



Daylight and Sunlight and Overshadowing Assessment

Jacksons Corner

For SG Capital, International House, 1-6 Yarmouth Place, W1J 7BU

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Daylight, Sunlight and Overshadowing

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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, BRE trained daylight consultants and LEED accredited professionals.

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Daylight, Sunlight and Overshadowing

Executive Summary

Daylight, sunlight and overshadowing analysis was carried out for the proposed redevelopment of the Jacksons Corner site. The development is located on the corner at the point where the Kings Road meets the High Street, southeast of Market Square, Reading. This report outlines the results of the analysis for the planning application, assessing the potential daylight and sunlight impacts on 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) which is accepted as good practice by Planning Authorities.

The following assessments were carried out:

- Daylight: 25 Degree Line
- Daylight: Vertical Sky Component
- Daylight: No Sky Line
- Sunlight: Sunlight Access
- Sunlight: Sunlight Overshadowing

Specialist computer modelling software was used to carry out the daylight and sunlight impact assessment. The computer model used for this assessment is based on the architectural drawings and 3D model provided by S333 Architecture + Urbanism.

Daylight Assessment

A total of 160 windows on existing neighbouring buildings were identified as facing the proposed development. The daylight assessment results are as follows:

- 79 of the windows were identified to be connected to commercial spaces where artificial lighting is likely to be on during the day and that daylight access is not considered to be crucial;
- 71 out of the 81 windows passed the 25 degree line test;
- 1 of the remaining 9 windows achieved a VSC of greater than 27%;
- 7 of the remaining 8 windows achieved recommended relative VSC values of 80% of their former value;

- 1 of the remaining 2 windows achieved recommended relative NSL value of 80% of their former value;
- The remaining window was found to belong to non-habitable space where the BRE daylight criteria do not apply and subsequently the expectations will be lower.

Overall, the proposed development is not anticipated to result in any significant impact on daylight access to the existing and proposed surrounding properties.

Sunlight Assessment

An assessment of sunlight access was not deemed necessary based on BRE recommended guidelines as all of the windows within 90° due south and facing the proposed development belong to commercial buildings. Therefore, the proposed development was not found to have any significant impact on the sunlight received by windows on surrounding residential properties.

The communal amenity space within the proposed development is also considered to receive sufficient sunlight for its intended use, taking into consideration the dense urban location of the development.

Overshadowing Assessment

A solar access analysis was not undertaken as no amenity areas were found in close proximity to the proposed development. Therefore, the proposed development is not anticipated to have any impact on sunlight access to amenity and open spaces.

Summary

In summary, the proposed development was not deemed to have any significant impact in terms of daylight and sunlight to neighbouring windows and open spaces, particularly in the context of a high density urban environment within which this site is located.



Daylight, Sunlight and Overshadowing

Introduction

This report assesses the daylight, sunlight and overshadowing impacts of the proposed development of Jacksons Corner may have on the existing properties and open spaces surrounding the site in Reading town centre.

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.

Although the BRE recommends that daylight and sunlight assessments are applicable only to windows connected to habitable spaces, it should be noted that the design team was unable to gain access to existing neighbouring buildings to determine uses /size for the rooms that are served by windows with a direct outlook onto the site. Therefore, all windows facing the proposed development have been included in this assessment, even though some of them may serve non-habitable rooms.

It should be noted that although the numerical values stated in the BRE guide 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.

This figure of 27% was achieved in the following manner: a theoretical road was created with two storey terraced houses upon either side, approximately twelve 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 in a urban setting such as that at Bell Lane, this kind of urban form is unlikely and impractical.



