Report

Potential
Daylight & Sunlight
Impact by the Proposed
Development

Location:

139-147 Camden Road
NW1 9HA.

Date of report:

2nd November 2015

M&S Associates
Design & Management
Chartered Building & Land Surveyors

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1. Introduction

The report has been prepared to assess the potential impact from the proposed development on the aspects of daylight and sunlight received by nearest surrounding buildings and neighbouring lands (garden and open spaces).

The surrounding buildings, to assess the impact on the residential properties of similar window positions facing “90 degree due north” mainly located in south east direction from the proposed site on Camden Road. The School buildings with windows facing “90 degree due north”, located in the west direction from the proposed site on Sandal Road.

The practise M&S Associates, experts in Geomatics and CAD Measured Surveys, a firm of Chartered Building & Land Surveyors carried out the full measured survey, 3D computer modelling and Daylight & Sunlight analysis including overshadowing study.

The proposed site is currently predominately used as a private car park for Autodeutsche Garage. The site is not within a conservation area.

Planning permission is sought for the erection of a five storey office block (use class - B1) with associated cycle parking and refuse storage, which would create office units at First to Fourth Floor level, whilst retaining the existing ground floor car park for the sole use by the existing adjacent Autodeutsche car repair garage.

Best practise for good daylight and sunlight the methods of calculations and criteria are set out in the guidelines in the latest version BRE Guide “Site Layout planning for daylight and sunlight” a Guide to Good Practise Second Edition.

The proposed development is similar in height of the surrounding neighbouring properties. The proposed site has a small footprint and the designers have amended the mass to reduce the over-shadowing impact on to neighbouring lands open spaces.

Camden Planning Guidance 6 – advises the Amenity Daylight and Sunlight is important for general amenity, health and well-being, bringing warmth into a property and to save energy from reducing the need for artificial lighting and heating. The council has to assess proposals that have the potential to reduce daylight and sunlight levels for existing and future occupiers.

The guidance relates Camden Core strategy policies:

- CS5 "Managing the impact of growth and Development" and
- CS14 "Promoting high quality places and conserving our heritage". and
- DP26 "Managing the impact of development on occupiers and neighbours of the Camden development policies.

The Council expects that all developments receive adequate daylight and sunlight to support the activities taking place in that building.

A daylight and sunlight report should assess the impact of the development following the methodology set out in the most recent version of BRE "Site Layout planning for daylight and sunlight" Guide to good practice.

Key messages:

- Expect all buildings to receive adequate daylight and sunlight.
- Daylight and Sunlight reports will be required where there is a potential to reduce existing levels of daylight and sunlight.
- We will base our considerations on the average daylight factor (ADF) and vertical sky component (VSC).

2.1. BRE Guidelines

The BRE gives criteria and methods for calculating daylight, and sunlight as well as overshadowing and through each approach define what they consider as a material impact. As these different methods of calculation vary in their depth of analysis, it is often arguable as to whether the BRE definition of 'material' is applicable in all locations and furthermore if it holds under the different methods of calculation.

As the majority of the controversial daylight and sunlight issues occur within city centres these explanatory notes focus on the relevant criteria and parts of the Handbook BRE "Site Layout planning for daylight and sunlight" Guide to good practice which are applicable in such locations.

In the Introduction of
'Site Layout Planning for Daylight and Sunlight (2011)',
Section 1.6 (page 1), states that:-

"The guide is intended for building designers and their clients, consultants and planning officials. The advice given here is not mandatory and this document should not be seen 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 (see Section 5). In special circumstances the developer or Planning Authority may wish to use different target values. For example, in an historic city centre a higher degree of obstruction may be unavoidable if new developments are to match the height and proportions of existing buildings".

again, the third paragraph of Chapter 2.2 (page 7) of the document states:-

> *'Note that numerical values given here are purely advisory. Different criteria may be used, based on the requirements for daylighting in an area viewed against other site layout constraints'.*

The reason for including these statements in the Report is to appreciate that when quoting the criteria suggested by the BRE, they should not necessarily be considered as appropriate. However, rather than suggest alternative values, consultants in this field often remind local Authorities that this approach is supportable and thus flexibility applied.

3. Assessment methodology and significance criteria

The main objective to carry out Daylight and Sunlight assessment and overshadowing of neighbouring lands;

- Assess the potential impact the proposed development, and it meets minimum standards of natural light on surrounding existing properties set out in the BRE Guide Sections 2.2 & 3.2.

- To assess the impact the proposed development has on neighbouring lands open spaces (e.g Cantelowes Gardens) overshadowing set out in BRE Guide Section 3.3 Gardens and Open spaces.

3.1. Measurement and criteria

Assessment would be based on the various numerical tests laid out in BRE Guidelines "Site Layout Planning for Daylight and Sunlight" 2nd Edition. It is important to note that BRE tests in general are based on the requirements of British Standard BS8206 Part 2.
Following factors will be calculated for Sunlight / Daylight Assessment.

- o Sunlight availability to windows, skylights and open spaces
- o Overshadowing in gardens and open spaces
- o Daylight to windows

3.2. Availability of Sunlight to Windows

Existing Buildings

The BRE Sunlight tests will be applied to all major habitable rooms and conservatories which have a "window facing 90 degrees of due south"**.** The guide states that kitchen and bedrooms are less important, although care should be taken not to block too much sunlight.

> *The BRE 3.2.11 guideline recommends* ***'If a living room of an existing dwelling has a main window facing within 90° of due south, and any part of a 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, then the sunlighting of the existing dwelling may be adversely affected.*** *This will be the case if a point at the centre of the window; receives less than 25% of annual probable sunlight hours, or less than 5% of annual probable sunlight hours between 21 September and 21 March; that the centre of at least one window to a main living room should receive at least 25% of the total annual probable sunlight hours, including at least 5% of the annual probable sunlight hours during the winter months between 21st September and 21st March and less than 0.8 times its former sunlight hours during either period and has a reduction in sunlight received over the whole year greater than 4% annual probable sunlight hours.*

The availability of Sunlight to windows can be calculated either by using the Sunlight availability and Sun path Indicator for a particular city provided by BRE or can be calculated with the help of computer based modelling programme.

3.3. Overshadowing to Gardens and Open spaces

The availability of sunlight is checked for all open spaces e.g. gardens and amenity spaces where sunlight is required.

> BRE Guide Section 3.3.7 states:
> *As a check, it is recommended that at least of the amenity areas listed above Section 3.3.3 should receive at least two hours of sunlight on 21 March. It is instructive to draw the **" two hours of sun contour"** which marks this area on plan, because the use of specific parts of a site can be planned with sunlight in mind.*

In relation to general overshadowing we often provide, where appropriate, an hourly record for existing and proposed situations, the effect of overshadowing on December 21st, March 21st and June 21st.

For open spaces the sun hours on the ground criteria is naturally adopted but this offers limited understanding of how a space will feel or appear generally.

3.4. Calculation Procedure for Daylight to Windows

Diffuse daylight is the light received from the sun which has been diffused through the sky. Even on a cloudy day when the sun is not visible, a room will continue to be lit with the light from the sky.

Diffuse daylight calculations will be undertaken at all main windows of adjoining / neighbouring residential properties. The BRE Guide states that windows to bathrooms, toilets, storerooms, circulation areas and garages need not be analysed.

*In the first instance, if a proposed **development falls beneath a 25 degree angle taken from a point two metres above ground level, then the BRE say that no further analysis is required** as there will be adequate skylight (i.e. sky visibility) availability.*

The two methods for calculating daylight to **existing** surrounding residential properties are as follows:

- Vertical Sky Component (VSC) and
- No Sky Line / No Sky Contour (NSC)

The main method for calculating daylight to **proposed** residential properties is:

- Average Daylight Factor (ADF).

3.5. Calculation method of Vertical Sky Component (VSC) (%)

The percentage of the sky visible from the centre of a window is VSC (Vertical Sky Component).
Diffuse daylight is adversely affected if after a development the **VSC is both less than 27% and less than 0.8 times (20% of its former value).**

Once obstruction angle is calculated equivalent Vertical Sky Component can be determined using the table provided in "Site Layout Planning for Daylight and Sunlight" by BRE.

Alternately VSC can either be calculated with the help of 3D modelling using computer program namely MBS Daylight, or using Skylight Indicator or Waldram Diagram designed by BRE.

3.6. Calculation Method of No-Sky Contour

The no-sky contour test involves the calculation of percentage of a room's area which can receive direct skylight. **Diffuse daylight is likely to be adversely affected if after the development the area of a room receiving direct skylight is 0.8 times (20% of its former value).**

CALCULATIONS from BRE Guide "Site Layout Planning for Daylight and Sunlight" Appendix D:

The depth of no-sky line (d) is calculated as:

d=X (H/Y)
where;
***X** =is the distance from the outside wall to the obstruction,*
***H** = height of the window head above the working plane and*
***Y** = the height of obstruction above the window head.*

From the depth of no-skyline we can calculate "The percentage of working plane that receives direct light from the sky (D)" which can be calculated as:

D= (d/rd) x 100
where:
***D=** is the depth of no-skyline and*
***rd** is the room depth.*

3.7. Calculation Method of Average Daylight Factor (ADF)

The calculation of ADF takes into account a range of variables e.g size of the window, area of room surfaces, type of glazing, number of windows in a room and factors such as reflectivity of the internal finishes. For any receptors failing to satisfy the VSC criteria of 27%, a more detailed study based on the Average Daylight Factor (ADF) should be undertaken for comparison against the minimum daylight requirement as described in the BS 8206-02 (BSI, 2002).
Based on which ADF of:
1% in bedrooms,
1.5% in living rooms and
2% in kitchens should be achieved.

BRE Formula to calculate Daylight Factor (DF):
*CALCULATION: **DF = (M x W x 0 x T) / [A x (1-R2)]***
*Where; **M** is correction factor for dirt, **W** is total glazed area of windows or roof lights, **0** is angle of visible sky, **T** is transmission factor of glazing, **A** is total area of all the room surfaces (ceiling, floor, walls and windows) and **R** is area weighted average reflectance of the room surfaces (walls, floor and ceiling).*

3.8. Methodology Existing Buildings

First of all, using simple geometry, it will be determined whether the daylight to existing buildings and amenity spaces is adversely affected and this will be done using 25 degree and 45 degree methods.

