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Report

On

Sunlight, Daylight and
Overshadowing

At

The Shakespeare
1 Shakespeare Terrace
Lower Richmond Road
Richmond

For

Young & Co's Brewery PLC

21st December 2009

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CONTENTS

1. INTRODUCTION
2. SCOPE OF THIS REPORT
3. METHODOLOGY
4. THE DRAWINGS
5. THE SCHEME
6. DESCRIPTION OF THE SURROUNDINGS
7. SUNLIGHT
8. DAYLIGHT
9. CONCLUSIONS

APPENDIX 1 SHADOW PATH ANALYSIS

APPENDIX 2 DAYLIGHT TO EXISTING AND PROPOSED RESIDENTIAL BUILDINGS

1 Introduction

- 1.1 The development site is known as The Shakespeare and is located in Richmond, south-west London. This report considers the possible sunlight, daylight and overshadowing impact from the proposed scheme on to existing residential buildings surrounding the site, and the impact the proposed building may have on itself.
- 1.2 The existing development site is outlined in red on Figure 1.

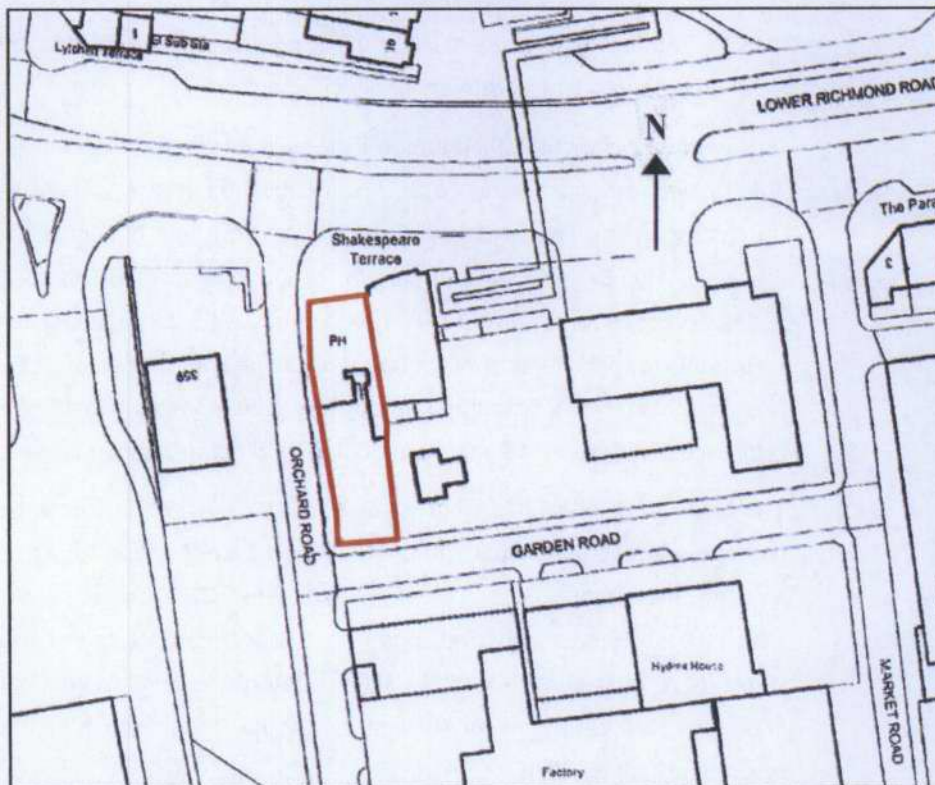


Figure 1. Existing Site Plan

2 The scope of this report

2.1 This report considers the sunlight and daylight issues against the criteria set out for national discretionary guidance in the publication 'Site Layout Planning for Daylight and Sunlight' (SLP) published by the Building Research Establishment in 1991¹. The document SLP refers both to particular amounts of daylight and sunlight and refers to a method of setting alternative target values for skylight. We are not aware of LPAs setting such alternative target values. The document SLP states in its own introduction on page 1 that:

2.1.1 *"The advice given here is not mandatory and this document should not be seen as an instrument of planning policy"*

2.2 Government policy has encouraged increases in density of development, in some cases significantly, since SLP was published in 1991. There has been no corresponding re-evaluation of sunlight and daylight benchmark levels in that time. The British Standard current for this subject is BS 8206-2:2008 – code of practice for daylighting. This dates from 2008. In the absence of other levels, this report relates sunlight and daylight levels to those of SLP. For the reasons given in this paragraph, in our view, these levels should be seen as references, now some 18 years out of date, and not as limiting values.