Daylight, Sunlight and Overshadowing

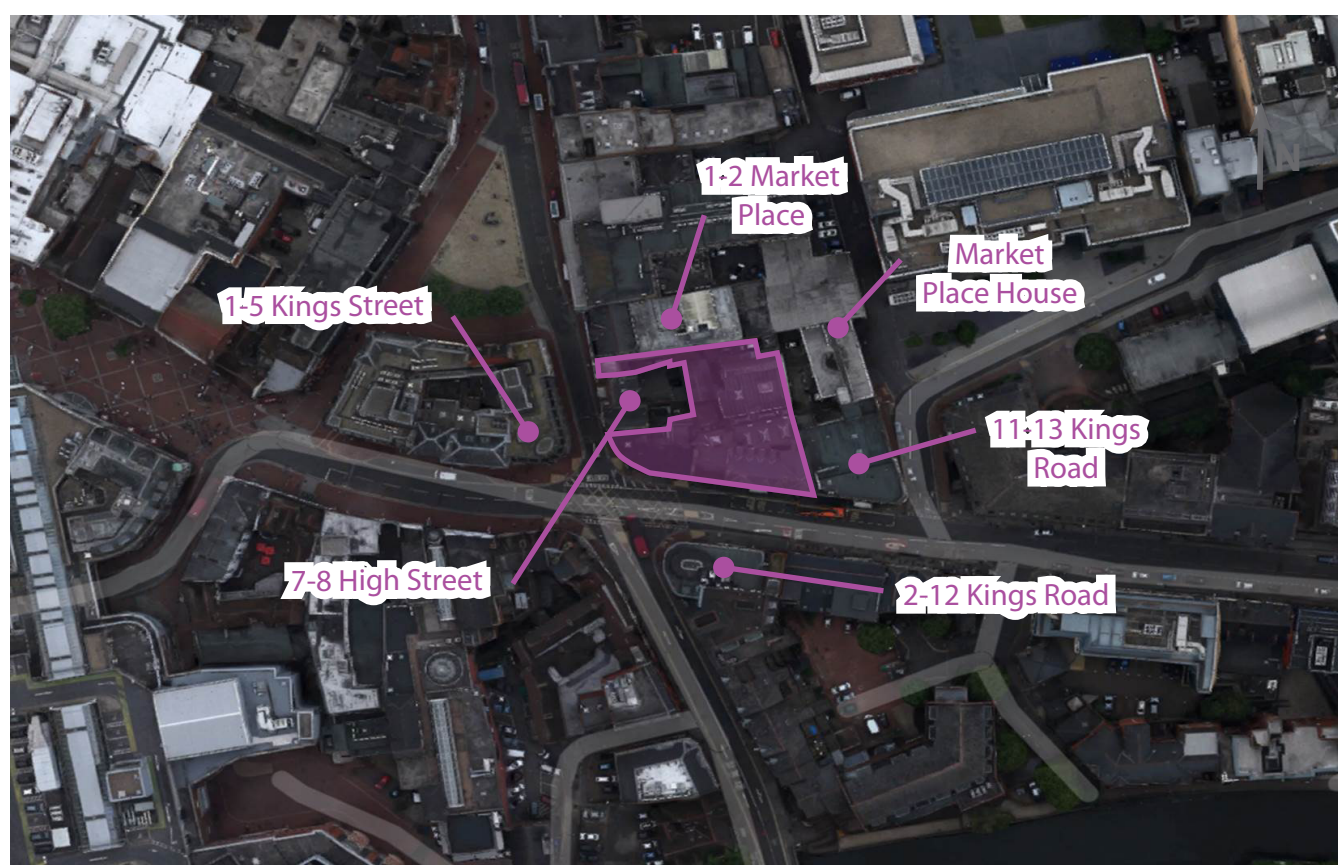
Site

The proposed scheme comprises the refurbishment of 3 no. non-domestic units on the basement and ground floors, refurbished domestic units from the first to the third floors of the existing building fronting King's Road, and new-build domestic units from the first to the sixth floors at the rear of the development. The scheme would include approximately 1,126m² of non-domestic space in the part retained building, 18 dwellings in the refurbished building and 16 new-build dwellings.

The approximate location of the proposed development is shown in the figure below.

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

 Approximate site area



The approximate site location of the proposed development is shaded in pink.

Daylight, Sunlight and Overshadowing

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 would need to be calculated.

3. Relative Vertical Sky Component

Good levels of daylighting can still be achieved if VSC levels are within 80% of their former value. For rooms with two or more windows, the mean values of the existing and proposed situations can be utilised.

4. Percentage of room with view of the sky (NSL)

Rooms connected to the windows assessed will not experience a noticeable loss in daylight if the percentage (%) of the room's working plane with a view of the sky is over 0.8 times its former value.

Sunlight

Access to sunlight (APSH and 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.

A sunlight 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 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 (when clouds are taken into account). The term 'winter probable sunlight hours' (WPSH) is used to mean the same but only for the winter period (21 September – 21 March).

The sunlight 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 and WPSH is not less than 80% times its former value; or
- reduction in sunlight received over the whole year is not greater than 4% of annual probable sunlight hours

In order for the windows to receive adequate sunlight access, they must achieve at least 372 hours of annual probable sunlight and 74 hours of winter probable sunlight during the year. Note that the BRE guidance expects the above to be met for living room windows only.



