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CONTRACT REPORT – SACRED HEART OF JESUS RC CHURCH TOWER

Client : Fr Gideon Wagay, The Presbytery, 62 Eden Grove, London. N7 8EN

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SUMMARY

The extent of overshadowing of neighbouring properties due to a planned tower extension to the Sacred Heart of Jesus RC Church, Eden Grove, London has been assessed using 3D computer software. The loss of daylight and sunlight to the affected windows, daylight distribution to affected rooms (no sky line) and loss of sunlight to amenity areas have been quantified and the results have been analysed using widely accepted BRE criteria. It is predicted that:

- The loss of both daylight and sunlight to windows is within acceptable limits.
- The reduction in room areas which receive direct skylight is within acceptable limits
- The loss of sunlight to amenity areas is within acceptable limits

Therefore, the overall overshadowing impact of the proposal on the surrounding neighbourhood is within acceptable limits

CONTENTS

1 BACKGROUND

Overshadowing occurs when buildings are in close proximity relative to their size. It manifests itself in reduced levels of daylight and sunlight in part, or all of the affected buildings. Daylight refers to the level of diffuse natural light coming from the surrounding sky dome or reflected off adjacent surfaces. Sunlight, on the other hand, refers to direct sunshine and is very much brighter than ambient daylight. A key difference between the two is that sunlight is highly dependent on orientation, whereas orientation has no effect on daylight.

In simple terms, the potential for daylight at a particular point may be quantified by assessing the proportion of the sky that is 'visible' from that point, i.e. not obscured by objects such as buildings. For points located on vertical surfaces such as walls, this proportion of visible sky is termed the 'vertical sky component' or VSC.

When there is a knowledge of affected window sizes and affected room dimensions, additional analyses may be undertaken for a more in-depth assessment of daylight. One of these analyses is to consider the daylight quality or daylight distribution within a room via a consideration of the no-sky line. This divides the area in a room which receives direct skylight (or has a view of the sky) from the area which doesn't.

Sunlight to windows is assessed by means of annual 'probable sunlight hours' that a window receives. This is achieved by considering both the complete annual shading variation at the window, and the statistical sunshine averages for the location in question.

Amenity area sunlight is assessed by considering whether or not significant areas receive no direct sunlight at all for a large part of the year. Accordingly, the equinox (21st March) is suggested as being the best date for evaluation, since if an area receives little sunlight on this date, it will be in almost permanent shade during the six winter months.

All of four of the above quantities are considered in the assessment carried out for this report.

2 QUANTIFYING OVERSHADOWING

As stated in the previous section, the question of the extent of overshadowing by one building on another is answered by considering the loss of daylight and sunlight. When examining a case of claimed potential loss of daylight and sunlight resulting from a new development, it is important that any analyses are as objective as possible. To achieve this objectivity in the present study, the guidelines laid down in the widely accepted BRE guidebook 'Site layout planning for daylight and sunlight: a guide for good practice', 2nd edition 2011 by P J Littlefair are adhered to. From now on in this document this guidebook will be referred to as *ref1.*

As stated in *ref1*, any potential reduction in daylight received by a vertical wall which contains one or more windows, may be quantified by calculating the 'vertical sky component' (VSC) (see appendix A for a definition of vertical sky component). The VSC may be calculated at any number of points, but it is suggested in *ref1*, that the centre of windows are used as reference points, or if the positions of windows are not known, a series of reference points 1.6m above ground level may be used. If the latter point positioning is used, the reference points should be spaced no more than 5m apart horizontally. To quantify the amount of daylight, the VSC is then calculated at all these reference points. Following the recommendations in *ref1* (page 7), the first criterion that is used to quantify overshadowing from these calculated values of VSC is the following:

Criterion1 - '*If the VSC with the new development in place is both less than 27% and less than 0.8 times its former value, then occupants of the existing building will notice the reduction in the amount of skylight*'. If this occurs the reference point will be deemed to fail the criterion.

In the present study, **Criterion1 is** tested at each of the above reference points.

The effect on daylight distribution in a room is assessed via the no-sky line, which requires a knowledge of the layout of the room. This divides the area in a room which receives direct skylight (or has a view of the sky) from the area which doesn't. The effect on daylight distribution is quantified by ascertaining the reduction in room area which can receive direct skylight as a result of a new development:

Criterion2 - '*If the area of the working plan in a room which can receive direct skylight is reduced to less than 0.8 times its former value, then the diffuse daylighting may be adversely affected*'

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To quantify the potential loss in sunlight, the first stage is to calculate the number of annual 'probable sunlight hours' which the interior receives. As stated in *ref1*, annual 'probable sunlight hours' means the total number of hours in the year that the sun is expected to shine on unobstructed ground, allowing for average levels of cloudiness for the location in question. In the present study, the number of annual probable sunlight hours is calculated at each of the same reference points used to calculate the VSC. Following the recommendations in *ref1* (page17), the second criterion, which is used to quantify overshadowing, is the following:

Criterion3 - '*If the available sunlight hours are both less than the 'amount above' and less than 0.8 times their former value, either over the whole year or just in the winter months (21 September to 21 March), then the occupants of the existing building will notice the loss of sunlight; if the overall annual loss is greater than 4% of annual probable sunlight hours the room may appear colder and less cheerful and pleasant*'. (Where '*amount above*' = 25% of annual probable sunlight hours, including at least 5% of annual probable sunlight hours during the winter months (21 September to 21 March)).

If this occurs the reference point will be deemed to fail the criterion.

Note that the above criterion need only be assessed for windows facing within 90 degrees of due south. *ref1*, also suggests that only windows serving living rooms and conservatories need to be assessed (page 16).

Section 3.3 of *ref1* covers the issue of overshadowing of amenity areas by surrounding buildings. This suggests that overshadowing should be quantified by assessing whether or not significant areas of the affected amenity space receive no direct sunlight at all for a large part of the year. Accordingly, the equinox (21st March) is suggested as being the best date for evaluation, since if an area receives little sunlight on this date, it will be in almost permanent shade during the six winter months (the time between the equinoxes).