2.3 The Code for Sustainable Homes (CSH)², first launched in December 2006, became operational in April 2007, and having a Code rating for all new build housing mandatory from 1st May 2008. The CSH refers back to the benchmark levels for new dwellings. The CSH refers back to the benchmark levels for new dwellings set out in SLP for daylight to living rooms, but has no criteria for new bedrooms, or sunlight. Under the Code there is no mandatory requirement for daylight.

2.4 The British Standard current for this subject is BS 8206-2:2008 – code of practice for daylighting³.

2.5 This report considers sunlight and daylight to the residential levels of each proposed building that might be affected by the adjacent proposed building. The analysis also considers the sunlight and daylight impact of the proposed development on to existing residential buildings adjacent to the site. Sunlight and daylight to non-residential buildings are not considered in this report, other than the analysis of the shadow paths that would result from the

¹ Littlefair, P.J (1991) Site Layout Planning for Daylight and Sunlight, A guide to good practice, BRE

² Code for Sustainable Homes, BRE Global, DCLG, October 2008

³ Lighting for Buildings. Code of Practice for Daylighting BS 8206-2: 2008, British Standards Institution, 2008

proposed development. Sunlight and daylight levels within commercial buildings are not generally town planning issues.

2.6 The analyses used in this chapter are:

2.6.1 **For sunlight:** The sun light protractor method and sunlight availability indicator for 51.5° N as set out in Appendix A of SLP;

2.6.2 **For daylight:** The principles set out in section 2 of SLP together with the concept of average daylight factor (*df*) as set out in both Appendix C of SLP - interior daylighting recommendations – and in BS 8206-2:2008:code of practice for daylighting; and

2.6.3 **For shadow paths:** The proposals are digitally modelled in 'Integrated Environmental Solutions' (IES) ModelIT software and then analysed in IES Suncast, version v5.9.0.1. Shadows are predicted at two hour intervals at mid-summer, the equinoxes and mid-winter.

3 Methodology

3.1 The methodologies used for the sunlight and daylight assessments are as follows:

For sunlight at a building

The methodology used is that of the sun light protractor method and sunlight availability indicator for 53.5° N as set out in Appendix A of Site Layout Planning for daylight and sunlight: A guide to good practice (SLP).

This method considers sunlight at a reference point. On looking out from the reference point the angular size of an obstructing building is assessed by reference to its ratio of Distance/Height relative to the reference point. The composite obstruction profile is plotted using this ratio. The resultant plot of obstructions for any given reference point is then overlaid on the Building Research Station (BRE) sunlight availability indicator for 53.5 degrees north.

The concept of available sunlight takes into account the probability of cloud obscuring the sun from a given reference point in addition to the change of sunrise and sunset times. Very approximately at 53.5 degrees north BRE anticipate an average of 3 hours and 49 minutes of sunlight per day

throughout the year on the basis only of cloud as an obstruction. The sunlight indicator takes into account the lower sun angles of the winter months.

The resultant assessment provides a percentage of annual probable sunlight hours at a given point. This assessment is for sunlight on the outside face of a building.

For sunlight at an open space

The test used is as set out by BRE in SLP as a simple statement. This is determined only by the presence or absence of physical obstruction to sunlight. The concept of annual probable hours is not used. An assessment is made of sunlight reaching the subject space at the equinox dates of 21 March and 21 September. The details are set out later in Significance Criteria.+

For Shadow paths

The proposals are digitally modelled in Integrated Environmental Systems' (IES) ModellT software and then analysed in IES suncast, version v5.9.0.1. Shadows are predicted at two hourly intervals at mid-summer, the equinoxes and mid-winter.

For daylight at a building

An accurate prediction is made of the amount of daylight within a room using the concept of average daylight factor (*df*). This assessment is carried out in accordance with section 2 and Appendix C of SLP - interior daylighting recommendations – and in accordance with BS 8206-2:2008:code of practice for daylighting. The reference levels for such daylighting are also given in the same documents and are detailed later in this report under Significance Criteria.

The procedure is, as with the sunlight analysis, to describe in terms of the Distance/Height ratio all physical obstructions to light paths with reference to a subject position. These obstructions are then plotted against the light distribution from a CIE Standard Overcast Sky⁴ as defined by the Commission Internationale de l'Eclairage (CIE).