Daylight, Sunlight and Overshadowing

Overshadowing

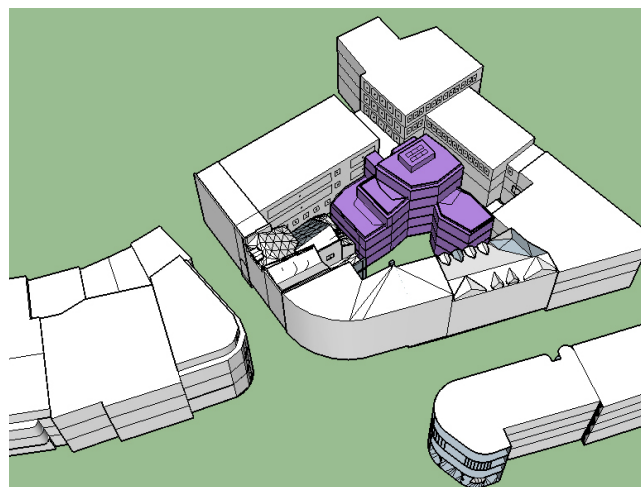
Sunlight to Amenity Spaces

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

The following sections present the daylight, sunlight and overshadowing assessment results for the proposed development.

Technical Model

The image below shows the model of the proposed development and the surrounding buildings that were assessed in the daylight, sunlight and overshadowing analysis. The massing of the proposed new build section of the development is highlighted in pink.



Technical model 3D view, with new build section of the development highlighted in pink

Daylight Assessment

Analysed windows

The location and number of the 81 windows included in the detailed assessment were determined based on desktop research, and are identified below:

- 7-8 High Street: A four storey mixed use building to the west of the development site (Windows 1-6);
- 1-2 Market Place: a four storey commercial building to the north-west of the development site (Windows 7 & 11);
- 11-13 Kings Road: a three storey mixed use building to the east of the development site (Windows 70-72, 74);
- 2-12 Kings Road: a four storey mixed used building to the south of the development site across Kings Road (Windows 75-119);
- 1-5 Kings Street: a four storey mixed used building to the west of the development site across High Street (Windows 129-152).

In addition, 79 no. windows on surrounding properties were identified as being attached to commercial spaces where artificial lighting is likely to be on most of the day and that daylight access is not considered to be crucial. The changes in daylight access to these spaces are not considered to be significant impact to the occupants. Therefore, these windows have been excluded from the detailed daylight assessment:

- Windows 8-10 & 12-26 of 1-2 Market Place;
- Windows 27-69 of Market Place House (a four/ five storey commercial building to the north-east of the development site (Windows 27-69);
- Window 73 of 11-13 Kings Road;
- Windows 120-128 of 2-12 Kings Road; and
- Windows 153-160 of 1-5 Kings Street.

The following section shows the analysis and results for the daylight assessment of the analysed windows. The results are in accordance with the BRE methodology detailed on Pages 6&7:

- 25 degree line;
- Vertical Sky Component (VSC), for those windows not passing the 25 degree line;
- Relative VSC analysis, for those windows not achieving 27% VSC;
- No Sky Line analysis, for those windows not passing the relative VSC test.

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

Daylight, Sunlight and Overshadowing

7-8 High Street

A total of 6 windows (window nos. 1-6) located on 7-8 High Street have been identified as facing the proposed development. The image below shows their locations. The results have been elaborated in the tables on the following page.

The analysis indicates that two of the windows pass the 25 degree line test, three windows achieve VSC values >80% of their former value, whilst the remaining window falls slightly short of meeting the BRE daylight access criteria.

This window (Window 6) is located very close to the proposed scheme and is overshadowed by the new build massing. However, the impact of the proposed development on this window is considered to be acceptable for the following reasons:

- Typical VSC targets in the BRE guide are not fully applicable for an urban environment such as that at Jacksons Corner;
- The relative VSC value is 0.71 times that of the existing condition, which is not significantly lower than the BRE target of 0.8;
- The window is unlikely to be connected to a main habitable space (based on site photo showing an extract fan above the window) and therefore the loss in daylight is not considered to be critical;

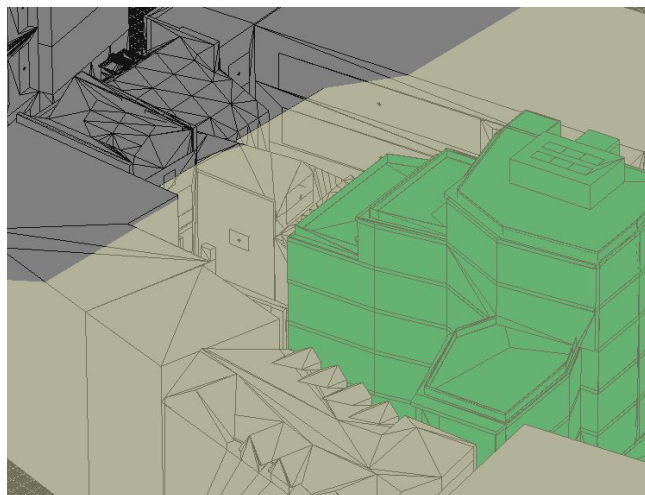
Overall, the impact that the proposed development has on Window no.6 on 7-8 High Street are considered to be acceptable.



