ATKINS

Member of the SNC-Lavalin Group

SOLD-Thames Young Mariners

Daylight Assessment Report

Surrey County Council

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Document history

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Contents

Executive Summary

Atkins has been appointed to carry out a daylighting assessment to assess the compliance of the proposed Thames Young Mariners development against the Average Daylight Factor and No-Skyline criteria stipulated within report BR 209, site layout planning for daylight and sunlight: a guide to good practice (3rd edition).

A 3-dimensional model of the Thames Young Mariners design was developed using IES VE software, based on proposed site layout plans from the architectural team, with all key inputs and assumptions outlined within this report.

The daylighting assessment has been carried out for all the habitable rooms. The modelling results show that the assessed rooms pass the BR 209 Average Daylight Factor and No-Skyline criteria.

The daylighting and no Skyline analysis are carried out to see if the perimeter rooms of the building or in other words all occupied spaces have enough daylighting availability in it or not. In the Analysis if the rooms don't comply it is generally recommended to add more windows or enlarging of existing window.

Similarly for no skyline it is check that from the room if the sky is visible or not, if it is visible to what extent it is visible.

1. Introduction

1.1. Background

This Daylighting Assessment report has been prepared by Atkins. It details the daylighting requirements and results for the proposed Thames Young Mariners development. The daylighting assessment has been carried out using the methodology outlined in 'Site layout planning for daylight and sunlight: a guide to good practice (BR 209) (3rd Edition, 2022)', guidance document produced by BRE in 2022.

1.2. Description of Development

Main Building Lower Ground Plan The lower ground floor maintains the relationship to the water's edge via the slipway of the existing development, comprising changing and drying facilities for water-based activities. Changing facilities are designed to provide flexibility and diversity in use by a variety of user groups, integrating accessible facilities for independent or inclusive use. Existing storage located adjacent to the building is to be transferred to the proposed floating pontoons indicated on the plan. These combine access to the water with storage with boats and equipment to support the multiple water-based activities

First Floor Plan These proposals show the relocated staff residential accommodation at first floor level. The scale of provision has been reviewed with SOLD to optimise the amount of accommodation and include overnight surveillance of the site, which is an important security measure necessary due to the equipment stored within the site. Access to this accommodation is distinct from the general use at upper ground floor level. To achieve the energy efficiency targets for this scheme, a plantroom is included at this level for the primary energy generation plant that serves this building and the adjacent Guest Residential Blocks. Air source heat pumps (ASHPs) will be located here, with heat rejection equipment positioned externally on the flat roof above the kitchen and changing areas

Guest Residential Blocks The three Guest Residential Blocks are additional to the existing development and represent an important part of the long-term viability. These will enable school groups to extend their stay on the site to multiple days and fully experience what is on offer. A standard design for each block is proposed to enable application of offsite modular construction. The layout is organised around a central corridor with four bed dormitories
sharing ensuite shower facilities. Additional guardian bedrooms are necessary for appropriate safeguarding of each group of children. The number of bedrooms is based on school group size. As for the changing facilities, our approach has been to integrate accessible sleeping provision alongside standard bedrooms so that groups can be fully inclusive. A small flexible room is included in each building for the school group to socialize and gather before and after activities.

Camping Changing Block The proposed camping changing block is a new provision on site and will serve as a dedicated facility to camping guests throughout their stay at TYM. This accommodation is located adjacent to the camping area, providing improved access and provision, and improving the overall operation of the site by providing discrete accommodation for different user groups.

1.3. Daylighting Guidance and Criteria

The Building Research Establishment (BRE) have set out in their handbook 'Site layout planning for daylight and sunlight: a guide to good practice (BR 209) (3rd Edition, 2022)', guidelines and methodology for the assessment of daylight and sunlight within proposed buildings. It is important to note that this document is intended to serve as a guide and is not mandatory. Ensuring that the key spaces in a building have sufficient access to daylight has the dual purpose of increasing occupant wellbeing and reducing dependence on electrical lighting, and in turn decreasing the energy demand.

Two daylight assessment metrics included in the BRE guide, namely Average Daylight Factor and No-Skyline are used to evaluate the daylighting levels of the proposed development.

