Daylight, Sunlight, Overshadowing Assessment

92 Fitzjohn's Avenue, Hampstead

For MAKE

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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

A sunlight and daylight analysis was carried out for the proposed development at 92 Fitzjohn's Avenue, in the London Borough of Camden. This report outlines the results of the analysis for the detailed planning application, primarily assessing the daylight and sunlight impacts on surrounding buildings.

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 assessments
- 25 degree line
- Vertical Sky Component
- No Sky Line

Sunlight assessments
- Annual Probable Sunlight Hours (APSH) and Winter Probable Sunlight Hours (WPSH) analysis
- Overshadowing of open amenity spaces

Specialist software was used to carry out the daylight and sunlight impact assessment. The analysis showed that the proposed development had no signficiant impact on daylight or sunlight levels to any of the surrounding buildings around the site.

All permanent opaque building elements at the proposed development have been included in the daylight and sunlight analysis as the proposed site conditions. The permeable fencing that forms part of site boundary has been designed to enable penetration of daylight and sunlight, and was not required to be included in the assessment as recommended by the BRE guidance.

Daylight Assessment

A number of existing windows adjacent to the site were identified, which may be impacted upon by the proposed development. Twenty-one windows passed the 25 degree line test and 7 existing windows were assessed in further detail.

Analysis showed that 5 of the modelled windows had VSCs greater than 27%; and VSC for the remaining two windows were over 80% of its existing values.

The proposed development will have no significant impact on daylight access to the surrounding windows. These windows will continue to meet all daylight targets set out in the BRE guidance document.

Daylight Assessment Overview

Building	Number of Windows	Window numbers	25 Degree Line Pass	VSC > 27%	VSC > 80% of Existing Value	No Sky Line Pass
Henderson Ct.	6	1 - 6	6 (100%)	n/a	n/a	n/a
Greenhill	6	7 - 12	6 (100%)	n/a	n/a	n/a
North Bridge House Senior School	4	13 - 16	0 (0%)	2 (50%)	2 (50%)	n/a
St. Anthony's	9	17 - 25	9 (100%)	n/a	n/a	n/a
Fitzjohn's Primary	3	26 - 28	0 (0%)	3 (100%)	n/a	n/a
TOTAL	28		21 (75%)	5 (17.9%)	2 (7.1.%)	n/a

Sunlight Assessment

The assessment of the surrounding buildings required Annual and Winter Probable Sunlight Hours analysis in order to determine the impact. The proposed development will have no significant impact on the buildings surrounding the site, and all windows will continue to meet all sunlight targets set out in the BRE Guidance document.

Overshadowing of Open Spaces

Amenity spaces in close proximity to the development were assessed for the sunlight they receive on 21 March. All five amenity spaces assessed passed the BRE tests with the development of 92 Fitzjohn's Avenue in place.

Summary

The proposed development at Fitzjohn's Avenue passes the BRE daylight and sunlight tests for the surrounding existing buildings and the sunlight hours test for surrounding open spaces.

Sunlight Assessment Overview

Building group	Number of Windows	Window Numbers	25 Degree Line Pass	Probable Sunlight Hours Test	Sunlight hours 80% of existing value?
Henderson Ct.	6	1 - 6	6 (100%)	n/a	n/a
Greenhill	6	7 - 12	6 (100%)	n/a	n/a
TOTAL	12		12 (100%)	n/a	n/a

Overshadowing Overview

Open Spaces	Number of Open Spaces	Area Receiving 2 Hours of Sunlight on 21 March is greater than 50%?	Area Receiving 2 Hours of Sunlight on 21 March 80% of existing value?
TOTAL	5	5 (100%) (pass)	n/a

Introduction

This report is intended to assess the daylight, sunlight and overshadowing impacts of the proposed development at 92 Fitzjohn's Avenue on the existing buildings surrounding the site.

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

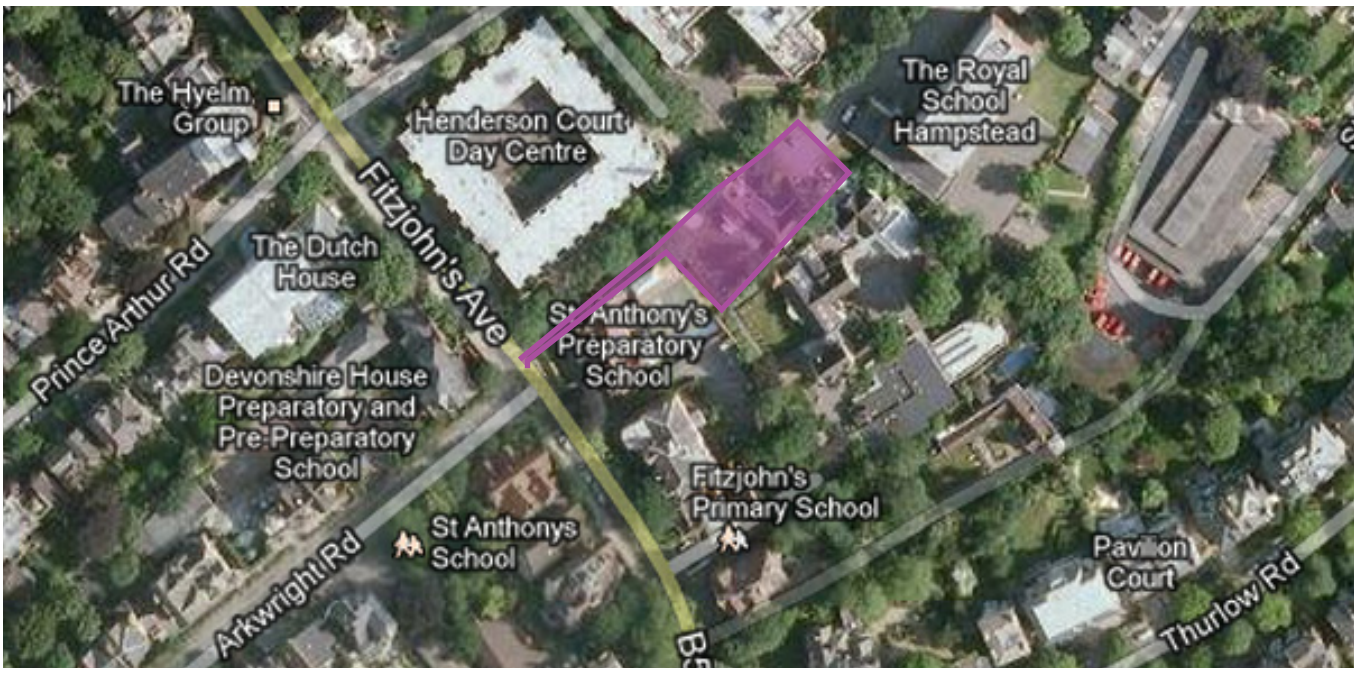
It should be noted that although the numerical values stated in the BRE provide useful guidance to designers, consultants and planning officials, these are purely advisory and may vary depending on context. Dense urban areas, for example, may often experience greater site constraints when compared to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

Site

The proposed development of 92 Fitzjohn's Avenue is a single dwelling to be located east of Fitzjohn's Avenue, adjacent to Henderson Court Day Centre and St. Anthony's Preparatory School in Hampstead, within the London Borough of Camden.