Therefore, in the present analysis, the criterion used to assess the impact of the proposed development on the surrounding amenity spaces is quoted from *ref1* as follows:

Criterion4 - '*It is recommended that for it to appear adequately sunlit through the year, at least half of the garden or amenity area should receive at least two hours of sunlight on 21st March. If as a result of new development, an existing garden or amenity area does not meet the above, and the area which can receive two hours of sun on 21st March is less than 0.8 times its former value, then the loss of sunlight is likely to be noticable.*'

3 CALCULATION METHODS

A validated and verified 3D building analysis computer programme is used to calculate all quantities (Tas version 4.4.1 by EDSL Ltd). Refer to appendices A and B for more detail of VSC and APSH.

4 THE MODEL FOR SACRED HEART OF JESUS RC CHURCH

The model has been created based on the following drawings supplied by John Willcock Architects:

- Church drawings:
  - Drg No. 01-3100-103D – plan and elevations as proposed
  - Drg No. 01-3100-104D – elevations as proposed
- Site plan:
  - Location plan (from Ordnance Survey)
- Surrounding buildings:
  - New school annex (opposite) drawings – 01-3074-207C, 01-3074-208D, 01-3074-209B, 01-3074-210A, 01.2074.202D, 01.2074.203C, 01.2074.204E.
  - Survey drawings showing heights and window locations of other surrounding buildings – 911313-E1, 911313-E2, 911313

The planning application drawings for Carronade court (application P072463) have been downloaded which provide room layouts for the first floor. It is assumed that other floors follow a similar arrangement. These drawings also show the windows and window sizes in detail.

The window sizes and room sizes for affected rooms in the Presbytery were obtained on a site visit conducted on 7th August 2019.

Some views of the model are shown in Figures 1 – 6.

Some comments on the model are as follows:

- Buildings are included which are either affected by the proposed development or cause a significant mutual overshadowing between existing buildings.
- The windows to Geary are not exact and the dimensions of the rooms served by these windows are estimated. Only two columns of windows are analysed in Geary which are closed to the development and hence will be worst-affected. A greater number of windows and rooms to Carronade are analysed since it is not clear where the worst-case windows will be.
- An inspection of the architectural plan drawings for the school annex (John Willcock Architects drawings 01.2074.202D, 01.2074.203C, 01.2074.204E) revealed that the facing windows all serve either WCs or circulation spaces. Hence following *ref1*, these rooms and windows are not analysed

5 WINDOW DAYLIGHT RESULTS

The daylight results for the affected windows are shown in Table 1 below. The factor reduction in VSC is at least 0.8 for all windows. (In addition, the VSC is greater than 27% for many windows after development). **Therefore, with reference to criterion1, it is demonstrated that the loss of daylight due to the proposal is predicted to be within acceptable limits.**

room	window	VSC before development (%)	VSC after development (%)	Factor reduction in VSC	Pass/fail **criterion1**
carronade 1_1	carronade1	15.73	15.73	1	**Pass**
carronade 1_2	carronade1	25.82	24.41	0.95	**Pass**
carronade 1_2	carronade_door_large	15.84	15.84	1	**Pass**
carronade 1_2	carronade_door_large	22.85	21.99	0.96	**Pass**
carronade 1_2	carronade_door_large	1.29	1.14	0.88	**Pass**
carronade 1_3	carronade1	24.86	23.54	0.95	**Pass**
carronade 1_4	carronade1	27.58	26.84	0.97	**Pass**
carronade 1_4	carronade_door_large	15.71	15.71	1	**Pass**
carronade 1_4	carronade_door_large	29.07	27.6	0.95	**Pass**
carronade 1_4	carronade_door_large	9.83	8.86	0.9	**Pass**
carronade 1_5	carronade_door_large	17.98	17.98	1	**Pass**
carronade 1_5	carronade_door_large	29.53	28.58	0.97	**Pass**
carronade 1_5	carronade_door_large	13.24	12.3	0.93	**Pass**
carronade 1_5	carronade1	26.88	25.72	0.96	**Pass**
carronade 1_6	carronade1	27.53	27.53	1	**Pass**
carronade 2_1	carronade1	21.66	20.93	0.97	**Pass**

carronade 2_2	carronade1	28.9	27.25	0.94	**Pass**
carronade 2_2	carronade_door _small	26.12	24.12	0.92	**Pass**
carronade 2_3	carronade1	23.92	22.06	0.92	**Pass**
carronade 2_4	carronade1	31.12	29.74	0.96	**Pass**
carronade 2_4	carronade_door _small	30.05	28.35	0.94	**Pass**
carronade 2_5	carronade1	24.9	23.73	0.95	**Pass**
carronade 2_5	carronade_door _small	30.99	30.04	0.97	**Pass**
carronade 2_6	carronade1	33.09	32.28	0.98	**Pass**
carronade 3_1	carronade1	28.28	26.14	0.92	**Pass**
carronade 3_2	carronade1	34.74	32.39	0.93	**Pass**
carronade 3_2	carronade1	34.34	31.97	0.93	**Pass**
carronade 3_3	carronade_door _large	22.06	20.69	0.94	**Pass**
carronade 3_3	carronade_door _large	23.59	23.59	1	**Pass**
carronade 3_3	carronade_door _large	35.96	33.91	0.94	**Pass**
carronade 3_4	carronade1	35.07	33.52	0.96	**Pass**
carronade 3_4	carronade1	32.67	31.26	0.96	**Pass**
carronade 3_5	carronade_door _large	22.99	21.59	0.94	**Pass**
carronade 3_5	carronade1	33.32	33.32	1	**Pass**
carronade 3_5	carronade_door _large	24.6	24.6	1	**Pass**
carronade 3_5	carronade_door _large	36.62	35.35	0.97	**Pass**
carronade 3_6	carronade1	36.7	35.77	0.97	**Pass**
carronade 4_1	carronade_door _small	31.94	31.37	0.98	**Pass**
carronade 4_1	carronade1	37.78	34.8	0.92	**Pass**
carronade 4_1	carronade1	37.7	35.17	0.93	**Pass**
carronade 4_1	carronade1	37.7	36.1	0.96	**Pass**
carronade 4_2	carronade_door _small	36.37	33.94	0.93	**Pass**
carronade 4_2	carronade top	37.56	35.52	0.95	**Pass**
carronade 4_3	carronade_door _small	37.96	36.07	0.95	**Pass**
carronade 4_4	carronade_door _small	38.29	37.03	0.97	**Pass**
carronade 4_4	carronade_door _small	38.19	36.65	0.96	**Pass**
carronade 4_5	carronade_door _small	38.18	37.12	0.97	**Pass**
carronade 4_5	carronade_door _small	38.32	37.4	0.98	**Pass**
carronade 4_6	carronade_door	38.39	37.53	0.98	**Pass**