⁴ This is a completely overcast sky, the mathematical definition of which is given at Appendix H of SLP as a luminance ratio.

The resulting daylight at the external face of the building can be computed. This is known as the Vertical Sky Component (VSC). The parameters of window size, glass transmissivity, room size and internal surface reflectances are then evaluated against the VSC for the window location. The resulting assessment gives a measure of internal daylight as a *df* value known as average daylight factor.

The approach advocated by SLP, but not by BS 8206-2:2008, is to use only the external VSC measurement at existing surrounding property. Because this approach does not consider any of the window or room qualities, including window size for example, we prefer the more detailed average daylight factor approach and assessment.

The external measure of VSC takes no account of the actual conditions within a room. Therefore the average daylight factor method is to be preferred. This method takes into account window size, room size, and internal reflectances in addition to external light levels at the window. VSC is a measurement made externally only.

The current British standard BS 8206-2:2008 has been used by us to generate the following significance criteria.

The recommended average daylight factor levels in The Code of Practice are as follows:

- Bedrooms 1.0%df;
- Living Room 1.5%df; and
- Kitchens 2.0%df.

The criteria we define are in relation to current British Standards. The criteria that we use are measured by the number of receptors as a percentage of the whole where the *df* values would, after development, be below the *df* values set in the British Standard. The criteria can be summarised as follows:

- Less than 10% of rooms: minor adverse impact;
- 11% - 20% of rooms: moderate adverse impact; and
- 21% - 30% of rooms: substantial adverse impact.

The assessment of adequate light in general relates to the quantum of light remaining as set out in BS 8206-2:2008 (in this instance measured as average daylight factor – *df*) rather than how much light is taken away.

The recommended levels of sunlight in the same code of practice are given as:

"Interiors in which the occupants have a reasonable expectation of direct sunlight should receive at least 25% of probable sunlight hours. At least 5% of probable sunlight hours should be received during the winter months (21 September to 21 March)."

There is a rider to the above which states:

"The degree of satisfaction is related to the expectations of sunlight. If a room is necessarily north facing or if the building is in a densely-built urban area, the absence of sunlight is more acceptable than when its exclusion seems arbitrary."

There is no requirement for a dwelling to receive sunlight, and of course many do not. The BRE guidance suggests that sunlight assessments should only be made for windows, or walls in which there are windows, that face within 90° of due south.

The criteria that we use to measure significance are based on the above figures. The criteria are measured by the number of receptors as a percentage of the whole where annual probable hours assessed in accordance with the BRE and BS guidance would, after redevelopment, be below the 25% and 5% levels. The criteria can be summarised as follows:

Less than 10% of dwellings	:	minor adverse impact
11% - 20% of dwellings	:	moderate adverse impact
21% - 30% of dwellings	:	substantial adverse impact

Shading

The BRE guidance suggests that no more than 40% and preferably no more than 25% of garden or amenity areas should be prevented from receiving any sun on 21 March. If a new development causes overshadowing of open areas that do not meet this criteria, and the area which can receive some sun

on 21 March reduces by more than 20% of its former value, then the loss of sunlight may be noticeable, representing an adverse impact.

3.2 Definition of Significance

Significance criteria have been developed to protect residential properties, which are the most sensitive receptors.

The BRE guidance is summarised below and has been used as the basis for the criteria used in the assessment of daylight and sunlight impacts.

Daylight;

- A window may be adversely affected if the vertical sky component (VSC) measured at the centre of the window is less than 27%.
- A room may be adversely affected if the average daylight factor (ADF) is less than 1% for a bedroom, 1.5% for a living room or 2% for a kitchen.

Sunlight;

- A window may be adversely affected if a point at the centre of the window receives in the year less than 25% of the annual probable sunlight hours including at least 5% of the annual probable sunlight hours during the winter months (21 September to 21 March) and less than 0.8 times its former sunlight hours during either period.

3.3 Uncertainty/Assumptions

The assessments set out above are those generally carried out for sunlight and daylight analysis in England and Wales at design and assessment stage. The 'sunlight at a building' assessment and the internal daylight assessment are based on two theoretical concepts. One is the concept of probable hours of sunlight. In actual fact in any given year there is likely to be wide variation between the actual hours of sunshine at a given point and the theoretical figure of 1392 hours at 53.5 degrees north. The assessment therefore reports a percentage of probable hours rather than a number of hours. The other concept is that of the CIE Standard Overcast Sky. This is a widely used concept but does not report 'real weather' conditions. However both concepts are well understood in the industry and therefore serve as good bases for comparative analysis.