If new buildings are set out in accordance with the 25 degree method for daylight, this will be sufficient to show that the sunlight to the existing buildings will not be adversely affected.

If these two methods of assessments are satisfied, this will be sufficient in showing that the day lighting to existing buildings and their amenity spaces will not be adversely affected by the new development.

3.9. Methodology Proposed Development

If the distance of the **proposed development is not more than 3 times its height above lowest window, 25 degree rules will be tested**. If an obstruction to light (proposed development) rises above a line which is drawn at 25 degree to the horizontal from a point which is set 1.8m from the internal finished floor level of the existing building at the external wall of the existing building (ie it does not satisfy 25 degree method) or where buildings are not perpendicular to one another, other recommended methods of assessment will be used as suggested by BRE which would include calculation of Sunlight Hours, Vertical Sky Component, No-Sky Line, Daylight Factor etc.

It has been found that the complexity and height of built form, room sizes, room heights, window sizes and used of double glazing can result in inadequate daylight being achieved even though these buildings satisfy the requirements of the 25 degree. In order that adequate daylighting is achieved, it is necessary to ensure that the daylighting within rooms is adequate and this will be assessed using the “no-sky contour” methodology. If this is satisfied it demonstrates that proposed development has adequate daylight.

4.0 Information used in the Technical Study

4.1. Existing and Proposed Development in Context Site Location in Context

The proposed property is located near the junction of Camden Road and Sandal Road between the Railway line and Cantelowes Gardens Skate Park and large open spaces.
Park located North east side of a motor vehicle maintenance centre at 139-147 Camden Road:

- Existing Open Space in Cantelowes Gardens and Skate Park (NE).
- Existing Residential neighbouring properties on 208 – 226 Camden Road (SE).
- Existing School Buildings (W) of the plot.

Please refer to location map below in (Figure1).
The proposed site topography is level and is bounded by 1.6m high boundary brick walls (NW & NE Boundaries of the site).

Nearest the boundary in Cantelowes Gardens is a row of Deciduous trees (5No) advised common whitebeam in line 90 degrees from the proposed development boundary wall (NE).
The trees are of similar height and spread circa 8 metres high, the tree nearest the proposed development is circa 1metre away. Being deciduous the trees lose their leaves through the winter months.

Figure 1 - Location Map

4.2. Neighbouring Lands (park area and residential)

The North East Boundary wall the edge of the park “Cantelowes Gardens”. The Boundary wall is leaning outwards is near collapse due to tree roots being in close proximity just 1metre from the boundary.

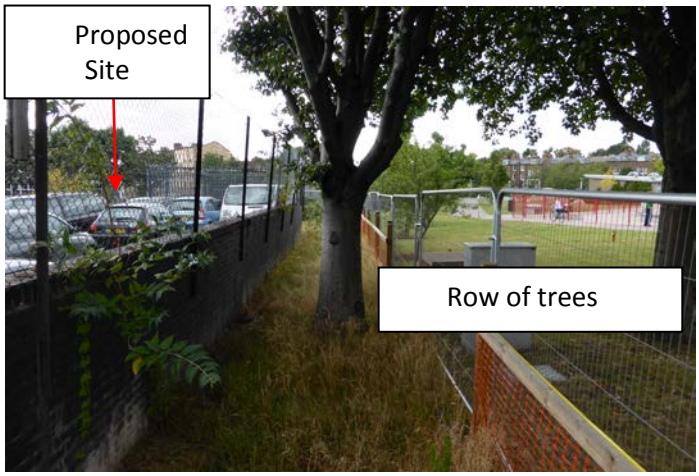

Figure 2 - Site Boundary wall NE proposed site. Proposed site to the left (red Arrow)

Figure 3 – 5No. whitebeams trees in Cantelowes Garden (NE)
Casting a shadow on the ground edge of skate park.

Figure 4 - Residential Flats Camden Road opposite proposed site (No.208-212)

4.3. Neighbouring Lands (park area and school)

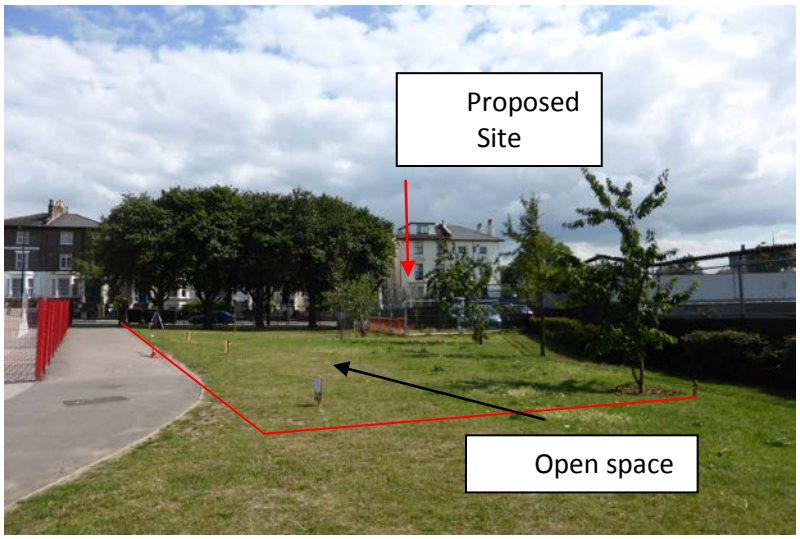

Figure 5 - Small section of the overall amenity space within Cantelowes Gardens pegged off by Council Area Analysed for Overshadowing in this report (red outline)

Figure 6 - Girls School Building (B1) on Sandal Road near Camden Road. (windows NW facing)

Figure 7 - Girls School Building (B2) on Sandal Road near Camden Road. (windows SE & NE facing)

5. Scope of the technical Study

5.1. Sources of Information

M&S Associates were instructed to carry out a study of the daylight and sunlight impact. A full measured survey was carried out externally of surrounding area to create an accurate 3D Digital model representation for analysis of the daylight and sunlight effects and to quantify in accordance with BRE Guide, and report on the findings.

Our clients brief:

- **Shading Impact Assessment** (BRE) effects on small open space within Cantelowes Gardens against the proposed development.
- **Daylight and Sunlight Assessment** (BRE) effects the proposed development has on the surrounding existing buildings.

5.2. Measurement

Onsite measurements carried out using a Totalstation instrument. Collecting important levels (x,y,z) of buildings (external building dimensions, roof heights and openings position for analysis. Linked to control points identified onsite. Control linked to OSGB National Grid height data with GPS. Equipment calibrated.

The As Built features recorded of the surrounding properties plus parks amenity areas close to the proposed development including trees and boundary heights etc.

Carried out in accordance with “RICS Specification for surveys of land, buildings and utility services at scale 1:500 and larger”.

5.3. 3D Model produced for Daylight and Sunlight Analysis

The survey data was post processed by in-house team, site plan and 2D Elevations were created and from the xyz data an accurate 3D Model was produced for further analysis using the latest analysis computer software.

5.4. Research

Searches were carried with local authorities by investigating planning portal archives to try and source relevant room layouts of neighbouring properties.
Data was sourced on the room layouts of some surrounding properties on Camden Road. The Planning portal had no information on proposed future development near the site and exhausted other avenues such as Estate Agent websites.

No information available on properties @ 208 / 216 / 222 / 226 Camden Road. .
The differences are that some properties have front bay windows which make the rooms larger than the ones without bay windows.
Sourced Information on 210 / 212 / 214 / 218 / 220 / 224 Camden Road to calculate the impact of No Sky line / No Sky Contour if required.
(Please refer in the (Appendix 4 page 38 Fig 42) number of scaled existing floor plans)

5.5. Location of Surrounding Properties

- The Girls school buildings west and south west direction from the proposed site. Main building height 4 Storey from lower ground floor level.
  The school main windows are north east and west facing.
  (not within 90deg due south)

- The residential flats are located South East direction, height 4 Storey from lower ground level. The main windows are north west facing
  (not within 90deg due south)

5.6. Daylight calculations for neighbouring buildings

The BRE Report sets out two calculations that should be used for testing the daylight to existing neighbouring buildings to a development:

- the vertical sky component (VSC) assessment
- the no skyline / contour (NSC) assessment

The BRE Report states that: *'the diffuse daylighting of the existing building may be adversely affected if either:*

- *the VSC measured at the centre of an existing main window is less than 27% and less than 0.8 times(20% of its former value); or*
- *the area of the working plane in a room which can receive direct skylight (the NSC) is reduced to less than 0.8 times (20% of its former value).'*

Both of these must be met because the failure of either one would indicate an adverse effect on the daylighting to the other property. If all obstructions are beneath the 25 degree line criteria, the VSC will be over 27 per cent.

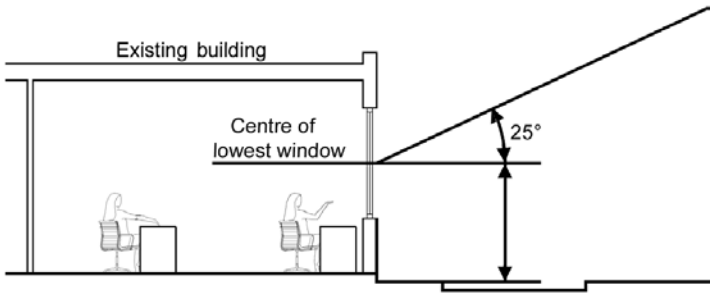

Figure 8 - Illustration of 25 deg rule for existing windows.

If the obstruction angle is above the 25 degree line then the VSC have to be calculated by using the skylight indicator at Appendix A in the BRE Report.

Skylight indicator is a semi-circular template that contains 80 crosses, each of which represent 0.5 per cent of the VSC. The template therefore represents 40 per cent of the total sky. Obstructions are plotted onto the template and the number of unobstructed crosses counted to establish the VSC. Separate templates can be produced for the existing and proposed conditions, or produced as overlay templates.

Alternatively, the same can be accomplished using the modified Waldram Diagram in Appendix B of the BRE Report.
A "computer program will calculate the VSC & APSH results from a 3D Model, MBS for Daylight tool was used to calculate VSC & APSH figures in this report".

5.7 The NSC (No Sky Contour) Assessment

By calculating the area of a room that has visible sky at a working plane height of 850mm above floor level. For simple environments, the NSC can be plotted by means of drawn plans and sections. Care must be taken to follow changes in roof profile and gaps between buildings. Where obstructions to the sky visibility are more complex then care must be taken in plotting the No sky contour (NSC).