The habitable area of the proposed dwellings are distributed over two storeys, with the main living areas at entrance floor level and bedroom accommodations planned for both floors. The development will replace an existing residential building and car parking on site.

The approximate site location and boundary is shown in the figure below.



Approximate site location and site boundary of 92 Fitzjohn's Avenue

Methodology

Daylight

The following methodology was used to carry out the daylight 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" (1991).*

1. Daylight to surrounding windows

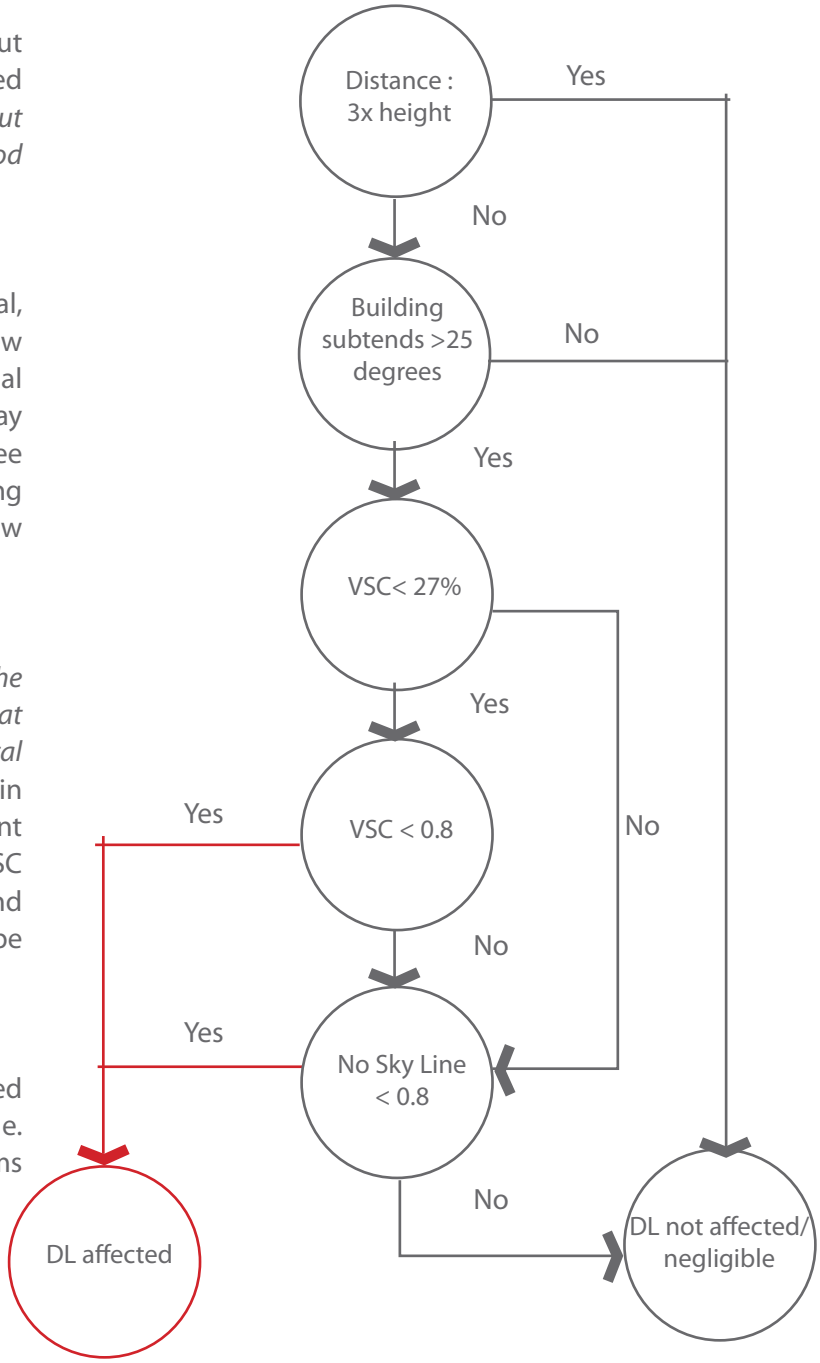
A plane is drawn at 25 degrees from the horizontal, at the centre of an existing window. If a new development intersects with this plane, the internal daylight levels of the surrounding windows may be reduced. When an obstruction of the 25 degree plane occurs, a more detailed assessment involving the 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 within 0.8 of their former value. Otherwise, the No Sky Line of the internal rooms would need to be calculated.



A summary of the methodology for daylighting in line with the BRE

Sunlight

The following methodology was used to carry out the sunlight 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).*

1. Overshadowing (APSH)

Existing windows

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:

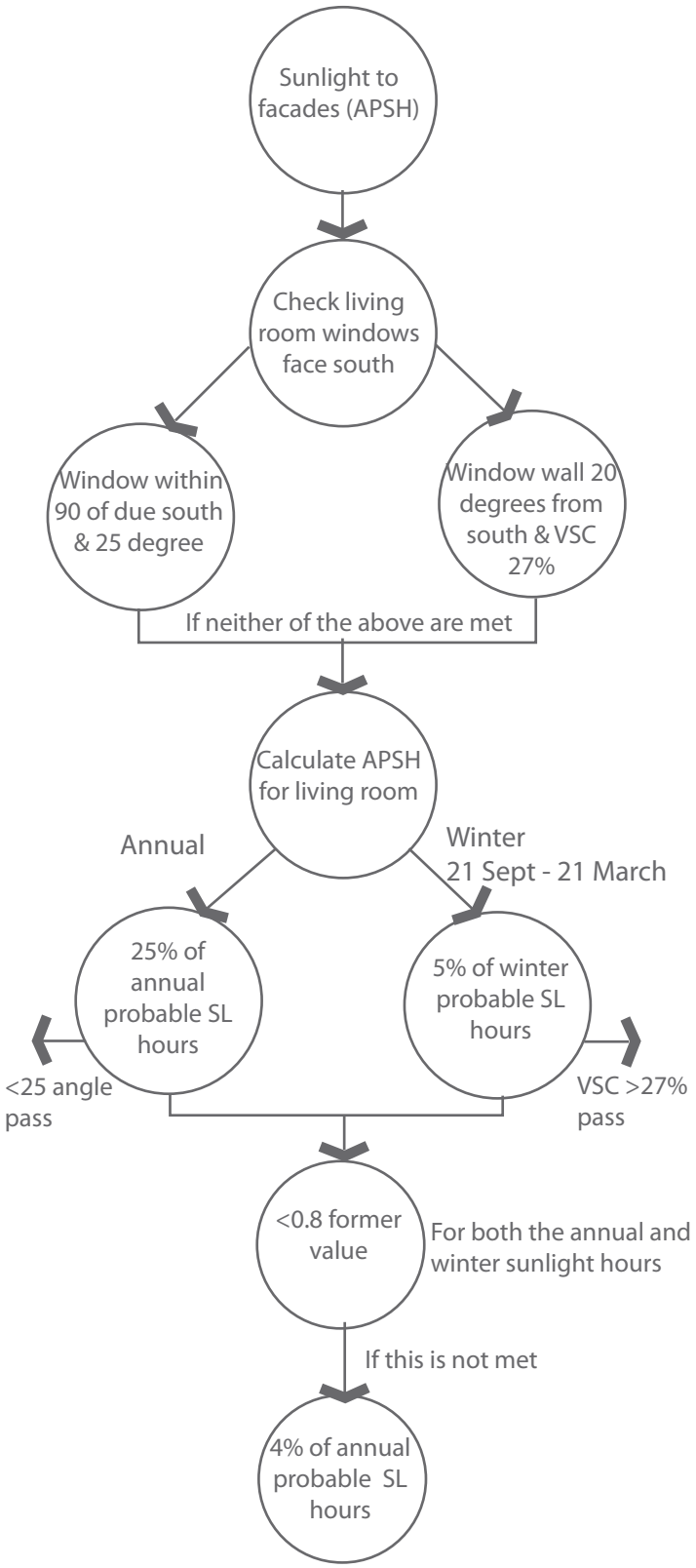
- there is an obstruction within the 25 degree line, calculated from the centre of the window
- the proposed development is situated within 90 degrees due south of the window

