Good levels of daylighting can still be achieved if VSC levels are over 0.8 of their former value.

Sunlight

Access to sunlight (APSH)

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 out 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 and
- the difference between the APSH is not less than 0.8 times its former value; or
- the 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 a window 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.

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".

The following sections presents the daylight, sunlight and overshadowing assessment results for the proposed development at Oak Grove.

Daylight Assessment

A total of 27 windows located on the residential properties surrounding the proposed development have been identified as facing the proposed development.

The residential properties include:

- 36 and 38 Ash Grove to the northwest (windows no. 1-9);
- 18 Richborough Road to the southwest (windows no. 10-18) and the semi-detached houses to the west (windows no. 19-24);
- 19 and 19a Richborough Road to the south (windows no. 25-27).

The following section shows the results for the daylight assessment of the above windows. The results are shown for the tests below, as detailed in the methodology on Page 7:

- 25 degree line;
- Vertical Sky Component (VSC), for those windows not passing the 25 degree line;
- Relative VSC, for those windows not achieving 27% VSC.

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

Residential buildings to the northwest of the site - 36 and 38 Ash Grove

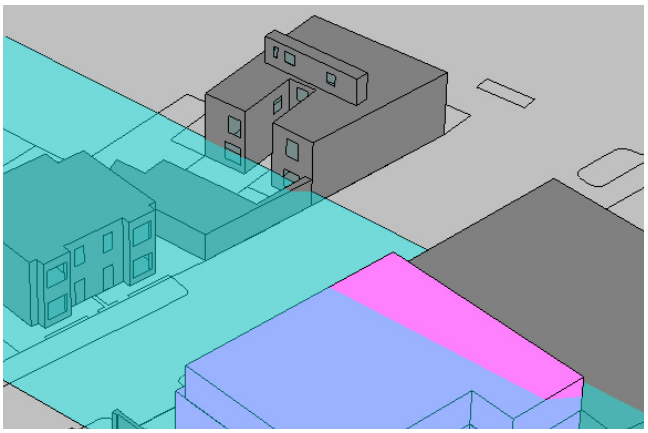
A total of 9 windows located on the dwellings at 36 and 38 Ash Grove to the northwest of the site have been identified as facing the proposed development.

The results showed that 3 windows passed the 25 degree line test, and 4 windows achieved VSC levels of greater than 27% under the proposed condition.

The remaining 2 windows had relative VSC levels above 0.8 under the proposed condition when compared to the existing condition.

Therefore, the proposed development does not have a significant negative impact to the assessed windows at these dwellings.

Potentially affected windows on 36 and 38 Ash Grove to the northwest


25° line emanating from first floor windows on 36 and 38 Ash Grove

Result Summary

Window No.	25 degree line test	VSC test			Comments
		Before (%)	After (%)	Relative VSC	
1	Further testing	-	32.7	-	No noticeable impact on daylight levels
2	Further testing	-	28.1	-	
3	Further testing	-	36.5	-	
4	Further testing	16.6	16.6	1.00	
5	Further testing	25.7	25.7	1.00	
6	Further testing	-	37.1	-	
7-9	Pass	-	-	-	

Number of windows	9
Windows passing 25 degree line test	3
Windows with a VSC greater than 27%	4
Windows that have a VSC of at least 80% of existing value	2
Windows that do not meet either criteria	0

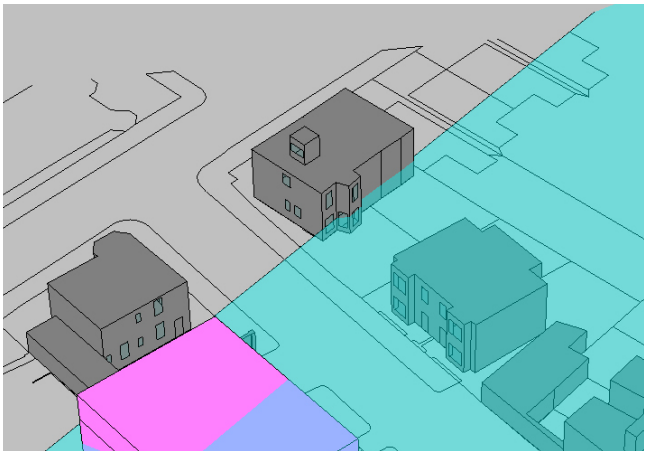
Residential buildings to the west and southwest of the site - 18 Richborough Road and the semi-detached houses to the west

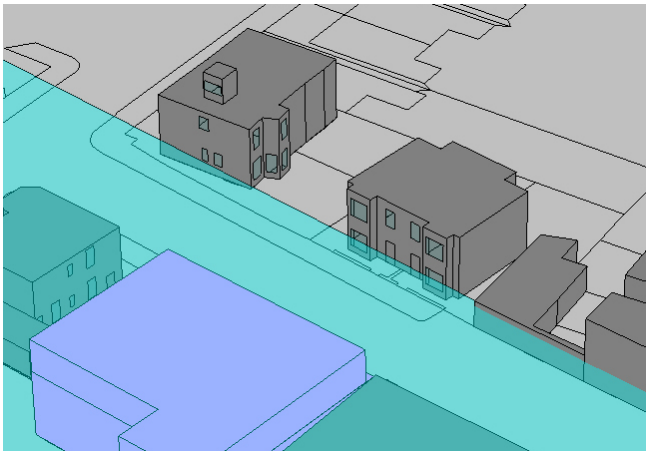
A total of 15 windows located on 18 Richborough Road and the semi-detached houses to the west of the site have been identified as facing the proposed development.