	_small				
geary grnd	geary1	26.86	26.37	0.98	**Pass**
geary grnd	geary1	26.16	25.56	0.98	**Pass**
geary 1st	geary1	30.5	29.9	0.98	**Pass**
geary 1st	geary1	29.4	28.79	0.98	**Pass**
geary 2nd	geary1	33.79	33.19	0.98	**Pass**
geary 2nd	geary1	32.88	32.14	0.98	**Pass**
geary 3rd	geary1	35.89	35.31	0.98	**Pass**
geary 3rd	geary1	35.13	34.35	0.98	**Pass**
presbytery grnd1	presby1,2,5,6	6.52	6.47	0.99	**Pass**
presbytery grnd1	presby1,2,5,6	7.03	6.72	0.96	**Pass**
presbytery grnd2	presby3,4,8,9,10,11	8.92	8.25	0.92	**Pass**
presbytery grnd2	presby3,4,8,9,10,11	8.76	7.96	0.91	**Pass**
presbytery 1st1	presby1,2,5,6	9.76	9.35	0.96	**Pass**
presbytery 1st1	presby1,2,5,6	11.31	10.2	0.9	**Pass**
presbytery 1st2	presby3,4,8,9,10,11	14.86	13.17	0.89	**Pass**
presbytery 1st2	presby3,4,8,9,10,11	14.52	13.14	0.9	**Pass**
presbytery 1st2	presby3,4,8,9,10,11	12.67	11.63	0.92	**Pass**
presbytery 1st2	presby3,4,8,9,10,11	10.08	9.29	0.92	**Pass**
presbytery 1st3	presby19,20	13.28	11.28	0.85	**Pass**
presbytery 1st3	presby19,20	14.84	12.88	0.87	**Pass**
presbytery 2nd1	presby12	17.95	14.83	0.83	**Pass**
presbytery 2nd2	presby15,16,17,18	23.13	20.11	0.87	**Pass**
presbytery 2nd3	presby15,16,17,18	23.74	21.44	0.9	**Pass**
presbytery 2nd4	presby15,16,17,18	23.27	21.5	0.92	**Pass**
presbytery 2nd5	presby15,16,17,18	16.68	15.43	0.93	**Pass**
presbytery 2nd6	presby21	25.63	22.86	0.89	**Pass**
presbytery 2nd6	presby21	20.8	20.52	0.99	**Pass**

Table 1. Vertical Sky Component (VSC) results for affected window.

6 ROOM DAYLIGHT DISTRIBUTION RESULTS

The results showing the reduction in room area which receives direct skylight are shown in Table 2. The factor reduction in is at least 0.8 for all rooms. **Therefore, with reference to criterion2, it is demonstrated that the change in no-sky line due to the proposal is predicted to be within acceptable limits**

room	Lit Area Existing (m^2)	Lit Area Proposed (m^2)	Factor reduction in lit area	Pass/fail **criterion2**
carronade 1_1	9.25	9.25	1	**Pass**
carronade 1_2	26.9	26.29	0.98	**Pass**
carronade 1_3	10.42	10.42	1	**Pass**
carronade 1_4	27.27	27.27	1	**Pass**
carronade 1_5	26.59	26.59	1	**Pass**
carronade 1_6	12.09	12.09	1	**Pass**
carronade 2_1	9.96	9.67	0.97	**Pass**
carronade 2_2	24.23	24.17	1	**Pass**
carronade 2_3	10.42	10.42	1	**Pass**
carronade 2_4	24.24	24.24	1	**Pass**
carronade 2_5	24.79	24.79	1	**Pass**
carronade 2_6	12.43	12.43	1	**Pass**
carronade 3_1	10.1	10.1	1	**Pass**
carronade 3_2	24.3	24.3	1	**Pass**
carronade 3_3	13.45	13.45	1	**Pass**
carronade 3_4	24.31	24.31	1	**Pass**
carronade 3_5	27.82	27.82	1	**Pass**
carronade 3_6	12.5	12.5	1	**Pass**
carronade 4_1	35.9	35.9	1	**Pass**
carronade 4_2	37.67	37.67	1	**Pass**
carronade 4_3	12.73	12.73	1	**Pass**
carronade 4_4	25.42	25.42	1	**Pass**
carronade 4_5	24.44	24.44	1	**Pass**
carronade 4_6	11.85	11.85	1	**Pass**
geary grnd	20.04	20.04	1	**Pass**
geary 1st	20.39	20.39	1	**Pass**
geary 2nd	20.82	20.82	1	**Pass**
geary 3rd	20.82	20.82	1	**Pass**
presbytery grnd1	3.48	3.48	1	**Pass**
presbytery grnd2	10.92	10.35	0.95	**Pass**
presbytery 1st1	5.28	5.03	0.95	**Pass**
presbytery 1st2	28.25	28.25	1	**Pass**
presbytery 1st3	11.23	11.17	0.99	**Pass**
presbytery 2nd1	4.2	3.44	0.82	**Pass**
presbytery 2nd2	7.37	7.09	0.96	**Pass**
presbytery 2nd3	7.66	7.53	0.98	**Pass**
presbytery 2nd4	7.75	7.69	0.99	**Pass**
presbytery 2nd5	8.01	7.78	0.97	**Pass**

presbytery 2nd6	16.03	15.45	0.96	**Pass**

Table 2. No-sky line results (reduction in area which receives direct sklight)

7 WINDOW SUNLIGHT RESULTS

As stated in *ref1*, the loss to sunlight should only be considered for windows which serve either living rooms or conservatories and which face within 90 degrees of due south. Since the rooms that windows serve are largely unknown, the results are shown here for all windows which face within 90 degrees of due south.