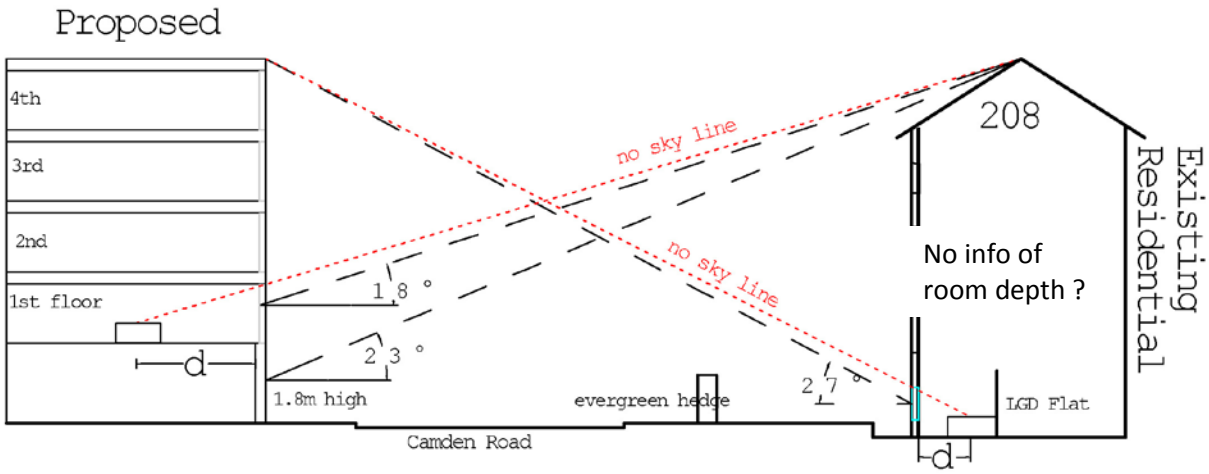

Figure 9 - No Sky Line depth (red) to EXISTING 208 Camden road and PROPOSED.

Figure 10 - No Sky Line depth (red) for the EXISTING 210 Camden Road (LGD Bay Window)

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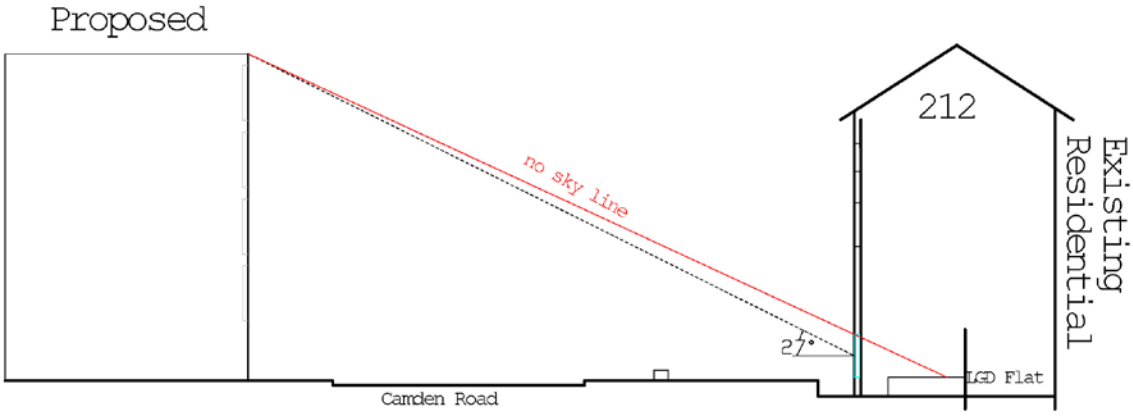

Figure 11 - No Sky Line depth (red) EXISTING 212 Camden Road (LGD Window)

5.8 25 Degree Rule (Existing properties)

The application of 25 degree rule indicated some windows on the lower ground floor of the row of houses along Camden Road were at a slightly greater angle of 27 to 29 degrees, the criteria under BRE advise calculations to be provided for VSC vertical sky component and (NSC) No Sky Line / Contour as best practise.

VSC tests carried out on all the windows along row of houses (208-226 Camden Road). The Daylight distribution within the rooms could not all be calculated due to the lack of information, without internal dimensions and layout information for some properties, therefore unable to calculated the NSC.

On the next page the images show the position and layout of the windows in 2D elevation and 3D Model. Houses numbered 208 to 226 (going from right to left direction)

The computer program (MBS Daylight) was used to calculate VSC and APSH were required.
The computer program formulated VSC & APSH results (using traffic light system indicator), results showed that all windows were given “the green light” which indicates a pass.

Therefore the tests confirm that the VSC is above 27%, and if lower than 27% the reduction of light has to be greater than 0.8 times (80%) to generate a green light and pass the requirement.

Other check to perform is the No Sky line test please refer to Section 5.13 page 23.

5.9 DAYLIGHT ASSESSMENT (EXISTING) 208 – 226 CAMDEN ROAD

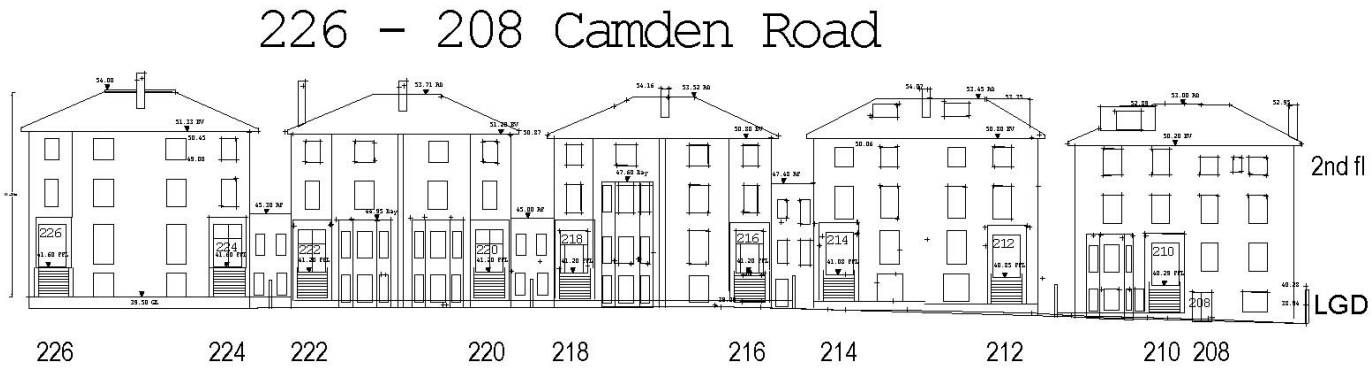

Figure 12 - 2D Front Elevation of windows (EXISTING 208 -226 Camden Road LGD up to 2nd floor).

Figure 13 - 3D Model Analysis of windows (EXISTING 208 -226 Camden Road) VSC Results (Screenshot)
Indicates GREEN LIGHTS on all WINDOWS
Software has PASSED VSC & APSH TESTS

5.10 TABLES OF RESULTS VSC Residential

Tables below indicate the VSC Calculations Results table 208-226 Camden Road.

Each **building** is numbered with house number (208 to 226),
each floor **level** indicated (lower ground floor up to second floor),
computer model generates the results for each **window**.

Please refer to Tables 1, 2 & 3 VSC Results on Residential properties.

VSC			above 27%		0.8 times
Building	Level	Window	VSC before %	VSC after %	Ratio
208	LGD	1004	36.37	34.61	0.95
208	GD	1005	38.54	36.35	0.94
208	GD	1006	35.92	33.35	0.93
208	1st	1007	38.96	37.48	0.96
208	1st	1008	38.45	37.21	0.97
208	2nd	1009	36.44	35.64	0.98
208	2nd small	1010	35.98	35.14	0.98
208	2nd	1011	36.32	35.39	0.97
210	LGD Bay	1013	37.13	33.11	0.89
210	GD Bay	1014	38.68	35.29	0.91
210	1st	1015	39	36.91	0.95
210	1st	1016	38.96	37.01	0.95
210	2nd	1017	34.67	33.72	0.97
210	2nd	1018	34.8	33.77	0.97
210	Dormer	1019	34.92	34.38	0.98
212	LGD	1020	34.78	31.01	0.89
212	GD	1021	37	34.07	0.92
212	1st	1022	39.04	37.12	0.95
212	1st	1023	39.06	37.05	0.95
212	2nd	1024	35.78	34.82	0.97
212	2nd	1025	35.66	34.74	0.97
212	Dormer	1027	23.58	23.58	1.00
214	LGD	1028	34.74	31.46	0.91
214	GD	1029	36.98	34.35	0.93
214	1st	1030	39.05	37.31	0.96
214	1st	1031	39.08	37.47	0.96
214	2nd	1032	35.75	34.91	0.98
214	2nd	1033	35.79	35	0.98
214	Dormer	1035	24.17	24.17	1.00
214	GD Link	1036	10.65	10.65	1.00
214	1st Link	1037	11.2	11.2	1.00

Figure 14 - Table 1 VSC (ALL PASSED)

VSC			above 27%		0.8 times
Building	Level	Window	VSC before %	VSC after %	Ratio
216	LGD	1042	34.29	32.17	0.94
216	GD	1043	36.79	35.1	0.95
216	1st	1044	38.92	37.82	0.97
216	1st	1045	39.07	37.81	0.97
216	2nd	1046	35.27	34.65	0.98
216	2nd	1047	35.18	34.64	0.98
216	GD Link	1038	10.82	10.82	1.00
216	1st Link	1039	11.33	10.71	0.95
218	LGD Bay	1049	36.27	35.05	0.97
218	GD Bay	1050	38.97	37.55	0.96
218	1st	1051	39.48	38.56	0.98
218	1st	1055	38.67	37.91	0.98
218	2nd	1056	35.27	34.89	0.99
218	2nd	1057	35.18	34.74	0.99
218	GD Link	1058	9.69	9.69	1.00
218	1st Link	1059	9.91	9.91	1.00
220	LGD Bay	1062	36.9	36.01	0.98
220	GD Bay	1063	39.03	38.28	0.98
220	1st	1064	39.09	38.6	0.99
220	1st	1065	39.12	38.55	0.99
220	2nd	1066	35.66	35.38	0.99
220	2nd	1067	35.57	35.34	0.99
220	GD Link	1060	9.09	9.09	1.00
220	1st Link	1061	9.68	9.68	1.00
222	LGD Bay	1068	37.03	36.48	0.99
222	GD Bay	1069	39.17	38.57	0.98
222	1st	1070	39.09	38.7	0.99
222	1st	1071	39.14	38.8	0.99
222	2nd	1072	35.64	35.47	1.00
222	2nd	1073	35.57	35.38	0.99
222	GD Link	1074	9.04	9.04	1.00
222	1st Link	1075	9.71	9.71	1.00