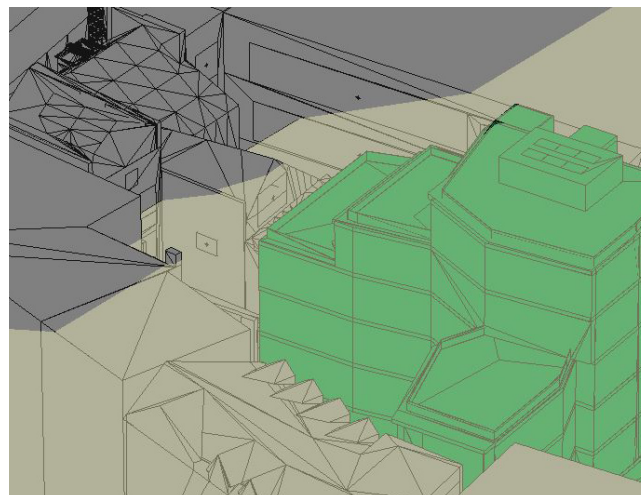
Image showing windows 2-6 on 7-8 High Street



Image showing windows 1-6 on 7-8 High Street



25 degree line emanating from the fourth floor windows on 7-8 High Street



25 degree line emanating from the third floor windows on 7-8 High Street

Result Summary for 7-8 High Street

Window Nos.	25 degree line-test	VSC test			Comments
		Existing VSC (%)	Proposed VSC (%) (recommended value >27%)	Relative VSC (recommended value >0.8)	
1	Pass	-	-	-	Good Daylight Levels Expected
2		-	-	-	
3	Further testing Required	26.2	23.9	0.91	
4		17.8	16.3	0.91	
5		16.8	16.0	0.96	
6		32.2	22.95	0.71	Acceptable reduction in daylight levels for a non-main habitable room in an urban location

Number of windows tested	6
Windows passing 25 degree line test	2
Windows with a VSC greater than 27%	0
Windows that have a relative VSC of at least 80% of existing value	3
Windows that belong to non-habitable space with lower daylight expectations	1

Daylight, Sunlight and Overshadowing

1-2 Market Place

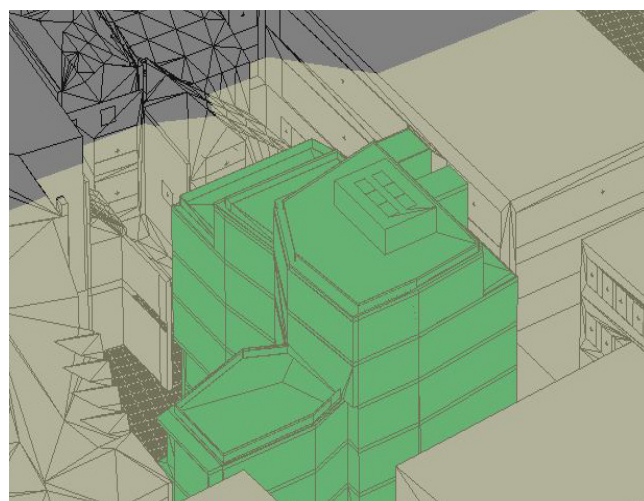
A total of 2 windows (window nos. 7 & 11) located on the 1-2 Market Place have been identified as facing the proposed development. The image below shows their locations. The results have been elaborated in the tables in the subsequent page.

The analysis indicates both of the windows pass the 25 degree line test.

Therefore, overall the proposed development is not considered to have a significant adverse impact on the assessed windows on 1-2 Market Place. The remaining windows (no. 8-10 and 12-26) at 1-2 Market are connected to office spaces where artificial lighting is likely to be on throughout the day and that high levels of daylight access is not considered to be essential.



Image showing windows 7 & 11 on 1-2 Market Place



25 degree line emanating from window 11 on 1-2 Market Place

Result Summary for 1-2 Market Place

Window Nos.	25 degree line-test	VSC test			Comments
		Existing VSC (%)	Proposed VSC (%) (recommended value >27%)	Relative VSC (recommended value >0.8)	
7 & 11	Passed	-	-	-	No noticeable impact on daylight levels

Number of windows tested	2
Windows passing 25 degree line test	2
Windows with a VSC greater than 27%	0
Windows that have a relative VSC of at least 80% of existing value	0