Room	**Window**	**Before Development**		**After Development**				
		% annual probable sunlight hours	% annual probable sunlight hours during winter	% annual probable sunlight hours	Factor reduction (annual)	% annual probable sunlight hours during winter	Factor reduction (winter)	Pass/fail **criterion2**
carronade 1_1	carronade1	21	6	21	1	6	1	**Pass**
carronade 1_2	carronade1	43	9	41	0.94	8	0.87	**Pass**
carronade 1_2	carronade_door_large	37	8	35	0.95	8	1	**Pass**
carronade 1_3	carronade1	44	11	42	0.96	10	0.87	**Pass**
carronade 1_4	carronade1	47	12	45	0.97	12	0.93	**Pass**
carronade 1_4	carronade_door_large	54	13	52	0.95	11	0.89	**Pass**
carronade 1_5	carronade_door_large	58	17	56	0.97	15	0.9	**Pass**
carronade 1_5	carronade_door_large	36	15	35	0.96	13	0.89	**Pass**
carronade 1_5	carronade1	47	16	46	0.97	15	0.92	**Pass**
carronade 1_6	carronade1	46	10	46	1	10	1	**Pass**
carronade 2_1	carronade1	37	7	36	0.99	7	0.96	**Pass**
carronade 2_2	carronade1	57	13	54	0.94	11	0.82	**Pass**
carronade 2_2	carronade_door_small	47	10	45	0.95	9	0.89	**Pass**
carronade 2_3	carronade1	48	18	45	0.95	16	0.86	**Pass**
carronade 2_4	carronade1	62	19	59	0.96	17	0.87	**Pass**
carronade 2_4	carronade_door_small	53	18	51	0.96	16	0.9	**Pass**
carronade 2_5	carronade1	51	21	49	0.95	19	0.89	**Pass**
carronade 2_5	carronade_door_small	55	21	53	0.95	18	0.88	**Pass**
carronade 2_6	carronade1	62	19	59	0.97	17	0.89	**Pass**
carronade 3_1	carronade1	52	11	50	0.96	10	0.83	**Pass**
carronade 3_2	carronade1	67	26	62	0.93	22	0.84	**Pass**
carronade 3_2	carronade1	67	22	63	0.94	18	0.84	**Pass**
carronade 3_3	carronade_door_large	48	21	44	0.91	17	0.79	**Pass**
carronade 3_3	carronade_d	73	26	69	0.95	23	0.85	**Pass**

	oor_large							
carronade 3_4	carronade1	65	24	63	0.96	22	0.89	**Pass**
carronade 3_4	carronade1	59	17	56	0.96	15	0.85	**Pass**
carronade 3_5	carronade_door_large	48	21	46	0.96	19	0.9	**Pass**
carronade 3_5	carronade1	62	17	62	1	17	1	**Pass**
carronade 3_5	carronade_door_large	73	26	70	0.97	24	0.91	**Pass**
carronade 3_6	carronade1	71	24	70	0.98	22	0.94	**Pass**
carronade 4_1	carronade1	83	30	78	0.94	26	0.85	**Pass**
carronade 4_1	carronade1	85	31	81	0.95	27	0.87	**Pass**
carronade 4_1	carronade1	85	31	82	0.96	27	0.89	**Pass**
carronade 4_2	carronade_door_small	70	23	67	0.95	19	0.84	**Pass**
carronade 4_2	carronade top	75	27	71	0.95	23	0.86	**Pass**
carronade 4_3	carronade_door_small	77	28	74	0.97	26	0.91	**Pass**
carronade 4_4	carronade_door_small	77	28	75	0.98	27	0.95	**Pass**
carronade 4_4	carronade_door_small	77	28	74	0.97	26	0.91	**Pass**
carronade 4_5	carronade_door_small	77	28	75	0.98	27	0.94	**Pass**
carronade 4_5	carronade_door_small	77	28	75	0.98	27	0.94	**Pass**
carronade 4_6	carronade_door_small	77	28	75	0.98	27	0.96	**Pass**
geary grnd	geary1	51	20	51	1	20	1	**Pass**
geary 1st	geary1	57	20	55	0.96	20	1	**Pass**
geary 2nd	geary1	61	21	58	0.95	21	1	**Pass**
geary 3rd	geary1	63	23	60	0.95	23	1	**Pass**
presbytery grnd1	presby1,2,5,6	18	1	18	1	1	1	**Pass**
presbytery grnd1	presby1,2,5,6	19	1	19	1	1	1	**Pass**
presbytery grnd2	presby3,4,8,9,10,11	14	0	14	1	0	1	**Pass**
presbytery 1st1	presby1,2,5,6	25	5	25	1	5	1	**Pass**
presbytery 1st1	presby1,2,5,6	27	5	27	1	5	1	**Pass**
presbytery 1st2	presby3,4,8,9,10,11	27	2	27	1	2	1	**Pass**
presbytery 1st2	presby3,4,8,9,10,11	24	1	24	1	1	1	**Pass**
presbytery 1st2	presby3,4,8,9,10,11	16	1	16	1	1	1	**Pass**
presbytery	presby12	35	11	33	0.95	11	1	**Pass**

2nd1								
presbytery 2nd2	presby15,16, 17,18	43	11	40	0.93	11	1	**Pass**
presbytery 2nd3	presby15,16, 17,18	44	9	42	0.96	9	1	**Pass**
presbytery 2nd4	presby15,16, 17,18	42	7	40	0.96	7	1	**Pass**
presbytery 2nd5	presby15,16, 17,18	23	1	23	1	1	1	**Pass**
presbytery 2nd6	presby21	38	10	38	1	10	1	**Pass**

Table 3. Annual probable sunlight hour results for each reference point.