Figure 15 - Table 2 VSC (ALL PASSED)

VSC			above 27%		0.8 times
Building	Level	Window	VSC before %	VSC after %	Ratio
224	LGD	1078	34.64	34.61	1.00
224	GD	1094	37.37	37.19	1.00
224	1st	1086	39.12	38.89	0.99
224	1st	1087	39.16	38.9	0.99
224	2nd	1088	35.75	35.63	1.00
224	2nd	1089	35.63	35.53	1.00
224	GD Link	1076	8.81	8.81	1.00
224	1st Link	1077	9.76	9.76	1.00
226	LGD	1096	33.73	33.13	0.98
226	GD	1090	37.07	36.78	0.99
226	1st	1091	39.18	39.01	1.00
226	1st	1097	39.13	38.94	1.00
226	2nd	1092	35.67	35.59	1.00
226	2nd	1093	35.63	35.55	1.00

Figure 16 - Table 3 VSC (ALL PASSED)

5.11 DAYLIGHT ASSESSMENT (EXISTING) Girls School at Sandal Road

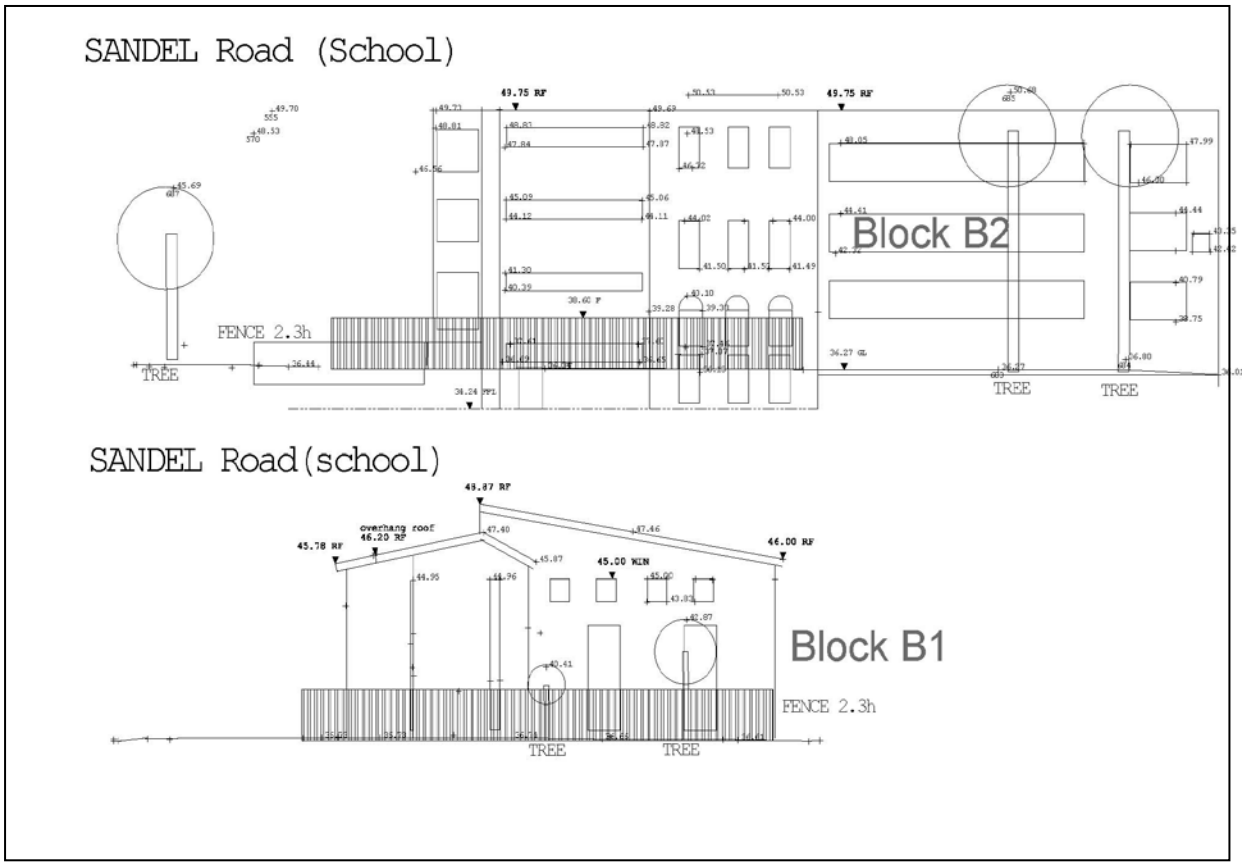

Figure 17 - 2D Elevations EXISTING Girls School (Sandal Road) Block 1 & 2

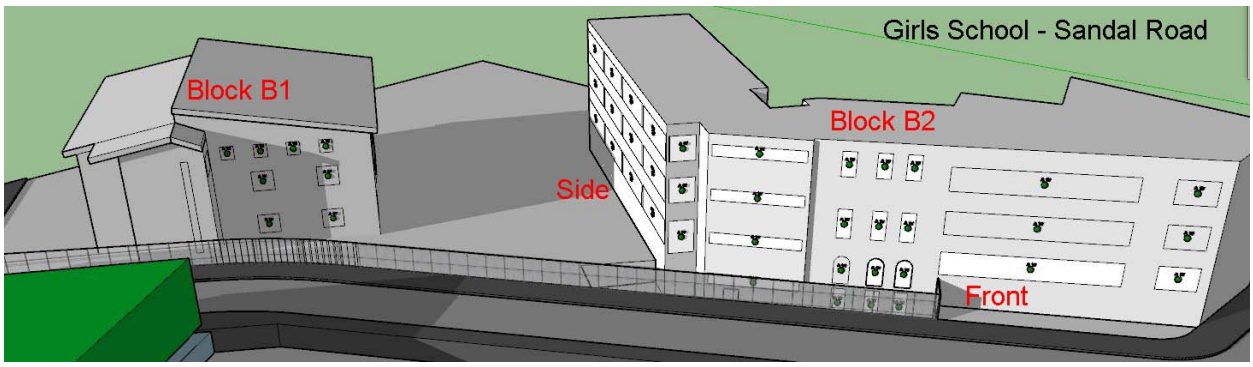

Figure 18 - 3D Model Analysis of EXISTING School – VSC Results ALL PASSED (WINDOWS).
(GREEN LIGHTS indicates software PASSED VSC & APSH TESTS)

5.12 TABLE OF RESULTS VSC School

See below VSC Calculations Results (tables 4 & 5) below - Girls School Buildings.

Each School Building Block number (1 or 2)
Block 1 is a 3 Storey building from Ground floor.
Block 2 is larger 4 Storey building from lower ground level.

Each level (floor level) is indicated where the windows are located
(lower ground floor up to second floor).

VSC		above 27% or 0.8 times			0.8 times
Building	Level	Window	VSC before %	VSC after %	Ratio
B1	GD (L)	1098	32.97	32.36	0.98
B1	GD	1099	36.38	35.3	0.97
B1	1st (L)	1100	34.91	33.82	0.97
B1	1st	1101	37.37	36.32	0.97
B1	2nd (L)	1102	30.7	29.79	0.97
B1	2nd (2L)	1103	36.02	35.16	0.98
B1	2nd (3L)	1104	36.36	35.54	0.98
B1	2nd	1105	35.49	34.73	0.98

Figure 19 - Table 4 VSC (ALL PASSED)

VSC		above 27% or 0.8 times			0.8 times
Building	Level	Window	VSC before %	VSC after %	Ratio
B2	Side End GD	1106	35.46	35.23	0.99
B2	Side GD	1107	34.99	34.75	0.99
B2	Side GD	1108	35.41	35.16	0.99
B2	Side GD	1109	35.89	35.61	0.99
B2	Side 1st	1110	37.7	37.35	0.99
B2	Side 1st	1111	37.49	37.23	0.99
B2	Side 1st	1112	37.31	37.11	0.99
B2	Side 1st	1113	37.57	37.4	1.00
B2	Side 2nd End	1114	38.86	38.77	1.00
B2	Side 2nd	1115	38.78	38.67	1.00
B2	Side 2nd	1116	38.78	38.63	1.00
B2	Side 2nd	1117	38.81	38.61	0.99
B2	Step GD	1118	28.36	27.8	0.98
B2	Step 1st	1119	28.73	28.32	0.99
B2	Step 2nd	1120	28.92	28.68	0.99
B2	Front LGD	1121	37.83	37.3	0.99
B2	Front GD	1122	38.39	37.9	0.99
B2	Front 1st	1123	38.86	38.46	0.99
B2	Front 2nd	1124	39.14	38.93	0.99
B2	Fr Sm LGD	1125	37.72	37.33	0.99
B2	Fr Sm LGD	1126	37.91	37.56	0.99
B2	Fr Sm LGD	1127	37.95	37.63	0.99
B2	Fr Arch GD	1128	38.07	37.67	0.99
B2	Fr Arch GD	1129	37.35	36.99	0.99
B2	Fr Arch GD	1130	37.98	37.54	0.99
B2	Fr Sm 1st	1131	38.59	38.23	0.99
B2	Fr Sm 1st	1132	38.76	38.43	0.99
B2	Fr Sm 1st	1133	38.78	38.47	0.99
B2	Fr Sm 2nd	1134	38.96	38.78	1.00
B2	Fr Sm 2nd	1135	39.12	38.95	1.00
B2	Fr Sm 2nd	1136	39.13	38.97	1.00
B2	Fr GD Wide	1137	38.61	38.39	0.99
B2	Fr 1st Wide	1139	39	38.79	0.99
B2	Fr 2nd Wide	1141	39.22	39.09	1.00
B2	Fr End GD	1138	38.74	38.59	1.00
B2	Fr End 1st	1140	39.09	38.94	1.00
B2	Fr End 2nd	1142	39.28	39.19	1.00

Figure 20 - Table 5 VSC (ALL PASSED)

5.13 No skyline test (existing) calculations and results

The impact on the daylighting distribution within the existing dwelling can be found plotting the no sky line / contour in the rooms of concern, include living rooms, dining rooms and kitchens. Bedrooms should also be analysed also, although they are less important.