Of the 15 windows assessed, 10 windows passed the 25 degree line test and 4 windows had VSC levels of greater than 27% under the proposed condition. The remaining window had relative VSC levels above 0.8 under the proposed condition when compared to the existing condition.

The proposed development does not have a significant negative impact to the assessed windows at these dwellings.

Potentially affected windows on 18 Richborough Road to the southwest and the semi-detached houses to the west


25° line emanating from ground floor windows on 18 Richborough Road to the southwest


25° line emanating from ground floor windows on residential building to the west

Result Summary

Window No.	25 degree line test	VSC test			Comments
		Before (%)	After (%)	Relative VSC	
10-11	Pass	-	-	-	No noticeable impact on daylight levels
12	Further testing	-	28.8	-	
13	Further testing	27.6	25.1	0.91	
14	Further testing	-	33.1	-	
15	Pass	-	-	-	
16	Further testing	-	33.5	-	
17	Further testing	-	37.2	-	
19-24	Pass	-	-	-	

Number of windows	15
Windows passing 25 degree line test	10
Windows with a VSC greater than 27%	4
Windows that have a VSC of at least 80% of existing value	1
Windows that do not meet either criteria	0

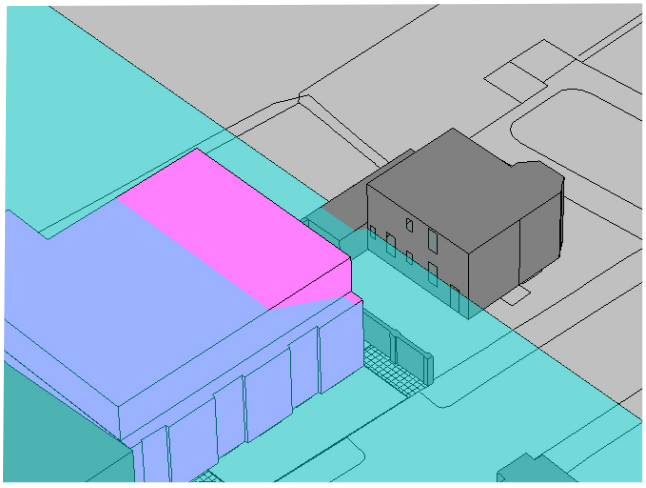
Residential building to the south - 19 and 19a Richborough Road

Six windows located on 19 and 19a Richborough Road to the south of the site have been identified as facing the proposed development.

Out of these 6 windows, 3 of them are unlikely to be connected to main habitable rooms. The small size of the openings also indicate that occupants at 19 and 19a Richborough Road do not rely on them for good daylight levels. As such, these 3 windows were not included in the DSO assessment.

For the 3 windows that have been included in the assessment, results showed that one of them achieved a VSC level of greater than 27%. The remaining 2 windows had VSC levels of less than 27%, and relative VSCs of below 0.8. It should be noted that although these two windows did not meet the BRE's recommended VSC targets, they would receive VSCs of over 20% under the proposed condition, which for an urban location like London is considered to be a satisfactory result.

Potentially affected windows on 19 and 19a Richborough Road (*The 3 no. windows that were marked as not assessed are connected to non-habitable rooms, and are therefore not applicable to the BRE Guidelines for daylight and sunlight)



25° lines emanating from the ground and first floor windows at 19 Richborough Road to the south

Result Summary

Window No.	25 degree line test	VSC test			Comments
		Before (%)	After (%)	Relative VSC	
25	Further testing	35.4	21.0	0.59	Satisfactory daylight levels for an urban setting
26	Further testing	36.0	25.4	0.71	
27	Further testing	-	31.9	-	No noticeable impact on daylight levels

Number of windows	3
Windows passing 25 degree line test	0
Windows with a VSC greater than 27%	1
Windows that have a VSC of at least 80% of existing value	0
Windows that have a VSC greater than 20%	2
Windows with low expected light levels	0

Summary of Offsite Daylight Results

Daylighting levels for the existing windows adjacent to the proposed site were found to be acceptable. The majority of the existing windows on the surrounding properties passed the 25 degree line test or one of the VSC tests.

In summary,

- 13 out of the 27 windows passed the 25 degree line test;
- 9 windows achieved a VSC of greater than 27%;
- 3 windows achieved the recommended relative VSC value of 0.8 of their former value;
- 2 windows had their relative VSC values marginally below the recommended relative VSC of 0.8. These windows would receive VSCs of over 20% under the proposed condition, which is considered to be satisfactory within an urban setting.