4 The Drawings

4.1 This report has been prepared in respect of the scheme shown on the drawings listed below dated October 2009.

All drawings are by Loates-Taylor Shannon Architects Ltd.

<u>Title:</u>	<u>Drawing no:</u>
Existing Site Location	EX (00) 001 P0
Existing Plans Level 0 and 1	EX (00) 002 P0
Existing Elevation	EX (00) 100 P0
Existing Sections A and B	EX (00) 200 P0
Proposed Site Location Plan	GA (00) 001 P3
Proposed Plans Level 0 and 1	GA (00) 002 P5
Proposed Plans Level 2 and 3	GA (00) 003 P4
Proposed Elevations	GA (00) 100 P5
Proposed Elevations	GA (00) 101 P4
Proposed Sections A and B	GA (00) 200 P3

5 Short description of the scheme

- 5.1 The proposal consists of partially demolishing the Shakespeare Public House and erecting two, three/four storey residential buildings. The layout of the proposed buildings is shown in Figure 2.

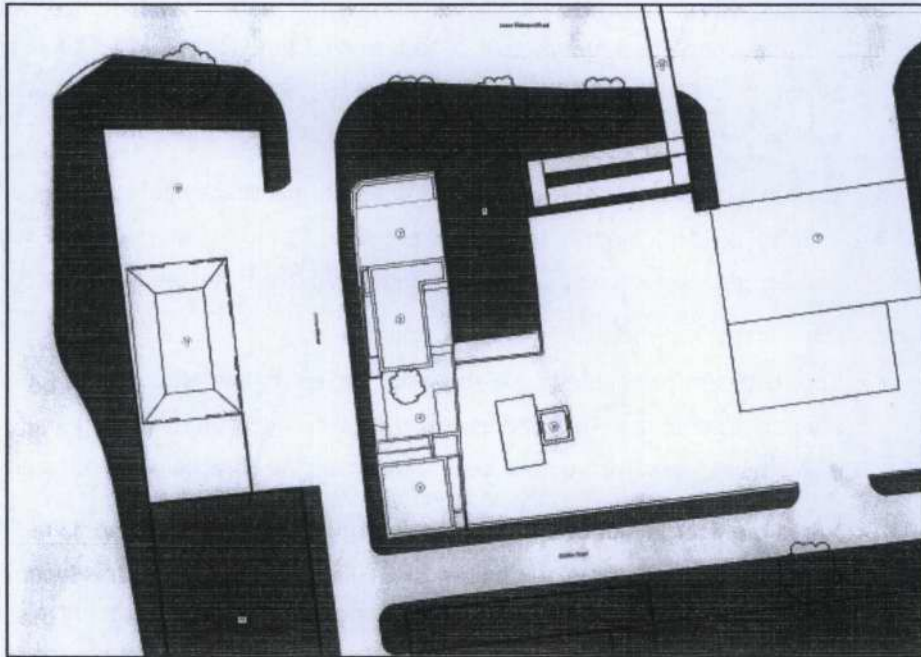


Figure 2. Proposed Site Plan

6 Description of the surroundings

- 6.1 To the north of the site, along Lower Richmond Road, there are terraced residential buildings. To the east, adjacent to the proposed site, there is a three storey residential building, known as 2 Shakespeare Terrace, and a fire station beyond that. To the south and the west of the site, there are three/four storey commercial premises.