Daylight, Sunlight and Overshadowing

11-13 Kings Road

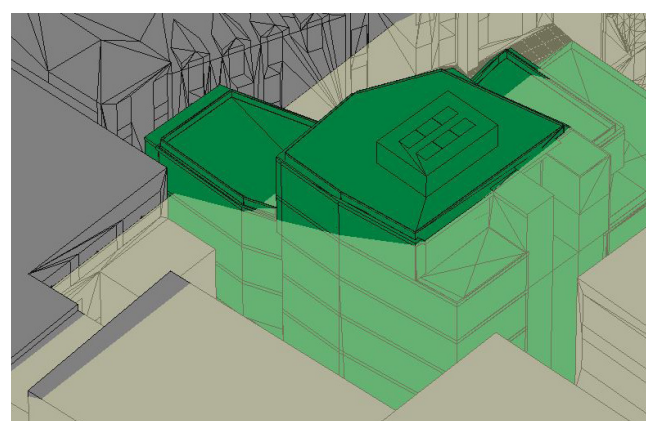
A total of 4 windows (window nos. 70-72, 74) located on 11-13 Kings Road have been identified as facing the proposed development. The image below shows their locations. The technical results have been elaborated in the tables on the following page.

The analysis indicates that 3 out of 4 windows achieve VSC values >80% of their former value. The remaining window is connected to a room which achieves a relative No Sky Line value >80% of its former value.

Therefore, the proposed development is not considered to have any significant impact on the assessed windows on 11-13 Kings Road.



Views of 11-13 Kings Road showing windows 70-72 & 74



25 degree line emanating from the windows on 11-13 Kings Road

Result Summary for 11-13 Kings Road

Window Nos.	25 degree line test	VSC test			NSL test			Comments
		Existing VSC (%)	Proposed VSC (%) (recommended value >27%)	Relative VSC (recommended value >0.8)	Existing NSL (%)	Proposed NSL (%)	Relative NSL (recommended value >0.8)	
70	Further testing Required	21.15	18.95	0.9	-	-	-	No noticeable impact on daylight levels
71		27.4	23.0	0.84	-	-	-	
72		28.65	21.15	0.74	0.92	1	0.92	
74		10.95	8.8	0.8	-	-	-	

Number of windows tested	4
Windows passing 25 degree line test	0
Windows with a VSC greater than 27%	0
Windows that have a relative VSC of at least 80% of existing value	3
Windows that have a relative NSL of at least 80% of existing value	1

Daylight, Sunlight and Overshadowing

2-12 Kings Road

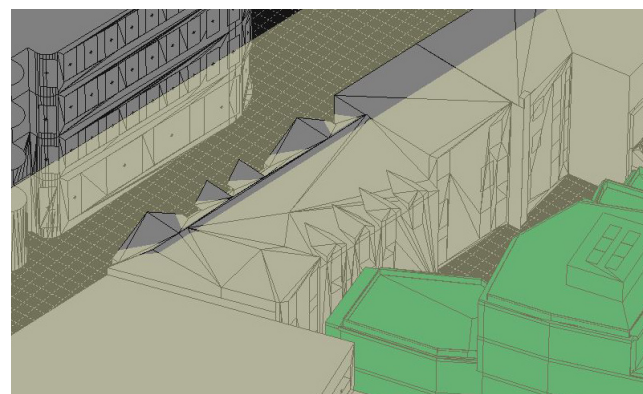
A total of 45 windows (window nos. 75-119) located to the south of the proposed site have been identified as facing the proposed development. The image below shows their location. The technical results have been elaborated in the tables on the following page.

The analysis indicated that all 45 windows pass the 25 degree line test.

Therefore, the proposed development is not considered to have any significant impact on the assessed windows on 2-12 Kings Road. The ground floor commercial spaces connected to windows 120 to 128 at 2-12 Kings Road are like to have artificial lighting in operation throughout the day and that high levels of daylight access is not considered to be essential.



Views of 2-12 Kings Road showing windows 75-135 to the south of the proposed site



25 degree line emanating from the first floor windows on 2-12 Kings Road

Result Summary for 2-12 Kings Road

Window Nos.	25 degree line test	VSC test			Comments
		Existing VSC (%)	Proposed VSC (%) (recommended value >27%)	Relative VSC (recommended value >0.8)	
75-119	Passed	-	-	-	No noticeable impact on daylight levels

Number of windows tested	45
Windows passing 25 degree line test	45
Windows with a VSC greater than 27%	0
Windows that have a relative VSC of at least 80% of existing value	0