The no sky line / contour divides points on a working plane which is assumed to be horizontal and 0.85m high in dwellings. Areas beyond the no sky line, since they receive no direct daylight, usually look dark and gloomy compared with the rest of the room.

According to the 'British Standard' supplementary electric lighting will be needed if a significant part of the working plane lies beyond the no sky line.

If the new development affects the no sky contour in the existing rooms and is reduced by 0.8 times its former value then this would be noticeable to the occupants. This is also true if no sky contour encroaches on key areas like kitchen sinks and worktops.

No sky line was drawn in section, based on exceeding the 25 Degree rule. (Refer to page 17 & 18). Houses 208 to 212 exceeded the 25 Degree rule the lower ground floor windows only.

The information researched from the Planning Portal on room layouts of surrounding properties, floor plans scaled from archived drawings, the accuracy of dimensions is approximate due to thickness of lines scan quality.

<u>The following calculation as outlined in BRE Guide Appendix D:</u>

- To calculate no skyline by d=x(h/y)
- To calculate percentage of working plane receiving daylight D=(d/rd)x100

House 208 (lower ground floor window) - incomplete
No information from planning portal on room depth or room type.
Calculate no skyline depth d = 2.71m.
Unable to calculate percentage of working plane receiving daylight

House 210 (lower ground floor bay window) - failed
Room depth is 4.55metres (a living room).
Using No skyline equation d=x(h/y), we calculate d=2.78m
Percentage of working plane receiving daylight D=(d/rd)x100,
we calculate D= 62%.
Total estimated reduction 38% of daylight on the working plane through the central window of the bay, please note there are two other windows each side which would increase the daylight in to the room.
Exceeded the daylight by 18% more than min standard advises by BRE, less concerned being a large bay window, but care has to be taken.

House 212 (lower ground floor window) - passed
Room depth 4.68 metres (a living room).
No skyline equation d=x(h/y), we calculate d=4.02m
Percentage of working plane receiving daylight D=(d/rd)x100,
we calculate D= 86%.
Total estimated reduction 14% of daylight on working plane.
According to BRE guide this window has adequate daylight with very small impact by the proposed development as it is greater than 0.80 times in reduction of daylight.

5.14 Sunlight calculations for neighbouring properties (EXISTING)

The BRE recommends

BRE 3.2.11: Summary

If a living room of an existing dwelling has main windows facing within 90 deg of due south, and any part of the ***new development subtends an angle of more than 25 degree to the horizontal measured from the centre of the window****, then the sunlighting of the existing dwelling may be adversely affected. This will be the case if the centre of the window:*

- *Receives less than 25% of annual probable sunlight hours, or less than 5% of annual probable sunlight hours between 21 September and 21 March and*
- *Receives less than 0.8 times former sunlight hours during either period and*
- *Has a reduction in sunlight received over the whole year greater than 4% of annual probable sunlight hours.*

Any reduction in sunlight below this level should be kept to a minimum. If the available sunlight hours are both less than the amount above and less than 0.8 times their former value, then the occupants of the existing building will notice the loss of sunlight.

In this case no windows are facing within 90deg of due south of the proposed development. Due to the orientation of the neighbouring properties no sunlight analysis is required.

5.15 Over shadowing analysis open spaces of neighbouring lands

To analysis the shadows cast during a day we generated a 3D computer model and geo referenced it, this allow the analysis of the shadows cast on hourly intervals.
Under BRE Guide the recommended time of year 21st March (equinox) which predicts the availability of sunlight on the ground.

BRE Guide Section 3.3.3 states
The availability of sunlight should be checked for all open spaces where it will be required. This would normally include:

- Gardens (back gardens) of houses.
- Parks and playing fields.
- Children's playgrounds.
- Outdoor swimming pools.
- Sitting out areas such as those between non-domestic buildings and in public spaces.
- Focal points for views such as a group of monuments or fountains.

BRE Guide Section 3.3.4 states:
Each of these spaces will have different sun lighting requirements and it is difficult to suggest a hard and fast rule. However it is clear that the worst situation is to have significant areas on which the sun only shines for a limited period over a large part of the year. The equinox (21 March) can be chosen as a date for assessment here.

BRE Guide Section 3.3.7 states:
As a check, it is recommended that the amenity areas listed above Section 3.3.3 should receive at least two hours of sunlight on 21 March. It is instructive to draw the " two hours of sun contour" which marks this area on plan, because the use of specific parts of a site can be planned with sunlight in mind.

BRE Guide Section 3.3.9 states:
The question of whether trees or fences should be included in the calculation depends upon the type of shade they produce. Normally trees and shrubs need not be included, partly because their shapes are almost impossible to predict, and a dappled shade of a tree is more pleasant than the deep shadow of a building (this applies especially to deciduous trees).
Nevertheless choose locations for tree planting with care. The aim should normally be to have some areas of partial shade under trees while leaving other parts of the amenity areas in full sun.

BRE Guide Section 3.3.10 states:
Fences and walls cast deeper shade than trees and their positions can often be predicted.
As a guide, shadows of walls or opaque fences greater than 1.5m high should be included in the calculation. Where low fences or walls are intended, or railings or trellises which let through sunlight, no calculation of shadows is necessary.

BRE Guide Section 3.3.11 states:
The above guidance applies to both new gardens and amenity areas and to existing ones which affected by new developments. If an existing garden or outdoor space is already heavily obstructed then any further loss of sunlight should be kept to a minimum.
In a poorly sunlit case, if as a result of new development the area which can receive two hours of direct sunlight on 21 March is reduced to less than 0.8 times (80%) its former size, this further loss of sunlight is significant. The amenity area will tend to look more heavily overshadowed.

BRE Guide Section 3.3.17 states:
It is recommended that for it to appear adequately sunlit throughout the year, **at least half of a garden or amenity space should receive at least two hours of sunlight on 21 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 21 March is less than 0.8 times its former value, then the loss of sunlight is likely to be noticeable. If a detailed calculation cannot be carried out, it is recommended that the centre of the area should receive at least two hours of sunlight on 21 March.

6 Impact upon surrounding open spaces (Cantelowes Gardens)

6.1 Hourly Shadow Analysis (21st March) 7am to 2pm

The following images were produced at generally one hour cycles from 07.00 to 17.00 on the **21st March GMT time at a Latitude 51.546185 N, 0.133590W.**

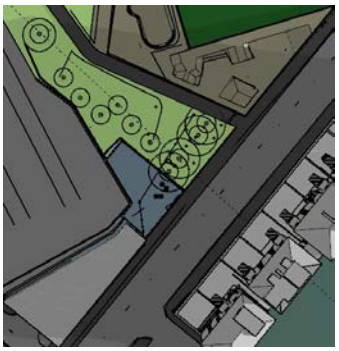

Figure 21 - 07:00hrs GMT (before)

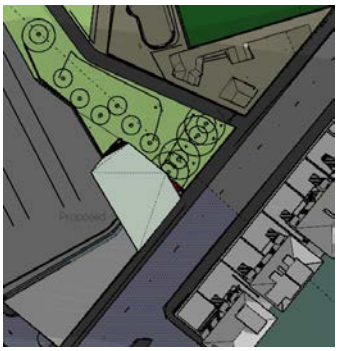

Figure 22 - 07:00hrs GMT (after)

Figure 23 - 10:00 hrs GMT (before)

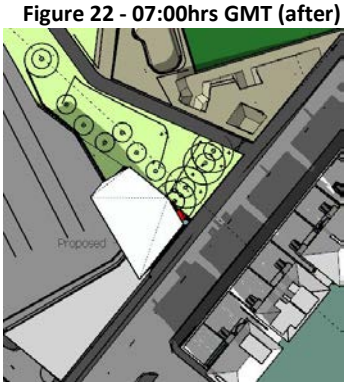

Figure 24 - 10:00hrs GMT (after)

Figure 25 - 12:00hrs GMT (before)

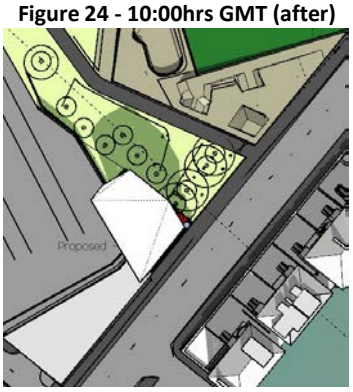

Figure 26 - 12:00hrs GMT (before)

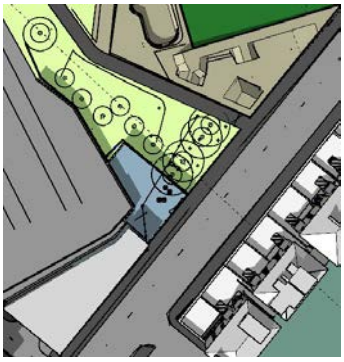

Figure 27 - 14:00hrs GMT (before)

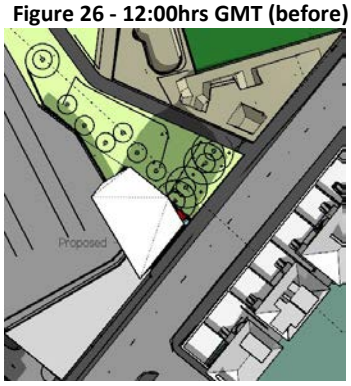

Figure 28 - 14:00hrs GMT (after)

6.2 Hourly Analysis 21st March - 3pm to 5pm

Figure 29 - 15:00hrs GMT (before)

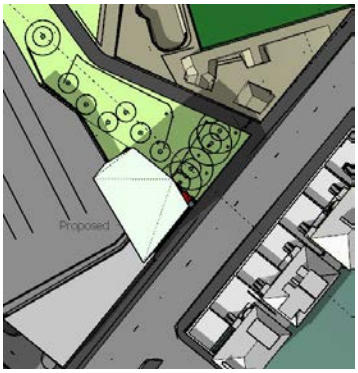

Figure 30 - 15:00hrs GMT (after)

Figure 31 - 16:00hrs GMT (before)

Figure 32 - 16:00hrs GMT (after)

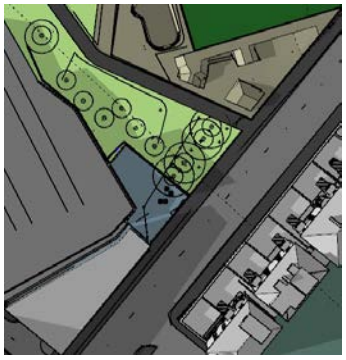

Figure 33 - 17:00hrs GMT (before)

Figure 34 - 17:00hrs GMT (after)

Figure 35 - 18:00hrs GMT (before)

Figure 36 - 18:00hrs GMT (after)

6.3 Overshadowing Analysis (before and after)

The sun rising from the east between the hours 07:00 to 10:00 hrs GMT shows the open space (grass area) east side of the proposed site initially overshadowed by the row of residential house SE corner, then reducing to minimum overshadowing 9AM.