7 Sunlight

7.1 Sunlight to Existing Residential Buildings

- 7.1.1 The discretionary minimum sunlight values for habitable rooms within a residential building are set out in the BRE's publication 'Site Layout Planning for Daylight and Sunlight' (SLP). The BRE suggests that for windows facing within 90° of due south, a discretionary minimum of 25% of total annual probable hours of sunshine with a minimum of 5% in the winter months – 21st September to 21st March. There is no sunlight requirement for windows that face within 90° of due north.
- 7.1.2 We have taken sunlight assessments to the lowest residential level of the adjacent existing building, known as 2 Shakespeare Terrace. This locations have been chosen as 'worst case' positions and have been tested in accordance with Appendix C of the SLP.
- 7.1.3 The results of our analysis are shown in Table 1 below, where it can be seen that after development at The Shakespeare, the existing living rooms to the ground floor of 2 Shakespeare Terrace will meet and exceed the BRE guidance for sunlight.
- 7.1.4 Due to the floor layout of 2 Shakespeare Terrace with both bedrooms facing into a lightwell, both bedrooms fall below BRE guidance BEFORE development. After development, one of the rooms will experience NO loss of daylight and the other will be reduced minimally (by 3%). This reduction is a marked improvement on the previously submitted scheme, where the total annual probable hours of sunlight received was 17.5% for this room.
- 7.1.5 There are no other residential properties within the vicinity which will be adversely affected by the proposed development at the Shakespeare.

Sunlight to 2/3 Shakespeare Terrace Before Development			
Window	Usage	Total Annual Probable Hours of Sunshine	Equinox Total Probable Hours of Sunshine
Ground Floor:			
Window 1/3	Living Room	73.0%	18.0%
Window 2/4	Living Room	60.0%	12.0%
Window 5	Bedroom	25.0%	0.0%
Window 6	Bedroom	24.0%	0.0%

NF= North Facing or within 90 degrees of due north, refer to paragraph 7.1.1

Table 1 Sunlight to Existing Residential Building (Before Development)

Sunlight to 2/3 Shakespeare Terrace AFTER Development			
Window	Usage	Total Annual Probable Hours of Sunshine	Equinox Total Probable Hours of Sunshine
Ground Floor:			
Window 1/3	Living Room	67.0%	10.0%
Window 2/4	Living Room	57.0%	9.0%
Window 5	Bedroom	25.0%	0.0%
Window 6	Bedroom	21.0%	0.0%

NF= North Facing or within 90 degrees of due north, refer to paragraph 7.1.1

Table 2 Sunlight to Existing Residential Building (AFTER Development)

7.2 Shadowing to Existing and Proposed Open Spaces

- 7.2.1 A series of plans are included at Appendix 1 to this report which show the shadow path analysis of the proposed scheme at certain times of the day at mid summer, mid winter and the equinoxes. The BRE guidance suggests that for an amenity space to be well lit, preferably no more than 25% of a garden or amenity area should be prevented from receiving any sun at all on 21st March.
- 7.2.2 The shadow path analysis from the proposed development demonstrates that there will be some transient shadow cast, and in the winter months the shadows will appear more prominent as the sun is lower in the sky. In our opinion, the proposed development will meet the BRE criteria, set out above.
- 7.2.3 The courtyard at the proposed development will receive sunlight on 21st March, meeting BRE guidance for overshadowing.
- 7.2.4 All of the rear garden area at 2 Shakespeare Terrace will receive some sunlight on 21st March, therefore meeting BRE guidance for overshadowing. There are no other amenity areas within the vicinity that will be adversely affected by the development at the Shakespeare.
- 7.2.5 It must also be considered that for the purpose of this analysis we have modelled and simulated the proposed buildings only. Taller elements of existing surrounding buildings will also cast shadow over other adjacent existing buildings. See Appendix 1 for shadow path analysis from the proposed buildings.

7.3 Sunlight to Proposed Residential Building

7.3.1 We have taken sunlight assessments to bedrooms and living rooms at ground floor level of the proposed residential building, to test the sunlight impact the proposed buildings may have on each other. These locations have been chosen as "worst case" positions and are shown on Figure 4 in Appendix 2.

7.3.2 Our analysis shows that after development at The Shakespeare, all of the windows tested will have good sunlight potential which is in excess of the discretionary percentage of annual probable hours stated in SLP. Table 2 shows our results.

Sunlight to Proposed Buildings			
Window	Usage	Total Annual Probable Hours of Sunshine	Equinox Total Probable Hours of Sunshine
Ground Floor:			
Window 1	Living Room	63.5%	9.5%
Window 2	Bedroom	48.5%	9.0%
Window 3	Living/Kitchen	32.0%	7.5%
Window 4	Bedroom	31.0%	8.5%
Window 5	Bedroom	29.0%	7.5%