In conclusion, the proposed development will not result in significant adverse impact on daylight to the surrounding properties.

Summary of Daylight Results for Surrounding Windows

Total no. of windows	Test 1: Windows passing 25 degree line	Test 2: Windows passing 27% VSC	Test 3: Windows passing Relative VSC	Windows not meeting test 1, 2 and 3 but with a VSC of >20%	Windows with low expected light levels
27	13	9	3	2	0

Sunlight Assessment

A sunlight assessment was carried out on the existing facades of adjacent properties to determine acceptable sunlight levels. The sunlight tests only apply to those windows that face within 90 degrees of due south, which include windows no. 1 to 3 and windows no. 5 to 9 located on 36 and 38 Ash Grove to the northwest. The total number of windows analysed was 8.

This test calculates the amount of sunlight hours the window receives across a whole year and over the winter period (21 September - 21 March). The following criteria must be met to pass this test:

1. Windows pass the 25 degree line test
2. Windows receive at least 25% of annual probable sunlight hours and at least 5% of probable sunlight hours in the winter (21 September-21 March); or
3. Windows under proposed conditions receive more than 0.8 times their former value during both periods; or
4. The reduction in sunlight received over the whole year is greater than 4% of annual probable sunlight hours.

Windows No. 7-9 passed the 25 degree line test and will therefore automatically pass the sunlight assessment. The remaining 5 windows were found to achieve annual and winter probably sunlight hours greater than the BRE recommended targets, and therefore will also pass the sunlight assessment.

Sunlight to existing buildings results

Window No.	25° line test	Annual Probable Sunlight Hours			Winter Probable Sunlight Hours			Comments
		Proposed (>372)	Existing	Relative APSH (%)	Proposed (>22)	Existing	Relative WPSH (%)	
1	Further testing	877	-	-	291	-	-	No noticeable change in sunlight levels
2	Further testing	779	-	-	282	-	-	
3	Further testing	1018	-	-	363	-	-	
5	Further testing	586	-	-	141	-	-	
6	Further testing	1044	-	-	385	-	-	
7-9	Pass	-	-	-	-	-	-	

Summary of Offsite Sunlight results

Sunlight assessment was carried out for 8 offsite south facing windows (within 90 degrees of due south). The assessment results are as follows:

- 3 windows pass the 25 degree line test;
- all of the remaining 5 windows assessed achieved 25% of probable annual sunlight hours and 5% of probable winter sunlight hours.

The proposed development is not considered to have any significant adverse impact on 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: Windows passing		Test 3: Proposed conditions with 0.8 times sunlight hours of existing condition during either period	Test 4: reduction of sunlight hours over the whole year less than 4% of annual probable sunlight hours	Windows not meeting criteria
		25% of annual sunlight hours	5% of winter sunlight hours			
8	3	5	5	0	0	0

Overshadowing Assessment

A review of the site plan showed that there are three private gardens located to the immediate south and west of the proposed development which may be affected.

A Solar Access Analysis was undertaken on this amenity area for the full 24 hours on 21 March. The image opposite shows that all of the assessed amenity spaces are predicted to have a minimum of 2 hours of sunlight on 21 March over at least 50% of the area. The proposed development was therefore not considered to have any significant adverse impact on sunlight access to the amenity spaces surrounding the site.

Percentage of area receiving at least 2 hours of sunlight denoted in yellow in the figure above.

Conclusion

The daylight analysis indicates that the impact on surrounding properties arising from the proposed development at Oak Grove will be within acceptable limits.

Daylight Assessment

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For the 2 windows that did not achieve relative VSC ratios of 0.8, it is important to take into account that the site is currently empty, which means that the windows under the existing site condition receive more than their fair share of daylight for an urban environment. In addition, BRE's 27% VSC target relates to daylight access to two storey terrace houses which are located at least 12m apart, and therefore should not be used as strict targets for this site. The 2 windows would receive VSCs of over 20% under the proposed condition, which is considered to be satisfactory at an urban setting within London.

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Overshadowing

Three private gardens were identified to be in proximity to the proposed development, and have been included in the overshadowing assessment. All the assessed spaces receive at least 2 hours or more of sunlight on 21 March on at least 50% of their area under the proposed condition, which meet the BRE's target for sunlight access.

The proposed development does not have a significant impact on sunlight access to the existing amenity spaces.

Summary

In summary, the majority of the existing windows on properties surrounding the proposed development meet the daylight and sunlight targets set out in the BRE Guide. Two windows located to the immediate south of the site had relative VSC marginally below the BRE criteria for daylight access. Although these windows do not meet the BRE criteria for daylight access, they are not considered to be significantly impacted by the proposed development as the VSC levels received by these windows were over 20%. This is a fair result for buildings within an urban environment such as the area surrounding the proposed development.

Overall, the proposed development is not expected to cause a significant negative impact to daylight and sunlight access for surrounding properties and amenity spaces.