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 and
- the difference between the APSH is not less than 0.8 times its former value

2. Sunlight to Amenity Spaces

Open spaces should retain a reasonable amount of sunlight throughout the year. The BRE states that an amenity space will be adequately lit, with no less than 2 hours of sunlight on the equinox (21 March).



A summary of the methodology for sunlight on facades in line with the BRE

Daylight Assessment

The BRE guidance specifies that '*where low fences or walls are intended, or railings or trellises which let through sunlight, no calculations is necessary'.* All permanent opaque building elements at the proposed development have been included in the daylight assessment as the proposed site condition. The fence that forms part of the site boundary has been designed to be permeable to enable penetration of daylight and sunlight, and therefore it is not required to be included in the assessment.

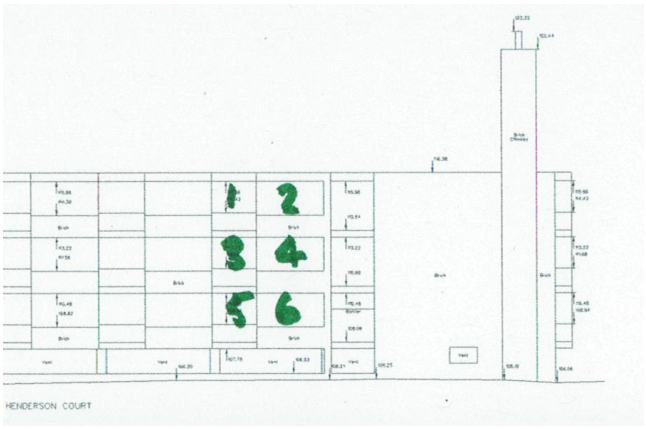
The subsequent pages show the results for the daylight assessment of the windows surrounding the development. The results are shown for the following tests, as detailed in the methodology on page 7:

- 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 on separate pages. A total of 28 windows were assessed. Although non-domestic windows have been included in this assessment, their requirement for daylight is less crucial in comparison to residential windows due to the likely operation of artificial lighting during daytime in non-domestic spaces.

Henderson Court

This day centre is located to the west of the site. A total of 6 windows on the southeast facade were identified as being potentially affected by the new development. These windows all pass the 25 degree line test.

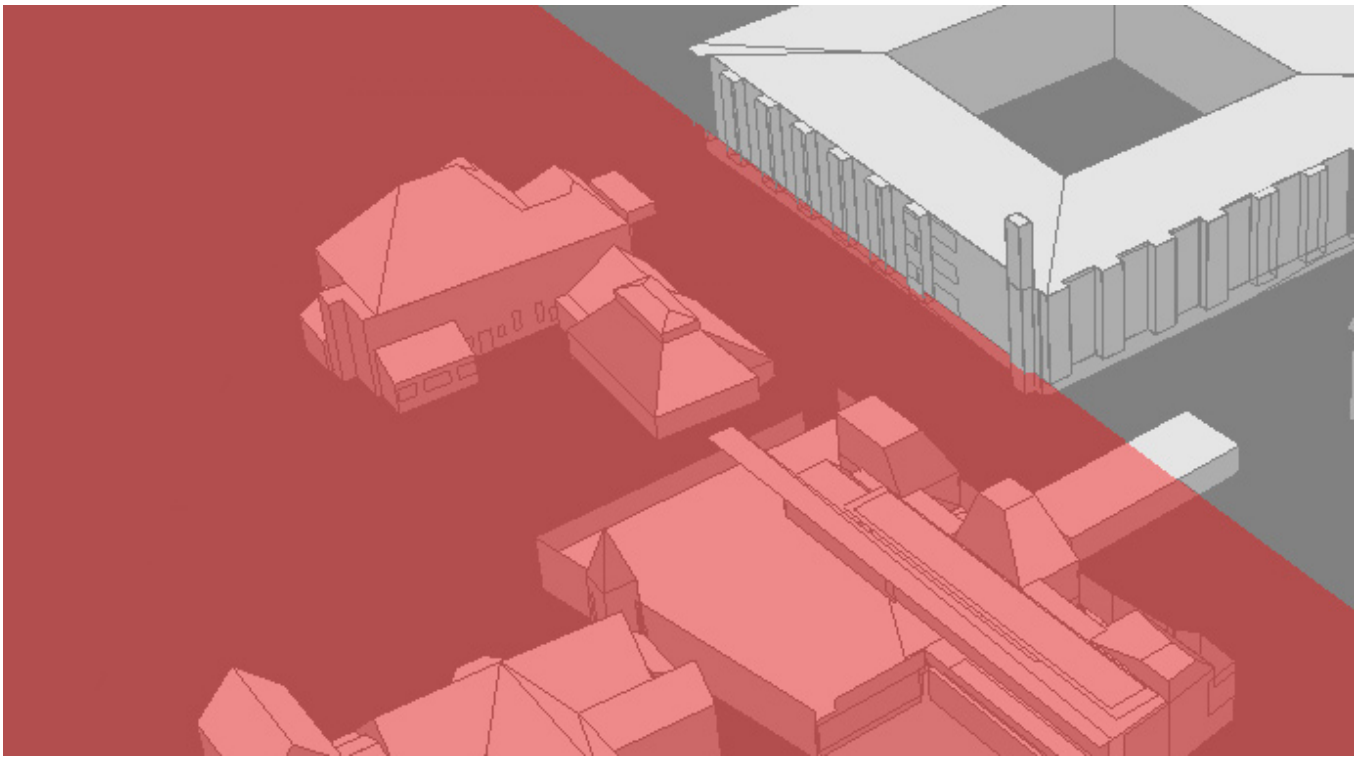


Henderson Court VSC Results

Window No.	25° Line Pass	VSC Before (%)	VSC After (%)	Relative VSC (%)
1	Yes (pass)	-	-	-
2	Yes (pass)	-	-	-
3	Yes (pass)	-	-	-
4	Yes (pass)	-	-	-
5	Yes (pass)	-	-	-
6	Yes (pass)	-	-	-