At 10.00 GMT the proposed development starts to cast a shadow on NW direction on the grass open space.

At 12:00 hrs shadowing on the ground rotates clockwise casting a shadow centre of open space. The trees are not affected near the front boundary at the park entrance. Pathway and skate park not affected with overshadowing.

At 14:00 hrs the shadow cast has moved further in clockwise direction, trees start to receive shadow from the development and a small section of pathway.

At 15:00 hrs the shadow cast has lengthened across the pathway at the entrance gate and small corner of skate park, trees are over shadowed.

At 16:00 hrs the shadow cast has lengthened further at the corner of skate park, trees are over shadowed. Continues to move in a clockwise direction.

At 17:00 hrs the shadow no longer casting on the skate park, shadowing the trees only within the park.

(Please refer to Hourly Analysis of Overshadowing page 26 to 27).

6.4 Shadow path analysis (summarised 7am to 5pm)

The range of colours identifies the length of time in hours the shading has affected the selected open space. The Study is taken over the full day on 21st March (7am to 5pm GMT).

The before and after allows an analysis on the impact the proposed development may cause. Software measures the amount hours the shadows are cast on the ground.

The shading ranges from black that denotes 10 hours of overshadow to yellow which denotes zero hours of shadow as indicated below on the legend.

On 21 March we receive 10 hours of sunlight in total. Therefore 8 hours shading equates to 2 hours of sunlight hours.

Therefore 8 hours would be the edge of the purple and Mid blue shading taken as the 2 hour contour.

The image below is taken from Shadow analysis tool carried out 21st March.

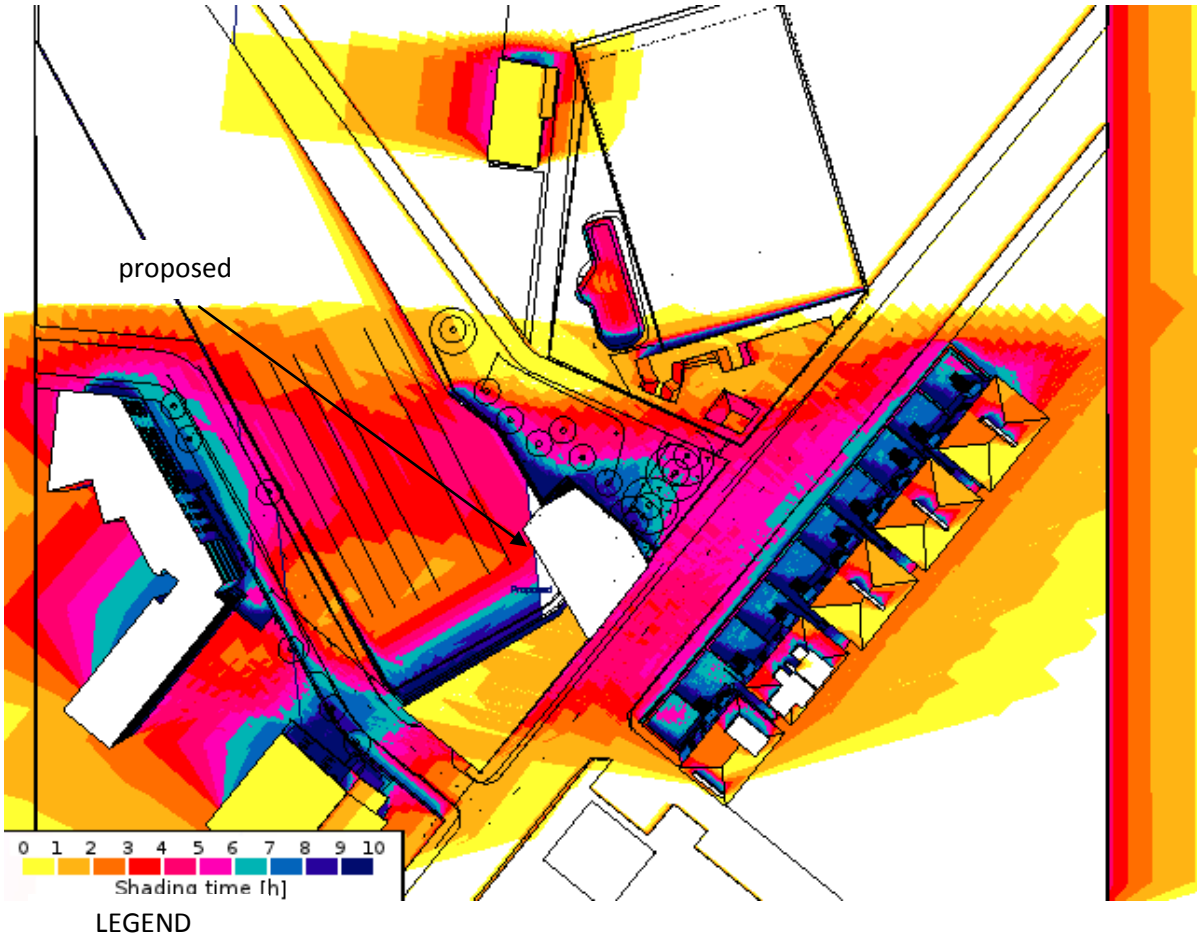

Figure 21 – OVERVIEW of shadows cast AFTER development

6.5 Shadow path analysis (2 hour contour measurement)

The 2 hour contour is defined green outline.

This open space was selected as the Council had pegged out grass area, we included this area for analysis. This is a small portion of the whole amenity space of the Park in Cantelowes Gardens.
Selected Area is 755m2 (grey outline), the 2 hour contour (green outline).

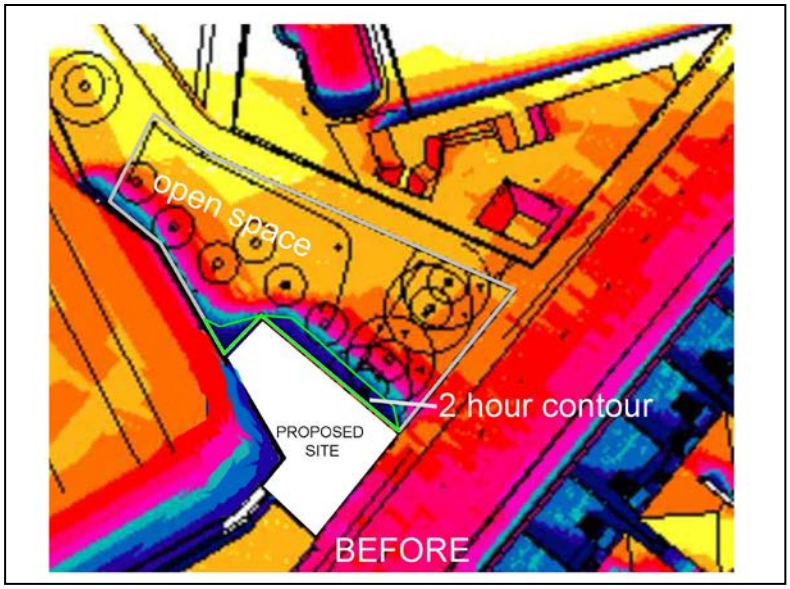

Figure 38 - 2 hour contour line BEFORE the proposed building (green outline)

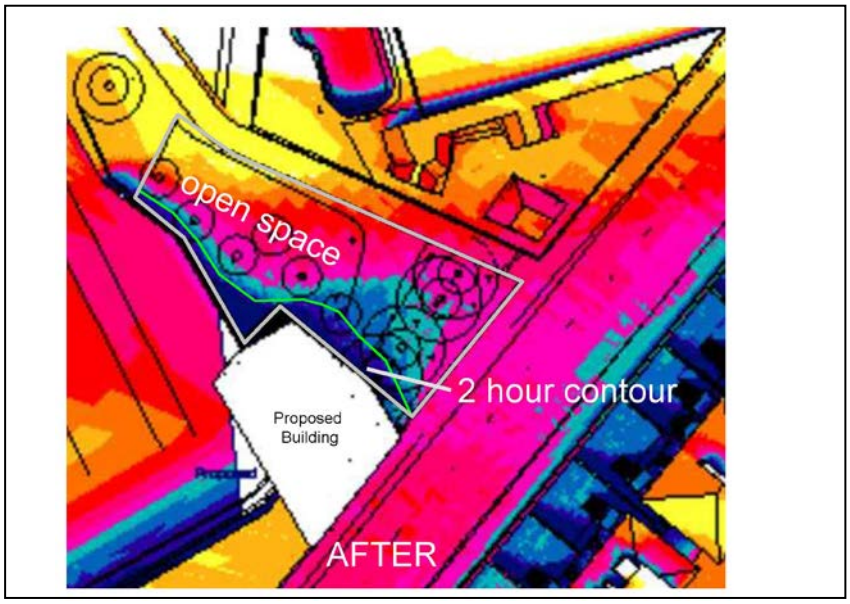

Figure 39 - 2 hour contour line AFTER the proposed building (green outline)

Results the proposed building overshadows an area of 115m2. “2 Hour Contour”

Conclusion: The 2 hour contour take up only 15% of the defined open space of 755m2. In our opinion according to the criteria stated in BRE Guide para 3.3.17 it advises at least half of the open space should receive at least 2 hours of sunlight. In this case loss of sunlit is insignificant with negligent impact on the open space selected (as pegged out by the Council).