The factor reduction for total annual sunlight hours is greater than 0.8 for all windows and the factor reduction for winter sunlight hours is either greater than 0.8 or the percentage of winter hours is greater than 5%**. Therefore with reference to criterion2, it is demonstrated that the loss of sunlight due to the proposal is predicted to be within acceptable limits.**

8 AMENITY AREA SUNLIGHT RESULTS

The sunlight results for the amenity areas as labelled in Figures 2 and 3 shown in Table 4.

Amenity	Amenity area (m^2)	Existing area lit (m^2)	Proposed area lit (m^2)	Existing %	Proposed %	Factor Proposed / existing (%)	Pass/Fail Criterion 3
carronade central amenity	1228.13	428.75	428.75	34.91	34.91	100	**Pass**
carronade roof1	28.58	21.79	21.79	76.24	76.24	100	**Pass**
carronade roof2	20.31	15.6	15.6	76.78	76.78	100	**Pass**
carronade roof3	19.07	13.61	13.61	71.38	71.38	100	**Pass**
school playground	491.19	470.02	470.02	95.69	95.69	100	**Pass**
geary garden	77.23	66.91	66.91	86.64	86.64	100	**Pass**

Table 4. Amenity area sunlight hour results for 21st March.

It can be seen that the proposed development has no effect on the amount of sunlight received by the amenity spaces. **Therefore, with reference to criterion3, loss of sunlight to all gardens due to the proposed development is comfortably within acceptable limits**

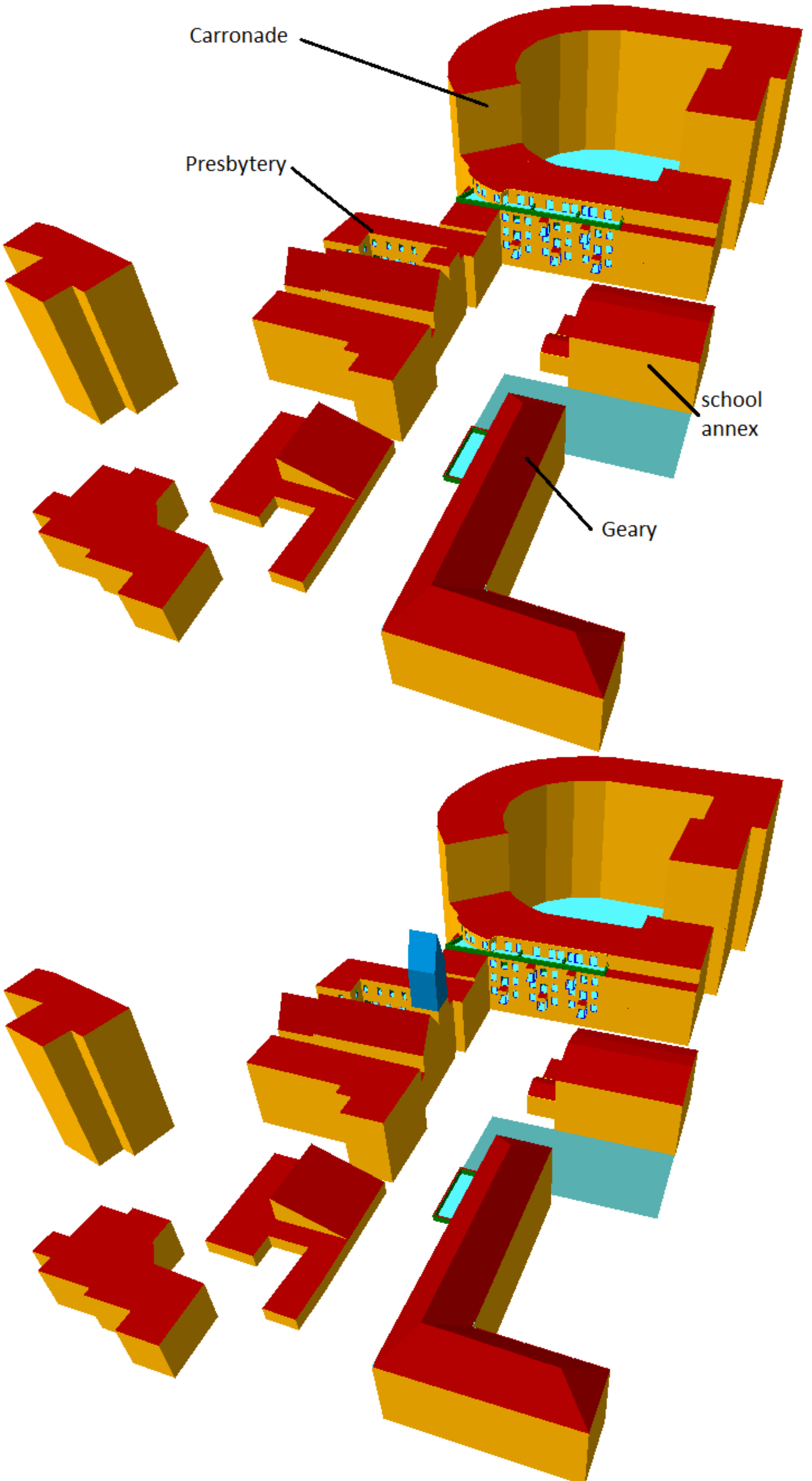


Figure 1	Overview of the model from the south-east (above – existing, below - proposed)	