Result Summary

Number of windows	6
Windows that pass the 25 degree line test	6
Windows with a VSC greater than 27%	0
Windows that have a VSC of at least 80% of existing value	0
Windows that do not meet either criteria	0



25 degree line emanating from windows 5 and 6 on Henderson Court

Greenhill Building

This residential block is situated to the north of the proposed development, where 6 windows were identified as facing directly onto the site and therefore may suffer from possible daylight and sunlight impacts. These windows all pass the 25 degree line test.

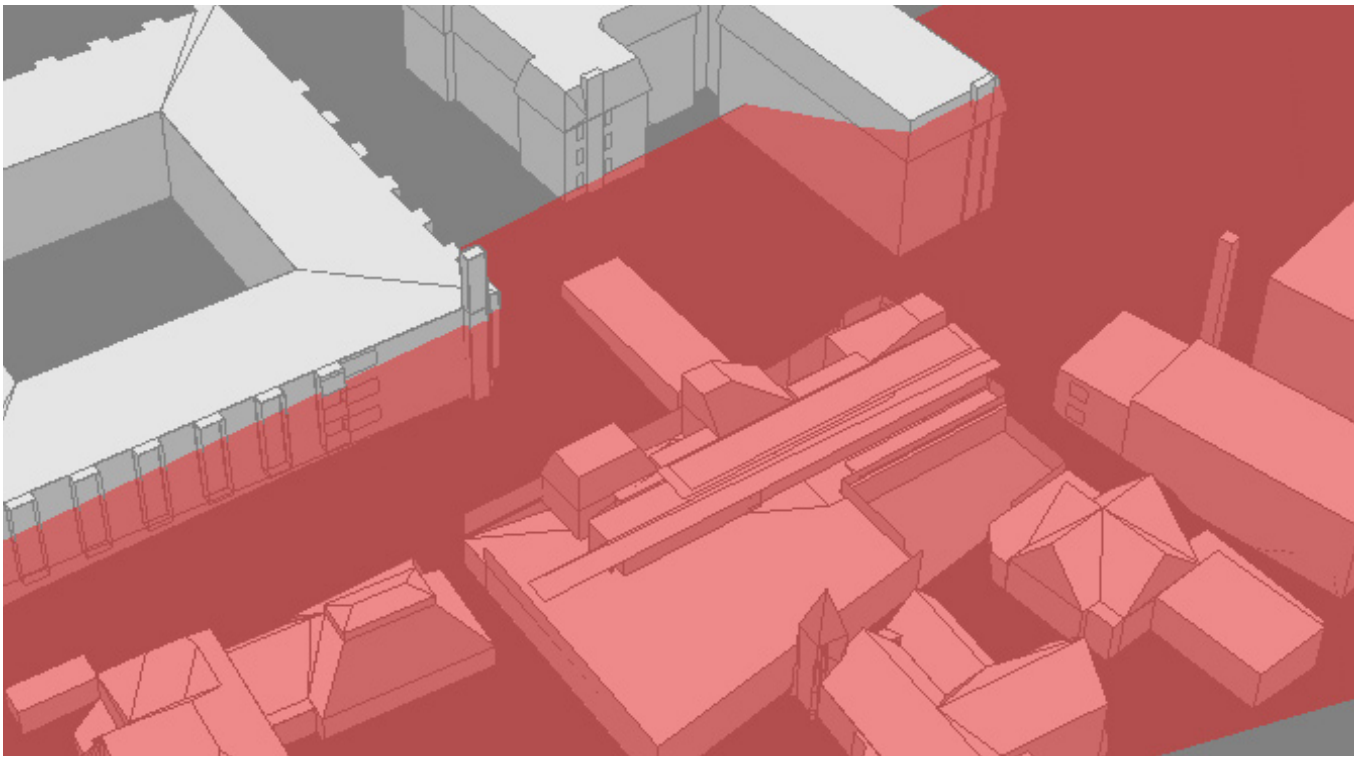
Since these windows are considered to be the most sensitive, the passing of these windows means that there will not be any impact on any other windows.

Greenhill Building VSC Results

Window No.	25° Line Pass	VSC Before (%)	VSC After (%)	Relative VSC (%)
7	Yes (pass)	-	-	-
8	Yes (pass)	-	-	-
9	Yes (pass)	-	-	-
10	Yes (pass)	-	-	-
11	Yes (pass)	-	-	-
12	Yes (pass)	-	-	-

Result Summary

Number of windows	6
Windows that pass the 25 degree line test	6
Windows with a VSC greater than 27%	0
Windows that have a VSC of at least 80% of existing value	0
Windows that do not meet either criteria	0



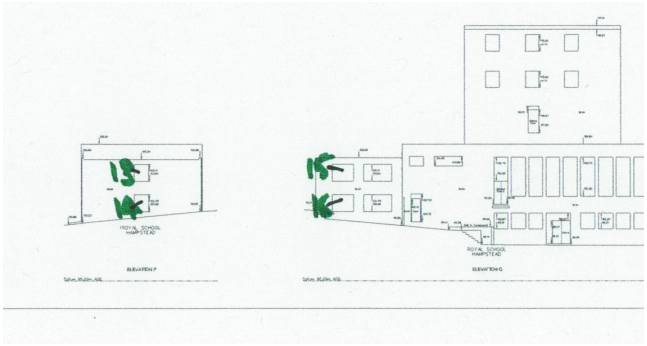
25 degree line emanating from windows 9 and 12 on the Greenhill Building

North Bridge House Senior School

The North Bridge House Senior School is located east of the proposed development. There are 4 windows facing the development and therefore may be impacted upon in terms of the daylight they receive.

The results showed that although the 25 degree line is subtended for all 4 windows, all windows passed the VSC test with either VSC values of greater than 27% or at least 80% of their former value.

The proposed development will have no significant impact on daylight access to these windows.