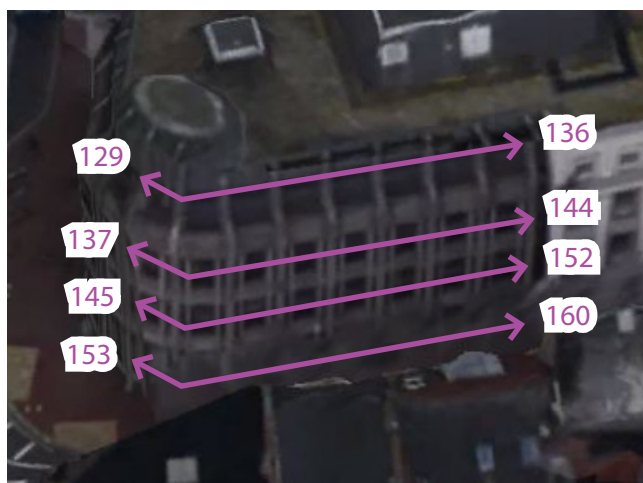
Daylight, Sunlight and Overshadowing

1-5 Kings Street

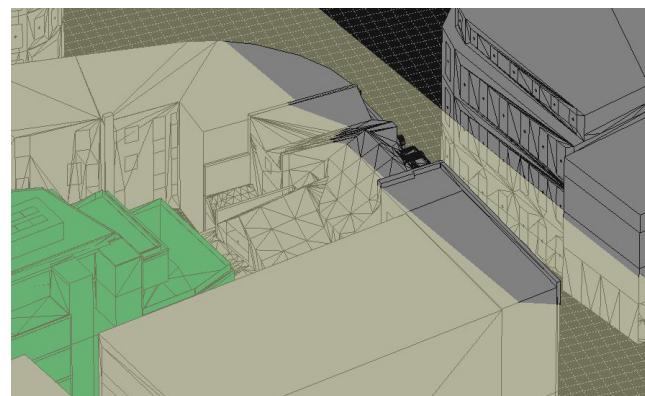
A total of 24 windows (window nos. 129-152) located to the west of the proposed site have been identified as facing the proposed development. The image below shows their location. The technical results have been elaborated in the tables on the following page.

The analysis indicated that all 24 windows pass the 25 degree line test.

Therefore, the proposed development is not considered to have any significant impact on the assessed windows on 1-5 Kings Street. The ground floor commercial spaces connected to windows 153 to 160 at 1-5 Kings Street are like to have artificial lighting in operation throughout the day and that high levels of daylight access is not considered to be essential.



Views of 1-5 Kings Street showing windows 129-160 to the west of the proposed site



25 degree line emanating from the first floor windows on 1-5 Kings Street

Result Summary for 1-5 Kings Street

Window Nos.	25 degree line test	VSC test			Comments
		Existing VSC (%)	Proposed VSC (%) (recommended value >27%)	Relative VSC (recommended value >0.8)	
129-152	Passed	-	-	-	No noticeable impact on daylight levels

Number of windows tested	24
Windows passing 25 degree line test	24
Windows with a VSC greater than 27%	0
Windows that have a relative VSC of at least 80% of existing value	0

Daylight, Sunlight and Overshadowing

Summary of Daylight Results

Daylighting levels for the existing windows potentially impacted by the development were found to be acceptable. A total of 160 windows were identified to be facing the development. 79 of the windows belong to non-domestic spaces where daylight levels are not considered to be crucial and therefore excluded from the detailed assessment. Of the 81 windows that were included in the detailed daylight assessment, the majority of the windows on surrounding properties passed the 25 degree line test or at least one of the VSC tests.

Overall, the proposed development is not anticipated to result in any significant impact on daylight access to the surrounding properties.

In summary,

- 71 out of the 81 windows passed the 25 degree line test;
- 1 of the remaining 9 windows achieved a VSC of greater than 27%;
- 7 of the remaining 8 windows achieved recommended relative VSC values of 80% of their former value;
- 1 of the remaining 2 windows achieved recommended relative No Sky Line value of 80% of their former value;
- The remaining window was found to belong to non-habitable space where the BRE daylight criteria do not apply and subsequently the expectations will be lower.

Summary of Daylight Results for Surrounding Windows

Number of windows surrounding site	160
Number of windows to non-domestic spaces where daylight levels is not crucial	79
Number of windows included in detailed daylight assessment	81
Windows passing 25 degree line test	71
Windows with a VSC greater than 27%	1
Windows that have a relative VSC of at least 80% of existing value	7
Windows that have a relative NSL of at least 80% of existing value	1
Windows that belong to non-habitable space with lower daylight expectations	1

Sunlight Assessment

A desktop study was undertaken to identify any facades of the existing neighbouring windows to determine impacted windows. Note the sunlight tests only apply to residential windows facing the proposed development, which face within 90 degrees due south.

The desktop study indicate that there are no residential windows within 90° due south and facing the development. Hence, assessment of sunlight access is not required, based on BRE recommended guidelines.

Subsequently, the proposed development was not found to have any significant impact on the sunlight received by windows on surrounding properties.

Overshadowing Assessment

An assessment of the sunlight levels of the surrounding amenity spaces that are in close proximity to the proposed development and may be overshadowed by the new building was undertaken.