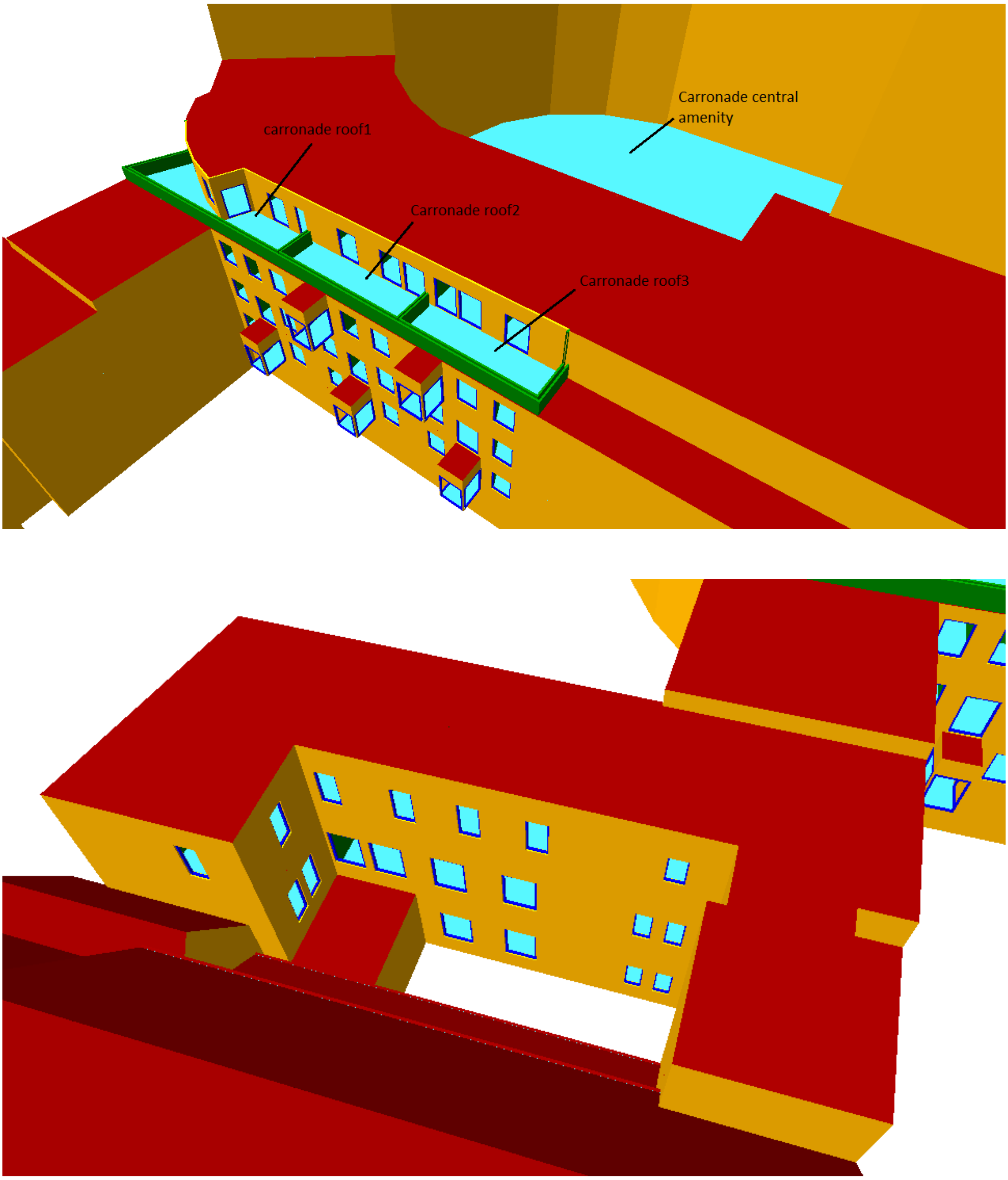


Figure 2	Close-up views (Carronade – above, Presbytery – below)	