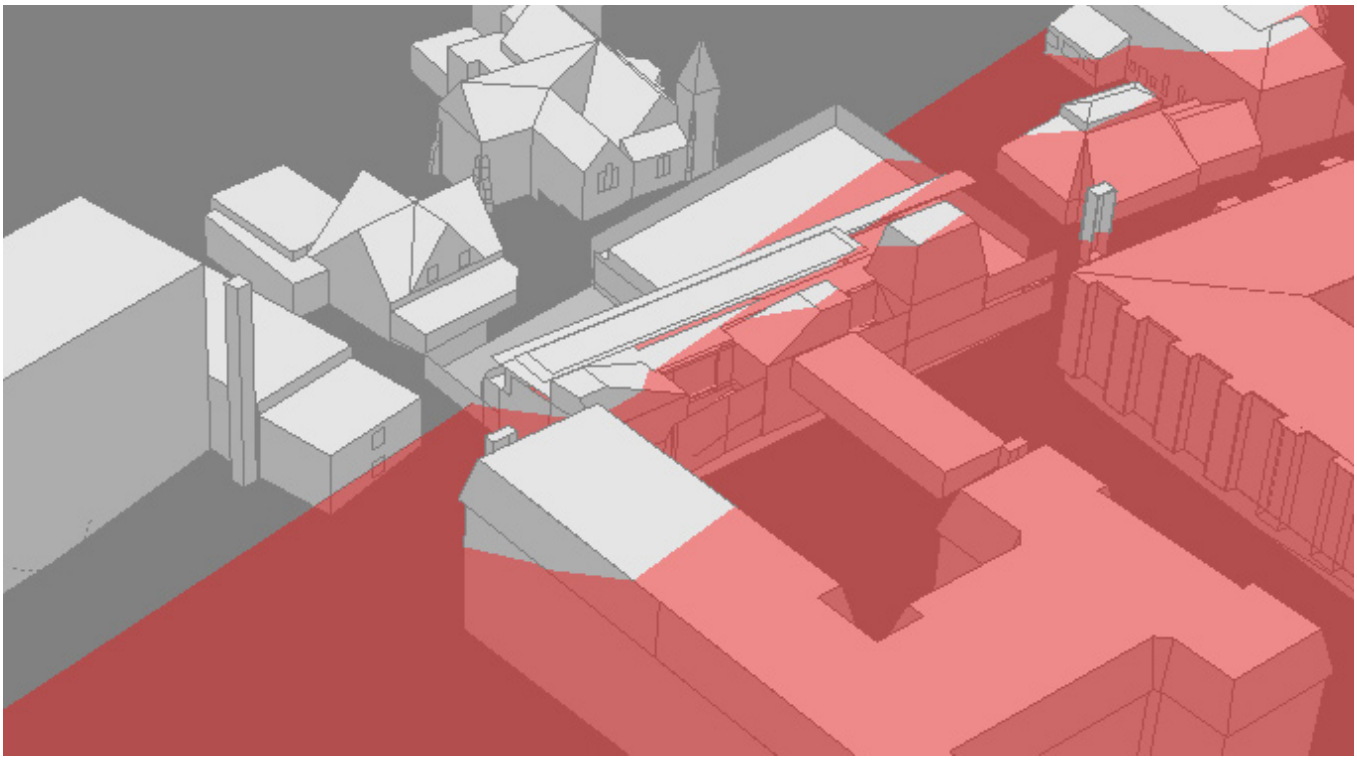
Windows 15 and 16 (worst-case scenario) were tested and passed. Therefore, these windows automatically pass.

The North Bridge House Senior School VSC Results

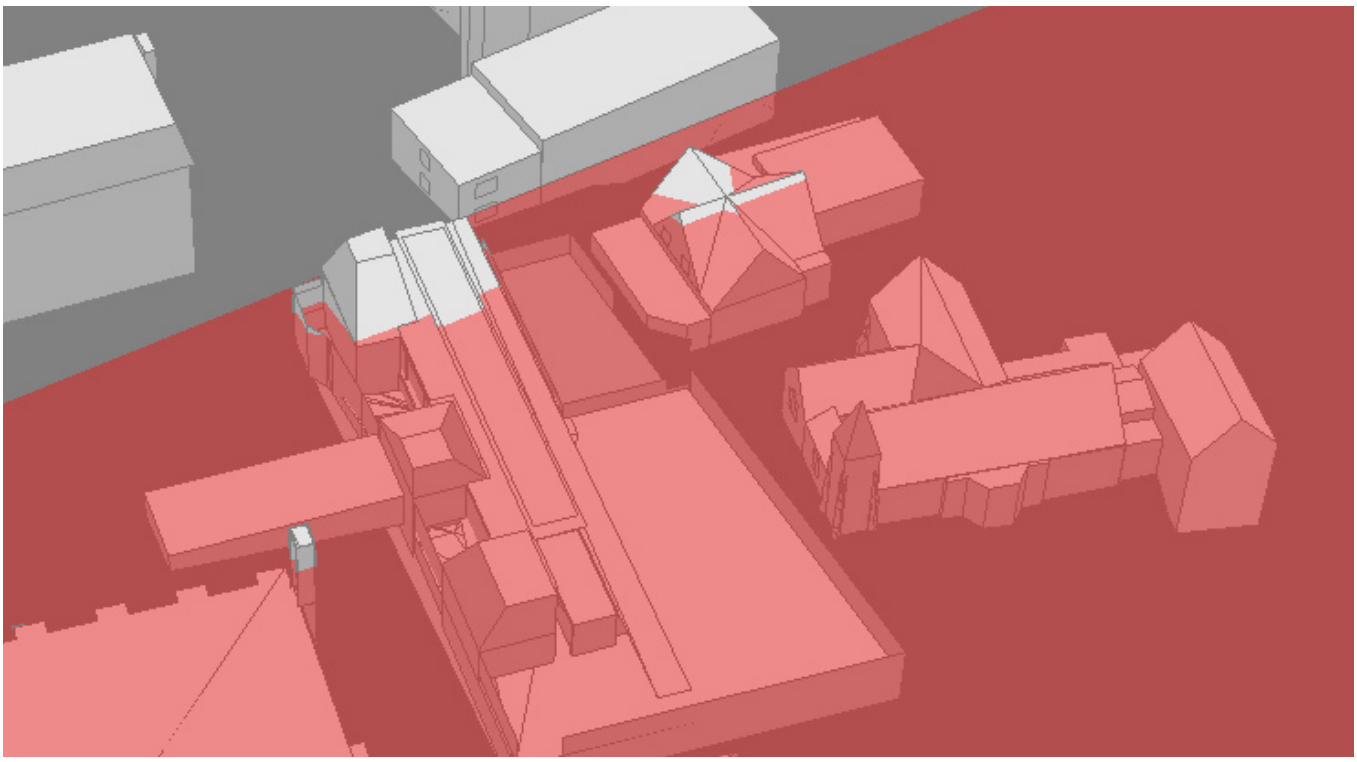
Window No.	25° Line Pass	VSC Before (%)	VSC After (%)	Relative VSC (%)
13	-	30.2	29.02 (pass)	-
14	-	28.2	26.8	90.4 (pass)
15	-	32.2	31.65 (pass)	-
16	-	29.8	26.22	87.9 (pass)

Result Summary

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



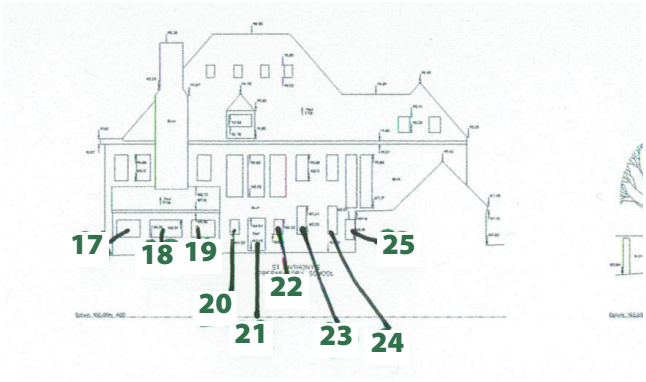
25 degree line emanating from window 14 on North Bridge House Senior School



25 degree line emanating from window 16 on North Bridge House Senior School

St. Anthony's Preparatory School

A further school is located southwest of the development site. Nine windows were identified for assessment. All were shown to pass the 25 degree line test and therefore no further testing was required.