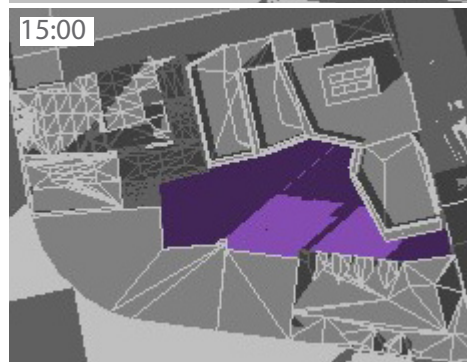
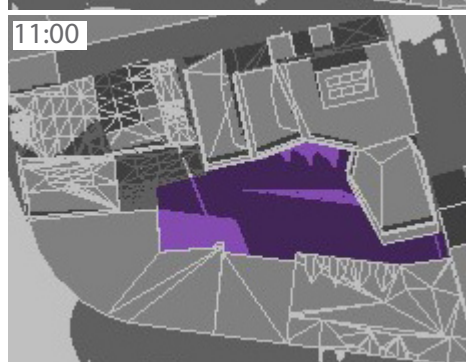
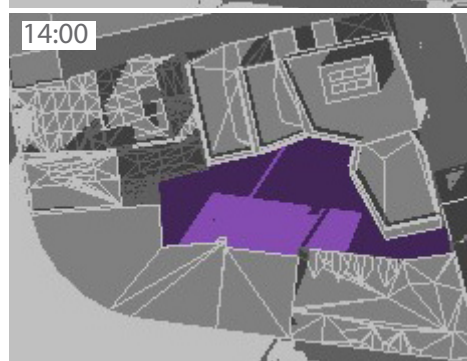
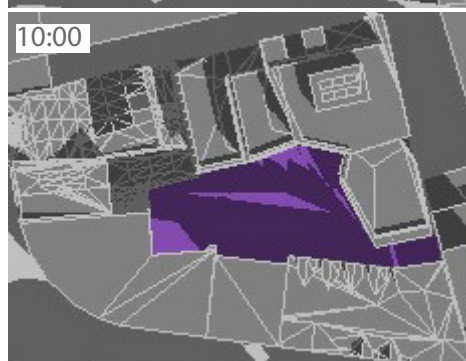
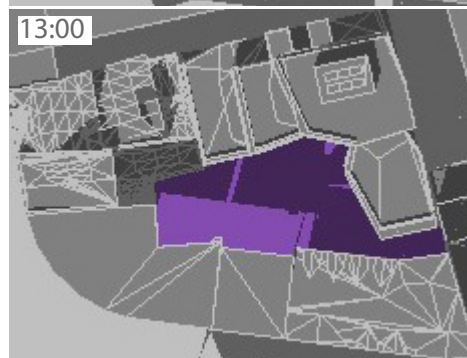
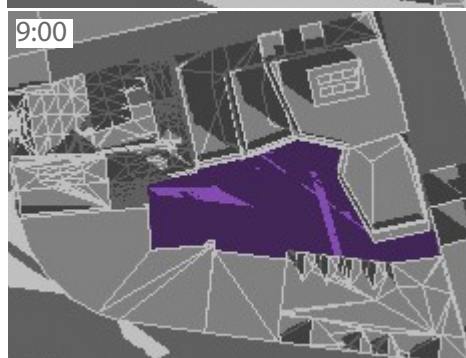
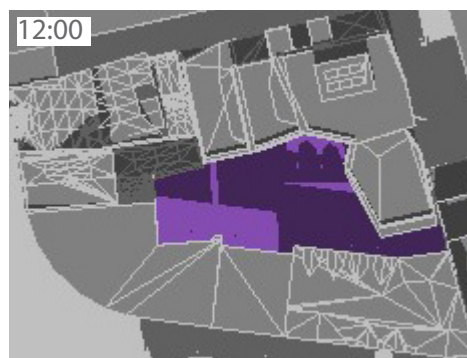
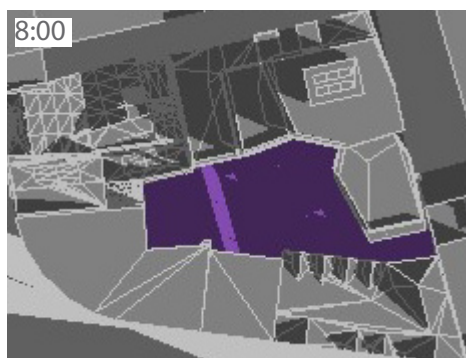
BRE Guidance suggests that the test should be run on 21 March which is the midpoint between the summer and winter solstices (equinox). At least half of each of the amenity areas should receive no less than 2 hours on 21 March. Where this is not achieved, a relative test should be carried out to show the are receiving 2 hours of sunlight is no less than 80% of its previous value.