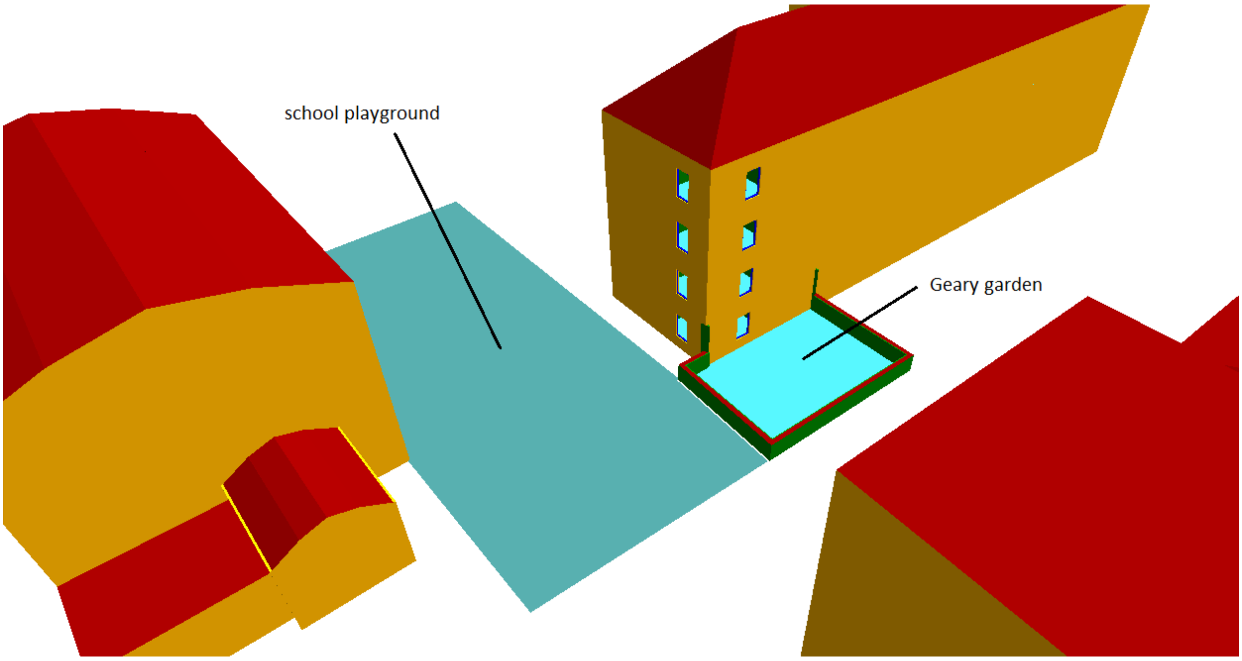


Figure 3	Close-up school annex and Geary House	

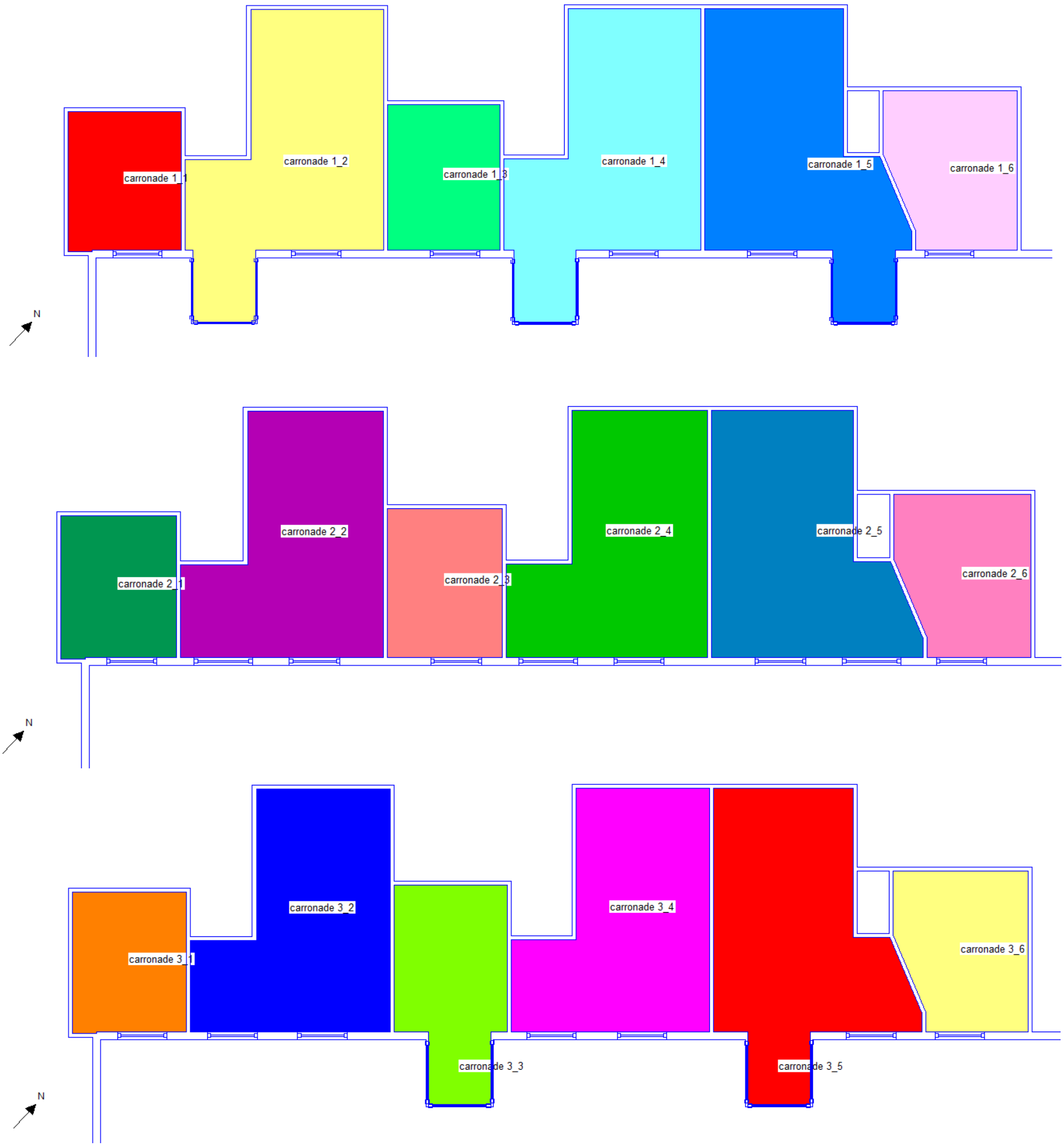


Figure 4	Plan drawings of Carronade Court (1st, 2nd, 3rd floors) showing room labelling (numbered from left to right)	