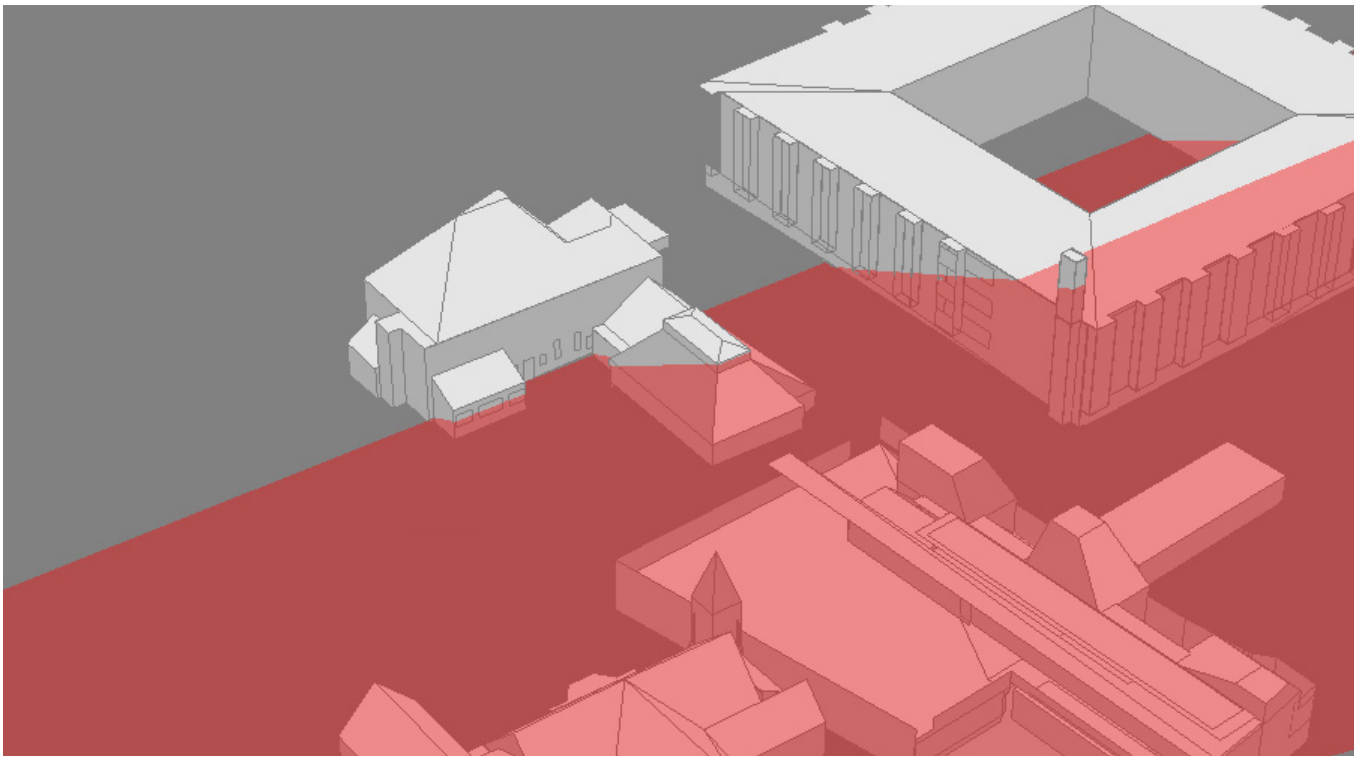


St. Anthony's Preparatory School VSC Results

Window No.	25° Line Pass	VSC Before (%)	VSC After (%)	Relative VSC (%)
17	Yes (pass)	-	-	-
18	Yes (pass)	-	-	-
19	Yes (pass)	-	-	-
20	Yes (pass)	-	-	-
21	Yes (pass)	-	-	-
22	Yes (pass)	-	-	-
23	Yes (pass)	-	-	-
24	Yes (pass)	-	-	-
25	Yes (pass)	-	-	-

Result Summary

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



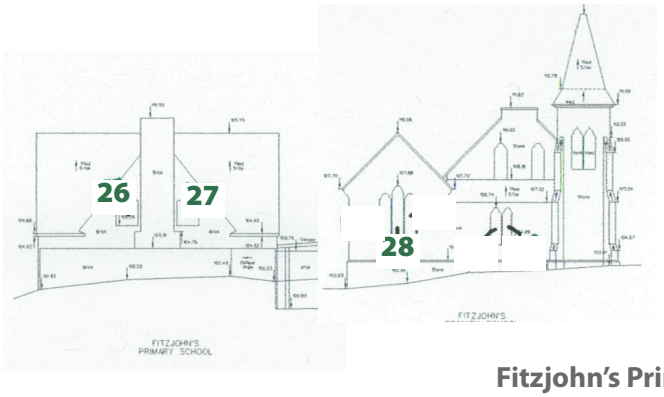
25 degree line emanating from windows 17-19 on St. Anthony's Preparatory School

Fitzjohn's Primary School

This primary school is located south and east of the proposed development. Four windows face the development, located across two school buildings.

The western window on the western building has been identified to be for a corridor. As there are no daylight requirements for this room, the window has not been included in the assessment.

Although the angles emanating from these three windows failed the 25 degree line test due to their proximity to the existing boundary wall, additional daylight analysis results show that all windows will achieve VSCs of at least 27% upon completion of the development. Furthermore, the proposed dwelling will lead to higher VSC levels to these windows, and therefore an improvement in daylight access due to the proposed building being located further away from Fitzjohn's Primary School and has a lesser height than the existing building on site.