7 Conclusion

7.1 Daylight impact on surrounding existing buildings. BRE Section 2.2

Referring to the 25 Degree rule, some of the lower ground floor windows 208 / 210 / 212 exceeded this rule, therefore checks were made. The section drawings (page 17 & 18) identified greater between **angles of 27-29 degrees measured on section**.

> ***BRE 2.2.5*** *– "if any part of the new development, this angle is more than 25 deg, a more detailed check is needed to find loss of skylight to the existing building. Both the total amount of skylight and its distribution within the building are important.*

The (VSC) vertical sky component was checked and passed with no impact but the (NSC) No skyline / contour analysis was calculated using BRE Guide equations as stated in Appendix D of "BRE Site Layout Planning for Daylight and Sunlight".

The depth of no-sky line (d) is calculated as:

> ***d=X (H/Y)*** *where;*
> ***X*** *=is the distance from the outside wall to the obstruction,*
> ***H*** *= height of the window head above the working plane and*
> ***Y*** *= the height of obstruction above the window head.*

From the depth of no-skyline we can calculate "The percentage of working plane that receives direct light from the sky (D)" which can be calculated as:

> ***D= (d/rd) x 100*** *where:*
> ***D=*** *is the depth of no-skyline and* ***rd*** *is the room depth.*

VSC results showed some windows being less than 27% in the recessed areas between the houses only. Between properties (214/216) – (218/220) – (222-224) Camden Road. But they satisfy the ratio 0.8 times former value rule.
The No sky line is the final check for daylight refer to Section 7.3 below.

7.2 The Vertical Sky Component (existing)

All windows pass the Vertical Sky Component (VSC) Calculations as per BRE Criteria.

7.3 Daylight distribution

The daylight distribution analysis showed some minor impact on the lower ground windows exceeding the 25 Degree Rule.
Houses 208/210/212 (LGD) exceeded 25Deg rule so calculations for no sky line were carried out, the results indicated some windows below min standard as stated in BRE Guide 0.8 times its former value. The information from Planning portal and survey data was used to calculate the percentage of no sky line and assuming the room layouts from planning portal are correct.

Our conclusion the proposed development has little or no impact on daylight on the surrounding residential properties especially 210 and 212 (LGD)

Without having the floor plans of House 208 (LGD) unable to complete the calculation.

7.4 Sunlight impact on surrounding existing buildings. BRE Section 3.2.

BRE 3.2.11: Summary
If a living room of an existing dwelling has main windows facing within 90 deg of due south, and any part of the new development subtends an angle of more than 25 deg to the horizontal measured from the centre of the window, then the sunlighting of the existing dwelling may be adversely affected. This will be the case if the centre of the window:

- *Receives less than 25% of annual probable sunlight hours, or less than 5% of annual probable sunlight hours between 21 September and 21 March and*
- *Receives less than 0.8 times former sunlight hours during either period and*
- *Has a reduction in sunlight received over the whole year greater than 4% of annual probable sunlight hours.*

The main windows of surrounding properties are facing within 90 degrees of due north.

Our conclusion referring to BRE Guide para 3.2.2 "Obstruction of sunlight" there appears to be no impact on the reduction of sunlight over whole year and winter months (APSH) to main living room windows facing 90deg due south and will continue receive sunlight with the new development subject to room layouts.

In this case no windows are facing within 90deg of due south of the proposed development. Due to the orientation of the neighbouring properties no sunlight analysis is required.
Therefore the windows have no impact with obstruction of sunlight by the proposed development according to the BRE criteria stated.

7.5 Impact of over shadowing to neighbouring lands (21st March) Open spaces

BRE Guide Section 3.3.17 states:
It is recommended that for it to appear adequately sunlit throughout the year, at ***least half of a garden or amenity space should receive at least two hours of sunlight on 21 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 21 March is less than 0.8 times its former value, then the loss of sunlight is likely to be noticeable. If a detailed calculation cannot be carried out, it is recommended that the centre of the area should receive at least two hours of sunlight on 21 March.*

Our conclusion confirms with para 3.3.17 criteria that "at least half of open space or amenity space should receive at least two hours of sunlight on 21 March".
(Please refer to Overall Shadow Analysis on page 31 & 32).

A Shadow Analysis tool program was used using 3D Model to calculate the overshadowing. Results showed open space impacted by only 15%.

Selected open space receives more than 2 hours of sunlight over 85% of the space. More than required with the minimum BRE requirement of 50% of the area.

Also the row of deciduous trees close to the boundary are only marginally overshadowed by the proposed development, the area of trees receive at least 2 hours and more of sunshine over 50% of tree area.

According to the criteria stated in para 3.3.17 of BRE Guide, the open green space and trees analysed have little to no significant impact by the proposed development with overshadowing.

7.6 Daylight and Sunlight impact on proposed building (BRE S 2.1. & 3.1.)

Preliminary checks indicate the proposed development passes the 25 degree rule. Therefore according to BRE Guide no issues with daylight and sunlight as the angle of obstruction is less than 25 degrees. (The obstruction angle was 18 degrees). (Please refer to Section detail page 17 Proposed).

Unable to calculate Average Daylight Factor (ADF) due to limited information available as proposed development at early design stage.

Conclusion:
According to BRE Guide para 2.1.21 Summary advises all windows of the proposed development will receive reasonable skylight if angle does not exceed 25 degrees, and no Vertical Sky Component (VSC) analysis required.

7.7 Rights of Light guidance from BRE Guide

BRE 2.2.18:
The windows of some existing buildings may also have a right to light. None of the guidelines here is intended to replace, or be a means of satisfying, the legal requirements in the law surrounding the right of light. The assessment of loss of light in rights of light cases is carried out in a different way to the methods given in this BRE guide. It should not be assumed that if the guidelines given here are satisfied then a new development will not infringe rights of light, or vice versa. If an existing building does have a right to light, then it would be prudent for the designer of the new development to check that it does infringe that right.

BRE 2.2.19:
It is not always apparent whether a right of light exists, but any window in a building older than 20 years should be assumed to have acquired a right under the Prescription Act 1832, in the absence of evidence to contrary. The advice of a specialist consultant, and possibly a lawyer, may be needed.

7.8 Boundary wall and proximity of trees

A concern with the boundary wall east side of the proposed site, currently leaning outwards, unstable appears the proximity of the nearest tree roots. A deciduous tree is within the circa 1 metre distance from the damaged boundary wall.
The trees branches are encroaching over the boundary wall of the proposed site.

Area has been cordoned off by the Camden Council within Cantelowes Garden Park, boundary wall requires rebuilt and Arborist and Structural Engineers investigation and report recommended.

(Please refer figure 2 Photograph of tree close to boundary wall on page 13).

8. References

BRE PRESS - Guide to good practice

- BRE 'Site layout planning for Daylight and Sunlight' 2nd Edition – Paul J Littlefair BR209 2011.

Clients Specifications

- Surveys of Land, building and utility services at scales 1:500 and larger (2nd Edition) 1997.

RICS practise standards and professional guidance notes

- Code of Measuring Practise (7th Edition) 2007
- Daylighting and Sunlighting (1st Edition) GN 96/2012

9.1. APPENDIX 1

Important Terms and Definitions

- **Vertical Sky Component (VSC) (%)**
  Defined as the amount of light striking the face of a window.

  VSC is expressed as a ratio (%) of the maximum value of daylight achievable for a completely unobstructed vertical wall. Max value is almost 40%. Min value should reach 27% or greater for enough sunlight to reach a window. Any reduction below this level should be kept to a minimum.
  In circumstances where levels are below 27% it is possible to accept a reduction to the existing level of daylight received not less than 0.8 times (80%) its original value. Any greater reduction is likely to have noticeable effect on amenity.
  This is defined in the Handbook "Site Layout Planning for Daylight and Sunlight" *as:- "Ratio of that part of illuminance, at a point on a given vertical plane that is received directly from a CIE standard overcast sky, to illuminate on a horizontal plane due to an unobstructed hemisphere of this sky."*
  "Note that numerical values given here are purely advisory. Different criteria may be used, based on the requirements for daylighting in an area viewed against other site layout constraints".

- **CIE Standard Overcast Sky**
  A completely overcast sky for which the ratio of its illuminance Ly at an angle of elevation y above the horizontal to the illuminance Lz at the zenith is given by :
  Ly=Lz (1+2 sin y) / 3.
  A CIE Standard overcast sky is darkest at the horizon and brightest at the zenith (vertically overhead).

- **No Sky Contour (NSC)**
  The outline on the working plane of the area from which no sky can be seen. For the purpose of assessing useful daylight, a working plane of 850mm above finished floor level is assumed. It is generally expected that ceiling heights will not fall below 2.4m.
  Calculations are very dependent on actual room layouts or having reasonable understanding of the likely layouts.

- **Average Daylight Factor (ADF) (%)**
  Average Daylight factor can be used as a measure to determine if a room will receive adequate daylight (%).
  This factor considers interior daylighting to a room and therefore is a more accurate indication of available light in a given room, if details of the room size and use are available in conjunction with BS 8206-2 recommendations "Code of practise for daylighting"

- **Probable Sunlight Hours**
  The long term average of the total number of hours during a year in which direct sunlight reaches the unobstructed ground (when clouds are taken into account).

- **Obstruction Angle**
  The angular altitude of the top of an obstruction above the horizontal, measured from a reference point in vertical plane in a section perpendicular to the vertical plane.