NF= North Facing or within 90 degrees of due north, refer to paragraph 7.1.1

Table 2 Sunlight to Proposed Building

8 Daylight

8.1 Daylight to Existing Residential Buildings

- 8.1.1 In accordance with Appendix C of the 1991 BRE publication 'Site Layout Planning for Daylight and Sunlight', we have assessed the Average Daylight Factor (*df*) for each of the existing residential buildings after redevelopment. The discretionary guidance for daylight to living rooms is a minimum 1.5% *df* and for bedrooms is a minimum of 1.0% *df*.
- 8.1.2 Table 3 sets out our results for assessments taken at ground floor level of 2 Shakespeare Terrace, in comparison with the discretionary guidance. It can be seen by the results that there will be no adverse impact on daylight to 2 Shakespeare Terrace. After development, the ground floor rooms will receive daylight levels which will meet and exceed the BRE discretionary guidance. There will be no material impact on daylight to dwellings further away or to the adjoining gardens adjacent to the site.
- 8.1.3 Details of the assessment and a window location plan can be seen in Appendix 2 of this report.

Daylight to 2/3 Shakespeare Terrace AFTER Development			
Window	Usage	<i>Adf</i> - Average Daylight Factor	Discretionary Guidance - <i>df</i> %
Ground Floor:			
Window 1/3	Living Room	3.1%	1.0% Bedrooms
Window 2/4	Living Room	3.1%	1.5% Living Rooms
Window 5	Bedroom	2.1%	2.0% Kitchens
Window 6	Bedroom	1.9%	

Table 3 Daylight to Existing Residential Buildings

8.2 Daylight to Proposed Residential Building

8.2.1 We have carried out daylight assessments to bedrooms and living rooms at ground floor level of the proposed buildings, to test the daylight impact the proposals may have on each other. We have taken the assessments at the same possible 'worst case' locations of the proposed building as with the sunlight tests.

8.2.2 The daylight assessments have been carried out on an Average Daylight Factor (*df*) basis, in accordance with SLP Appendix C.

8.2.3 Table 4 below sets out our results for this analysis and it can be seen that the BRE discretionary guidance standards are met and exceeded for the majority of rooms we have tested.

8.2.4 A living room/kitchen is proposed at Window 3. The *Adf* level achieved here is below the BRE discretionary guidance of 2.0% *Adf* for kitchens. In this instance, the living room would achieve enough daylight to meet the BRE criteria of 1.5%. However, the combined kitchen/living room would not. This room falls below the BRE criteria by a very small margin of 0.2%, which is not uncommon, given the layout of the proposed apartment and the balcony overhang, which is required for amenity space to the apartment.

8.2.5 In the case of W4, which is a proposed bedroom, again this room marginally falls below the BRE criteria of 1.0%. This is the only bedroom at ground floor level which falls below BRE guidance. The BRE suggests that bedrooms are the least important of the habitable rooms, while the CSH has no daylight requirements for new bedrooms at all, as set out in Paragraph 2.3 of this report. Other design solutions have been investigated, but the overall scheme is more appropriate in this layout.

8.2.6 See Plan 4 for a window location plan and details of this assessment in Appendix 2.

Daylight to Proposed Buildings			
Window	Usage	<i>Adf</i> - Average Daylight Factor	Discretionary Guidance - <i>df</i> %
Ground Floor:			
Window 1	Living Room	2.9%	1.0% Bedrooms
Window 2	Bedroom	1.1%	1.5% Living Rooms
Window 3	Living/Kitchen	1.8%	2.0% Kitchens
Window 4	Bedroom	0.6%	
Window 5	Bedroom	1.3%	

Table 4 Daylight to Proposed Residential Building

9 Conclusions

- 9.1 We can conclude that there will be good levels of sunlight and daylight to the proposed residential buildings at lowest residential level. After redevelopment, all but one of the bedrooms and one of the living room/kitchen we have tested at ground floor level will receive sunlight and daylight levels that meet and exceed the BRE discretionary guidance set out in SLP.
- 9.2 We have analysed the possible sunlight and daylight impact the proposed development may have on 2 Shakespeare Terrace, at lowest residential level, or to any existing amenity areas surrounding the site. After development at The Shakespeare, the existing residential properties will still receive satisfactory sunlight and daylight levels.
- 9.3 We have analysed the possible overshadowing impact the proposed buildings may have on surrounding open spaces. Our results show that there will be no material adverse impact from the proposed development at The Shakespeare. The proposed courtyard will receive some sun on 21st March, therefore meeting BRE guidance for overshadowing.

21st December 2009

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Appendix 1
Shadow Path Analysis