A desktop study was undertaken to identify any external open spaces that may be impacted upon by the proposed development in terms of overshadowing. As shown in the site image on page 5, there are no amenity spaces in close proximity to the proposed development which could be affected. Therefore, no impacts are likely in terms of overshadowing to open spaces.

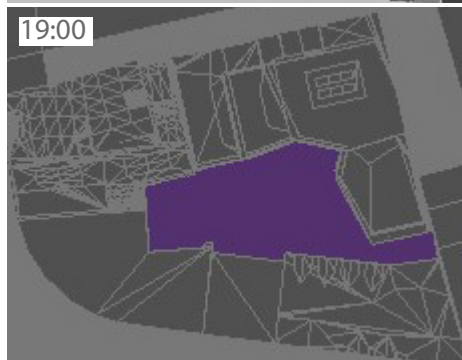
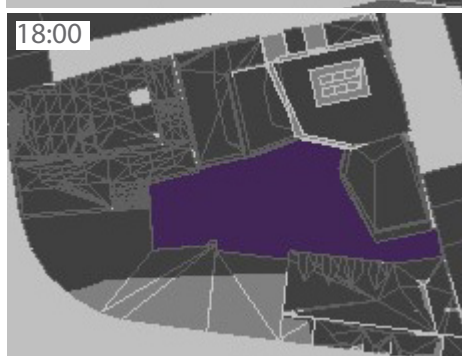
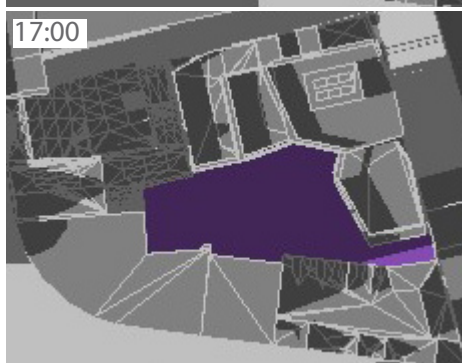
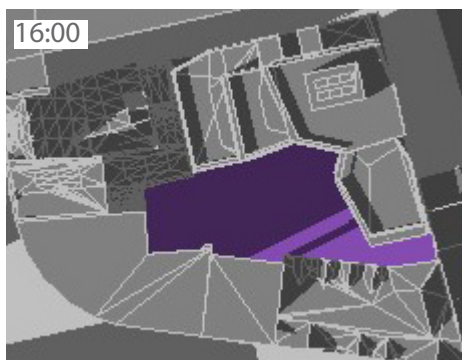
Following correspondence between the design team and the planning officer, additional overshadowing assessment was carried out for the central courtyard in the proposed scheme to understand the level of sunlight received by the communal amenity space. The following two pages display the hourly shadow diagrams of the proposed development, showing the area of courtyard receiving sunlight between the hours of 8am and 7pm on 21 March. The communal amenity space is considered to receive sufficient sunlight for its intended use, taking into consideration the dense urban location of the development.

Daylight, Sunlight and Overshadowing

Hourly shadow diagrams for the onsite amenity space



Hourly shadow diagrams for the onsite amenity space (continued)



Conclusion

Daylight Assessment

A total of 160 windows on existing neighbouring buildings were included in the assessment for daylight access and the daylight assessment results are as follows:

- 79 of the windows were identified to be connected to commercial spaces where artificial lighting is likely to be on during the day and that daylight access is not considered to be crucial;
- 71 out of the 81 windows passed the 25 degree line test;
- 1 of the remaining 9 windows achieved a VSC of greater than 27%;
- 7 of the remaining 8 windows achieved recommended relative VSC values of 80% of their former value;
- 1 of the remaining 2 windows achieved recommended relative NSL value of 80% of their former value;
- The remaining window was found to belong to non-habitable space where the BRE daylight criteria do not apply and subsequently the expectations will be lower.

Overall, the proposed development is not anticipated to result in any significant impact on daylight access to the existing and proposed surrounding properties.

Sunlight Assessment

An assessment of sunlight access was not deemed necessary based on BRE recommended guidelines as all of the windows within 90° due south and facing the proposed development belong to commercial buildings.

Therefore, the proposed development was not found to have any significant impact on the sunlight received by windows on surrounding residential properties.

Overshadowing Assessment

A solar access analysis was not undertaken as no amenity areas were found in close proximity to the proposed development. Therefore, the proposed development is not anticipated to have any impact on sunlight access to amenity and open spaces.

The communal amenity space within the proposed development is also considered to receive sufficient sunlight for its intended use, taking into consideration the dense urban location of the development.

Summary

In summary, the proposed development was not deemed to have any significant impact in terms of daylight and sunlight to neighbouring windows and open spaces, particularly in the context of a high density urban environment within which this site is located.