3D Model

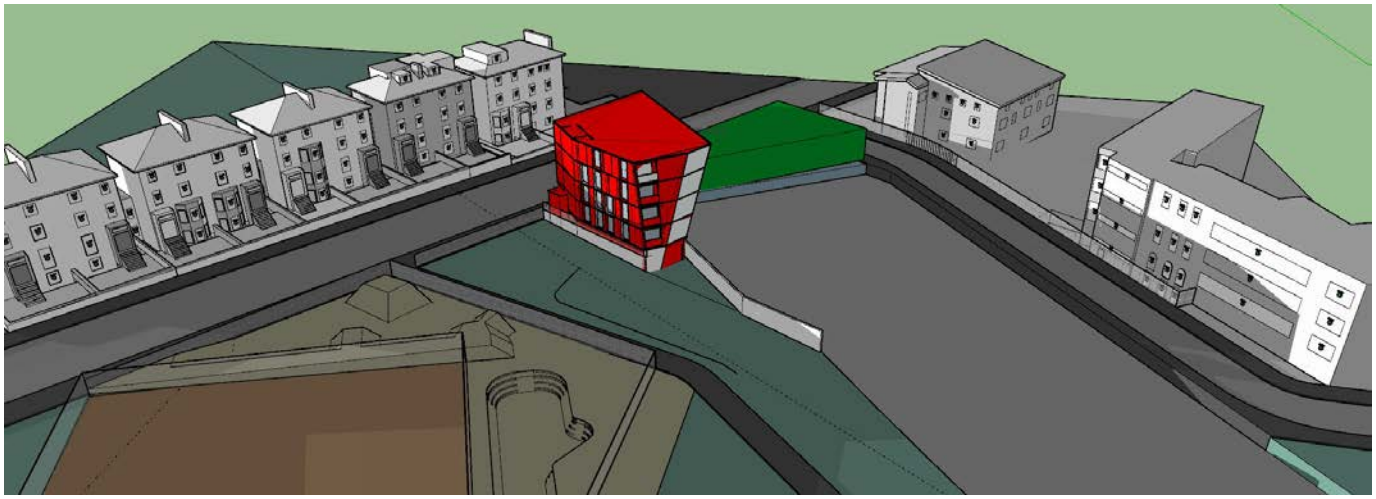

Figure 40 - 3D Model Overview

2D Cad Site Plan

Figure 41 - CAD Survey Drawing – Site Plan view

Residential Layouts (Planning Portal)
210/212/214/218/220

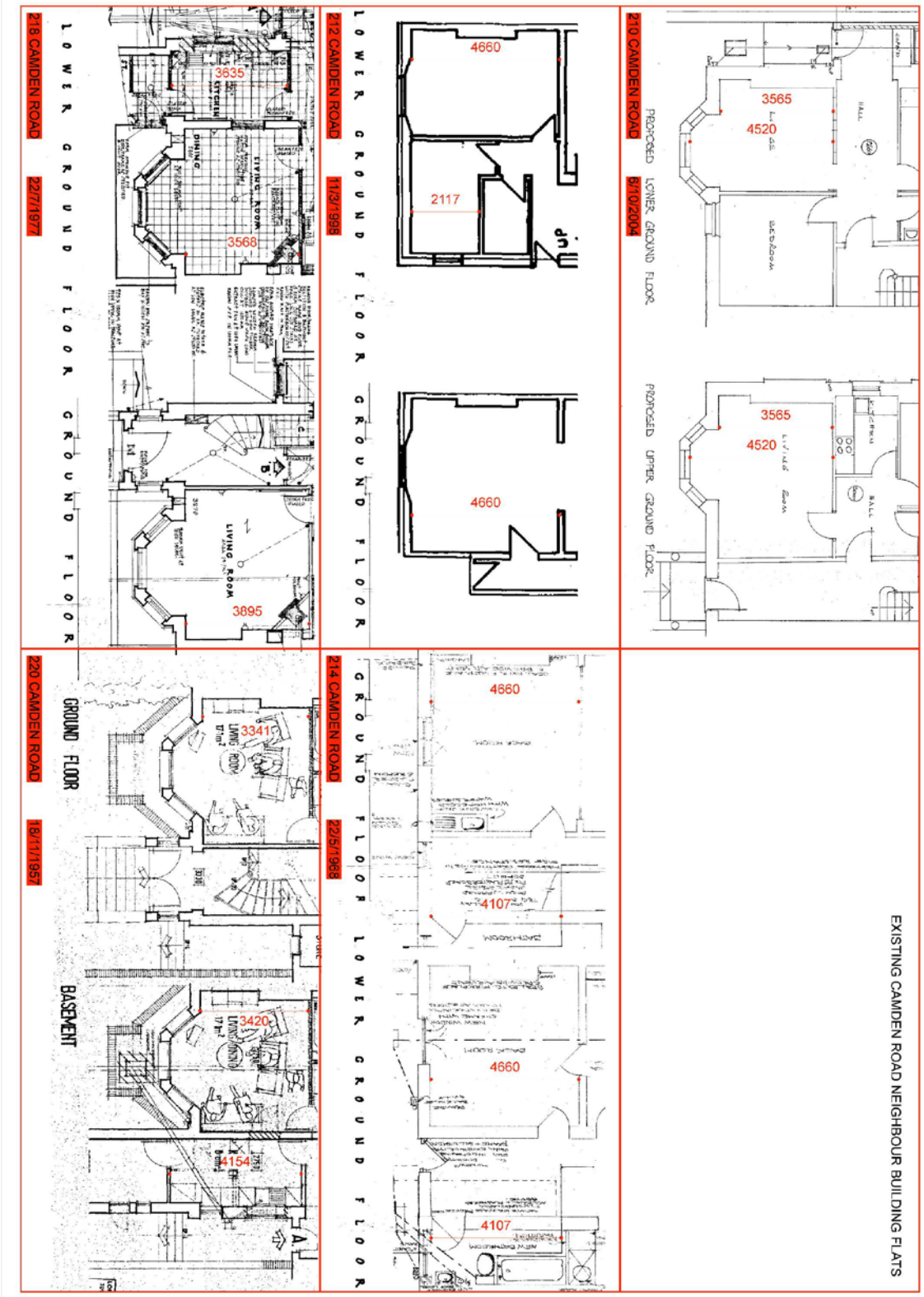

Figure 42 - Planning Portal Layouts Plans (for Reference)

Aerial Photograph (Cantelowes Gardens) Park

Figure 43 - Aerial photo Overview

LOCATION ACE MAP (NTS)

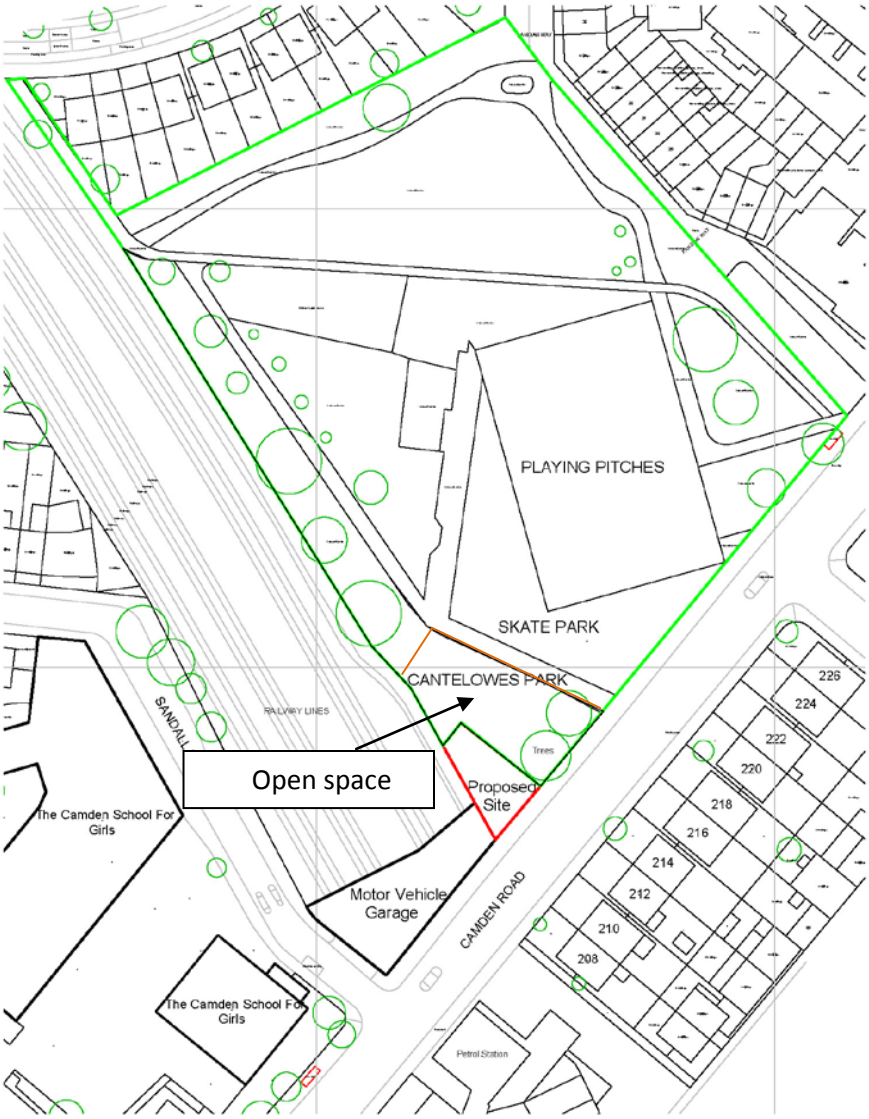

Figure 44 - ACE MAP

Areas of interest

Cantelowes Gardens Park (green)	14,593 m2
Open amenity space with trees (orange)	755 m2

PHOTOGRAPH CATALOGUE

Figure 45 - Google Earth image selected open space with trees (summer months)

Figure 46 – Whitebeam trees casting a shadow on the ground at the edge of skate park

Figure 47 – side view Whitebeam trees casting a shadow (summer months)

PHOTOGRAPH CATALOGUE (CONT'D)

Figure 48 – the row of trees (deciduous whitebeam trees) in the distance without leaves [photograph taken from a website of Cantelowes Gardens]

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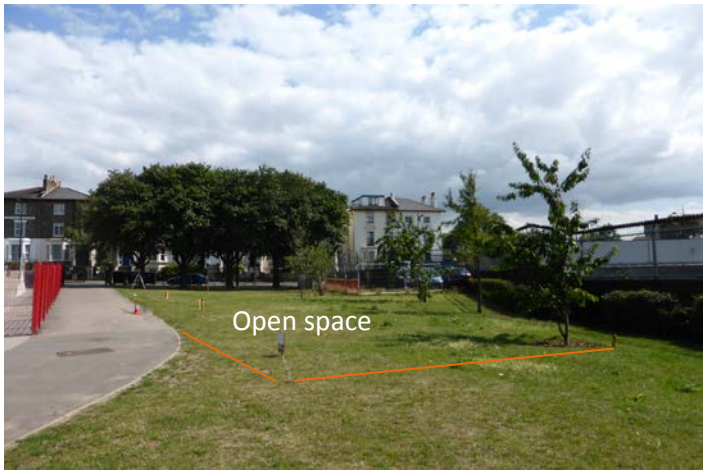

Figure 49 - full view of the open space pegged out by Council (summer months)