Windows for a corridor (no daylight requirements)

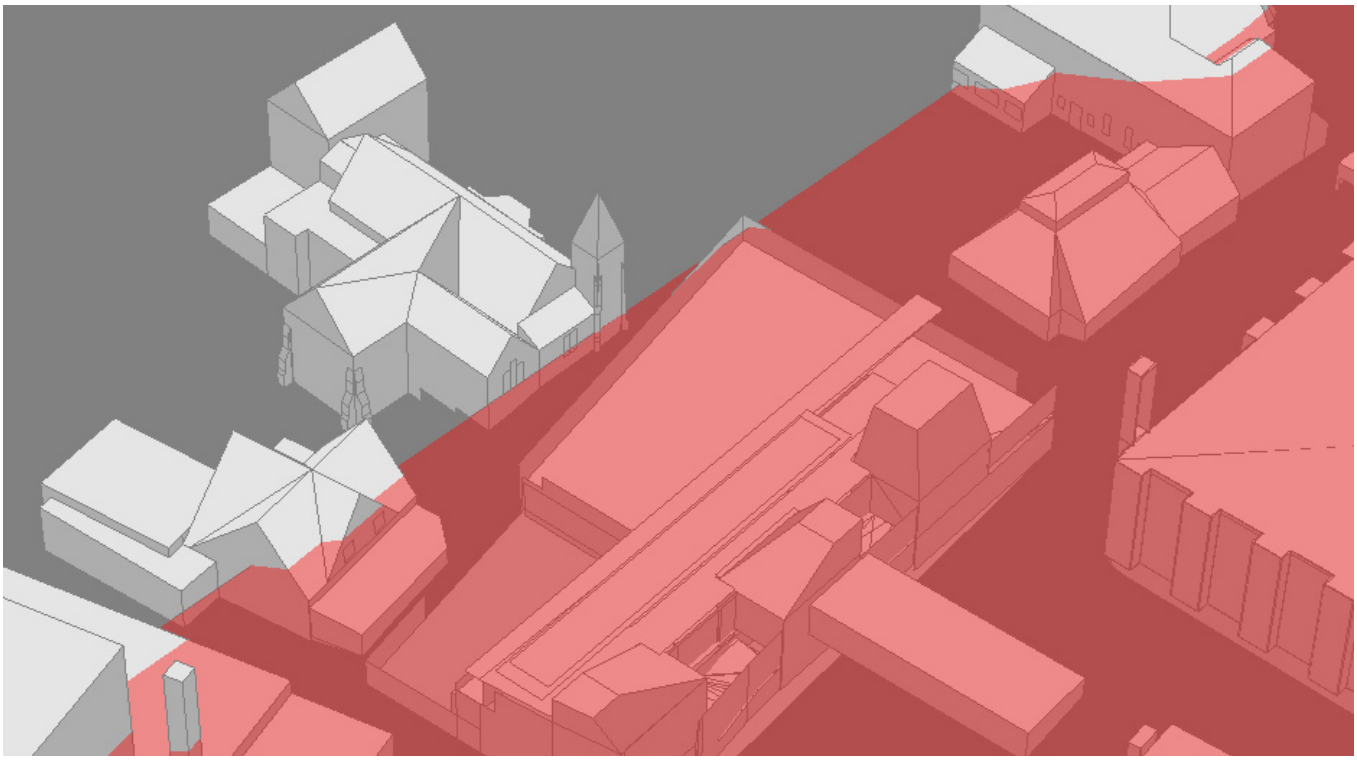
Fitzjohn's Primary VSC Results

Window No.	25° Line Pass	VSC Before (%)	VSC After (%)	Relative VSC (%)
26	-	34.4	35.2 (pass)	-
27	-	34.1	35.5 (pass)	-
28	-	25.4	34.3 (pass)	-

* tested for No Sky Line (see next page): achieves 100% area with view of the sky

Result Summary

Number of windows	3
Windows that pass the 25 degree line test	0
Windows with a VSC greater than 27%	3
Windows that have a VSC of at least 80% of existing value	0
Windows for a room with an area with view of the sky under the No Sky Line test greater than 0.8 times its former value	0
Windows that do not meet either criteria	0



25 degree line emanating from windows 26-28 on Fitzjohn's Primary

Sunlight Assessment

Existing Buildings

Surrounding windows which were south facing (within 90 degrees of due south) were assessed for the impact of the new development on the sunlight they receive. Therefore, the only buildings covered by this methodology are Henderson Court and Greenhill.

All windows were shown to pass the 25 degree line test and therefore not considered adversely affected by the proposed development at 92 Fitzjohn's Avenue in terms of sunlight access.

Annual and Winter Sunlight Hour Results

Henderson Court and Greenhill APSH and WPSH Results

	Window number	25 Degree Line Pass?	Annual Sunlight Hours (>372)	Winter Sunlight Hours (>22)	Relative Sunlight Hours Pass?
Henderson Court	1	Yes (pass)	-	-	-
	2	Yes (pass)	-	-	-
	3	Yes (pass)	-	-	-
	4	Yes (pass)	-	-	-
	5	Yes (pass)	-	-	-
	6	Yes (pass)	-	-	-
Greenhill Building	7	Yes (pass)	-	-	-
	8	Yes (pass)	-	-	-
	9	Yes (pass)	-	-	-
	10	Yes (pass)	-	-	-
	11	Yes (pass)	-	-	-
	12	Yes (pass)	-	-	-

Summary of Results

All of the existing south facing windows pass the 25 degree line test. The existing south facing facades will therefore continue to receive an adequate amount of sunlight with the new development in place.

Overshadowing of Open Spaces

An assessment of the sunlight levels of the surrounding amenity spaces was undertaken. Five of these open spaces were identified as being in close proximity to the development at Fitzjohn's Avenue.

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 Solar Access Analysis was undertaken on the two amenity areas for the full 24 hours on 21 March. Two images are provided on the next page showing the the overshadowing of open spaces for the baseline case with existing buildings on site and for the proposed development in place. It can be seen that all spaces pass the BRE test.

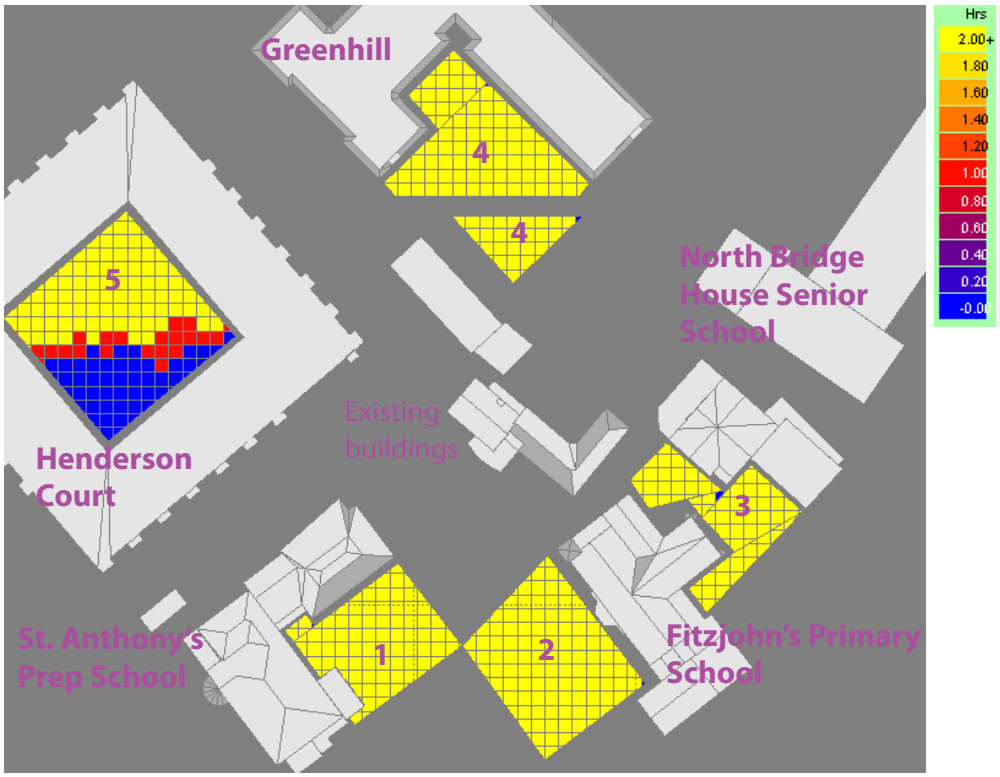
The table below quantifies the results of the sunlight assessment. For the amenity space to the south of the Greenhill Building, sunlight hours received by a very small part of the space ($6m^2$) will be affected by the proposed development which is not considered to be significant.