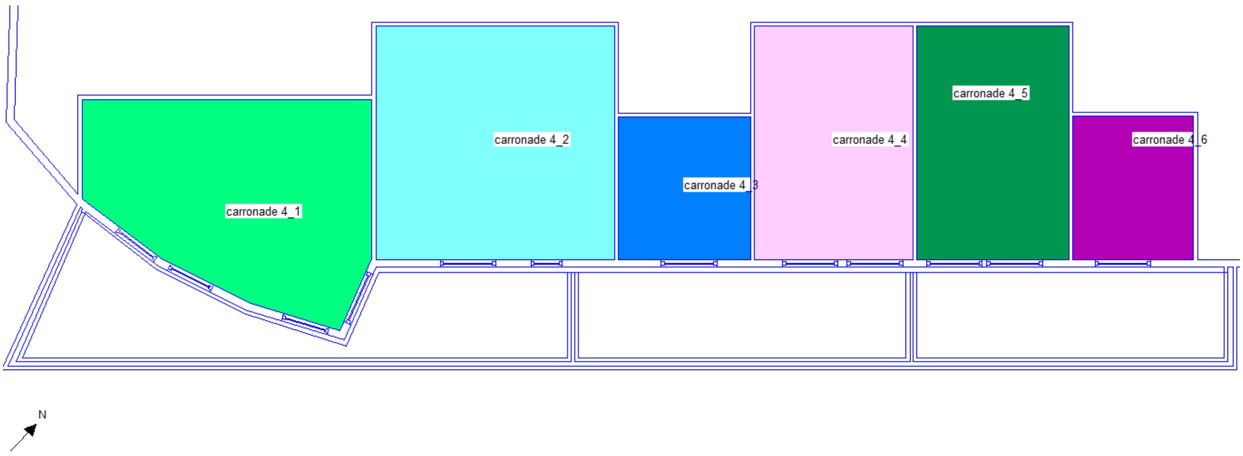


Figure 5	Plan drawings of Carronade Court (4th floor) showing room labelling (numbered from left to right)	

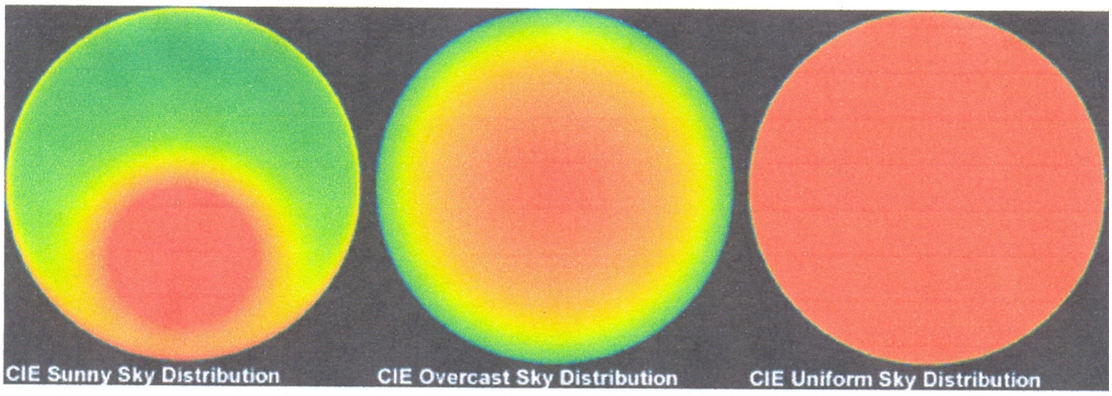
Figure 6	Plan drawings of the Presbytery (ground, 1st and 2nd floors) showing room labelling (numbered from right to left)

APPENDIX A – THE VERTICAL SKY COMPONENT

To quote from *ref1*, the vertical sky component (VSC) is defined as follows:

'*Ratio of that part of illuminance, at a given point on a given vertical plane, that is received directly from a CIE Standard Overcast Sky, to illuminance on a horizontal plane due to an unobstructed hemisphere of this sky* '(CIE = Commission internationale de l'Eclairage or the International Commission on Illumination).

Sky Distributions
On a sunny day, clearly most of the available light comes from the direction of the sun and the area immediately around it. On a perfectly overcast day the majority of light comes from the zenith of the sky straight above you, which can be up to three times more than at the horizon. Under some conditions, however, the distribution is much more uniform.
To describe this variation the CIE have developed a number of standard sky distributions based on very specific mathematical formula, examples of which are shown immediately below.



As stated in the quote above, the VSC is defined for Overcast Sky Conditions, i.e. the image in the centre, for which the zenith is brighter than the horizon.

Calculating the VSC.
The VSC for a point on a wall may be determined by considering all the objects which block a clear 'sight' of unobstructed sky. The wall itself will block out half of the sky hemisphere, so it would seem that the maximum theoretical value for a point on an isolated wall would be 50%. In fact, due to the assumed CIE Overcast Sky Condition, the maximum value attainable is 40% (ref1).

The VSC calculation may be achieved using pen-and-paper methods such as Waldram diagrams as suggested in ref1. However, the computer programme used here is more accurate, reliable and efficient. It performs the calculation by 'spraying' very many imaginary rays from the point and so determines the VSC from the percentage of these which reach the sky dome (with the assumed sky distribution taken into account).

APPENDIX B – DETERMINING THE NUMBER OF ANNUAL PROBABLE SUNLIGHT HOURS

As stated in section 3, to calculate the probable sunlight hours that each reference point receives, the first stage is to quantify the number of hours per day for which each point can potentially receive unobstructed sunlight. This task involves considering each of the 365 days per year in turn, and determining the number of hours between sunrise and sunset on each day that each reference point is in sunlight.

The steps listed below are then followed to determine the number of annual probable sunlight hours for each reference point:

1. For each month, sum the daily number of hours of potential unobstructed sunlight.
2. For each month, sum the daily number of hours between sunrise and sunset.
3. Express the monthly sum of potential unobstructed sunlight from 1 as a fraction of total potential hours, by dividing by the answer to 2.
4. For each month, multiply the above fraction by the hourly sunshine averages for the location as determined by weather statistics for the area. This gives the number of monthly probable sunlight hours. The weather statistics were taken from MET office data for Grenwich (the closest location from the dataset).
5. Calculate the number of annual probable sunlight hours by summing all the monthly probable sunlight hours from 2 above. This may be expressed as a percentage by dividing by the total hourly sunshine averages for the location. This percentage may then be compared with the 25% criterion suggested in *ref1*.
6. Calculate the number of probable sunlight hours during the winter months by summing all the monthly probable sunlight hours between October and March (inclusive) from 2 above. This may be expressed as a percentage by dividing by the total hourly sunshine averages for the location. This percentage may then be compared with the 5% criterion suggested in *ref1*.