The table below shows that at least half of each of the amenity areas receive more than 2 hours of sunlight. A relative test is therefore not required.

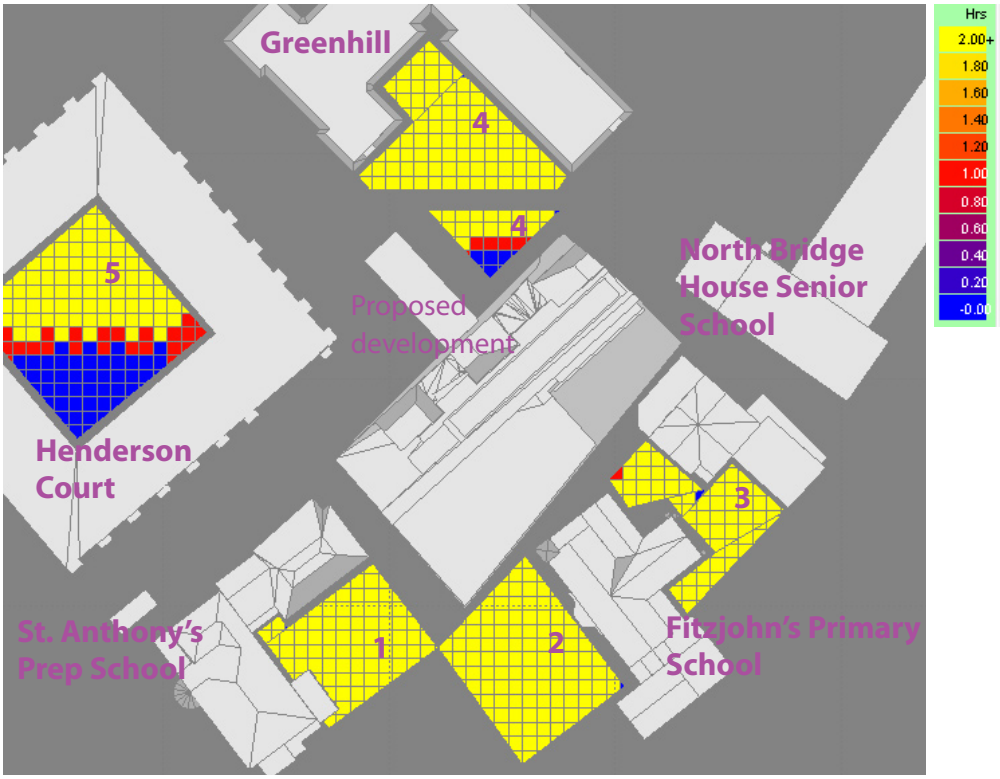
In summary, the development will have no material impact on sunlight to open spaces.

Overshadowing Results

Amenity Space	Area with existing buildings receiving 2 hours sunlight on 21 March	Area with proposed development receiving 2 hours sunlight on 21 March	Relative area test
1. St Anthony's Prep School	100%	100% (pass)	-
2. Fitzjohn's Primary School	100%	100% (pass)	-
3. Fitzjohn's Primary School	99%	98% (pass)	-
4. Greenhill	100%	92% (pass)	-
5. Henderson Court	55%	55% (pass)	-



Location of open spaces with the existing development in place.
Yellow indicates that at least 2 hours of sunlight is received.



Location of open spaces with the proposed development in place.
Yellow indicates that at least 2 hours of sunlight is received.

Conclusion

Daylight Assessment

The results from the existing building windows indicate that the provision of daylight will be adequate. This is due to the following findings:

- 21 windows were found to pass the 25 degree line;
- 5 of the 7 windows which failed 25 degree line were found to have a VSC of at least 27%;
- the remaining 2 of the 7 windows which had a VSC of less than 27%, was shown to achieve a VSC of at least 80% of its former value

The proposed development will have no significant impact on daylight to windows on surrounding properties.

Sunlight Assessment

Twelve windows were assessed for sunlight, all of which passed the 25 degree line test.

Overshadowing Assessment

Five amenity spaces were assessed which surround the development. An overshadowing assessment of these spaces showed that the development will have no material impact on sunlight to open spaces.

Summary

The proposed Fitzjohn's Avenue development passes the BRE daylight and sunlight tests for the surrounding existing buildings and the sunlight hours test for surrounding open spaces.

Daylight Assessment Overview

Building	Number of Windows	Window numbers	25 Degree Line Pass	VSC > 27%	VSC > 80% of Existing Value	No Sky Line Pass
Henderson Ct.	6	1 - 6	6 (100%)	n/a	n/a	n/a
Greenhill	6	7 - 12	6 (100%)	n/a	n/a	n/a
North Bridge House Senior School	4	13 - 16	0 (0%)	2 (50%)	2 (50%)	n/a
St. Anthony's	9	17 - 25	9 (100%)	n/a	n/a	n/a
Fitzjohn's Primary	3	26 - 28	0 (0%)	3 (100%)	n/a	n/a
TOTAL	28		21 (75%)	5 (17.9%)	2 (7.1%)	n/a

Sunlight Assessment Overview

Building group	Number of Windows	Window Numbers	25 Degree Line Pass	Probable Sunlight Hours Test	Sunlight hours 80% of existing value?
Henderson Ct.	6	1 - 6	6 (100%)	n/a	n/a
Greenhill	6	7 - 12	6 (100%)	n/a	n/a
TOTAL	12		12 (100%)	n/a	n/a

Overshadowing Overview

Open Spaces	Number of Open Spaces	Area Receiving 2 Hours of Sunlight on 21 March is greater than 50%?	Area Receiving 2 Hours of Sunlight on 21 March 80% of existing value?
TOTAL	5	5 (100%) (pass)	n/a