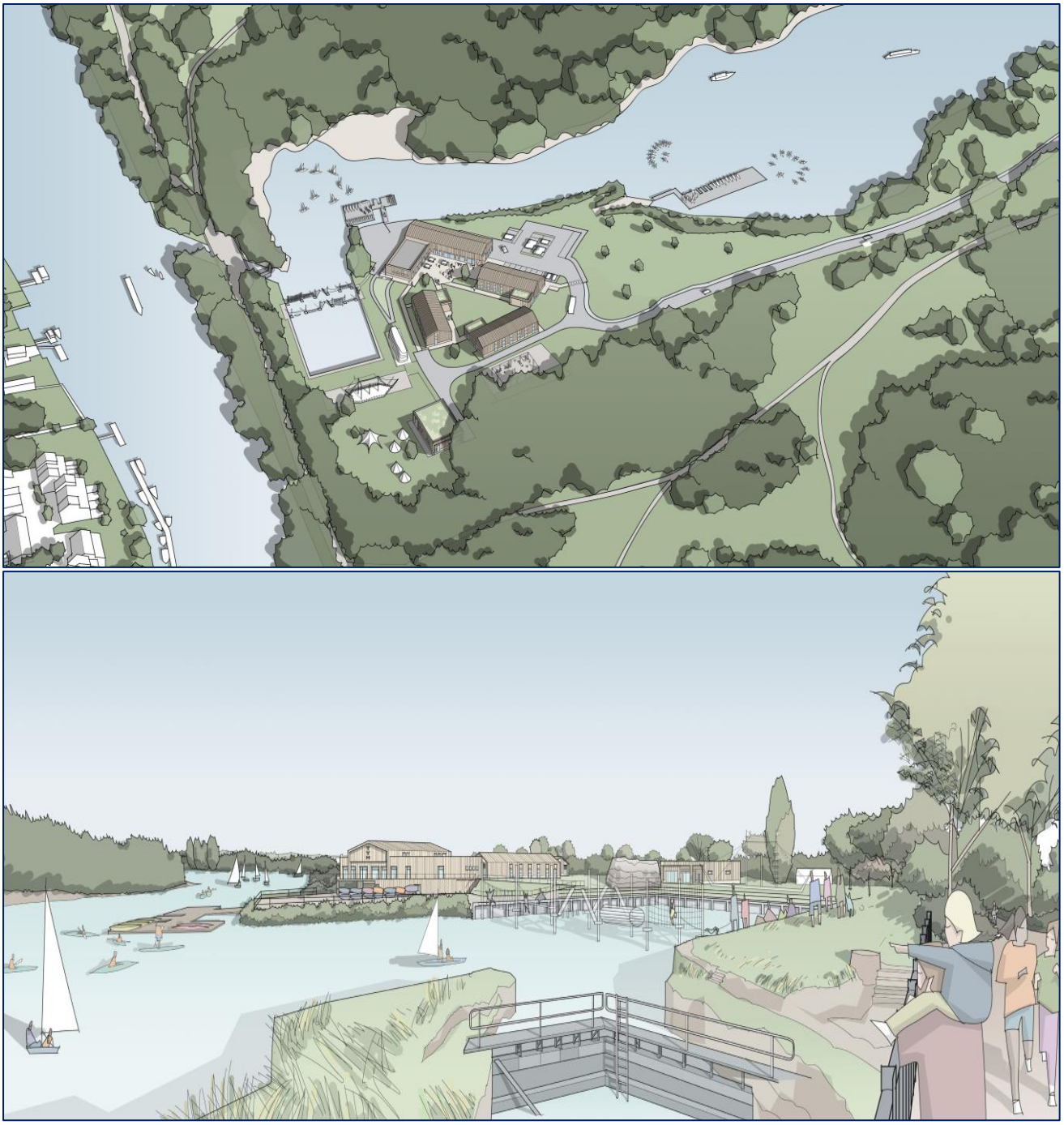

Figure 1-1 - Thames Young Marina (Bird Eye View & Path Vision)

1.4. Average Daylight Factor

Average Daylight Factor (ADF) refers to the ratio of total daylight flux incident on the working plane to the area of the working plane, expressed as a percentage of the outdoor illuminance on a horizontal plane due to an unobstructed CIE standard overcast sky. For example, a 1% ADF would mean that the average indoor illuminance would be one hundredth the outdoor unobstructed illuminance.

1.5. Target daylight factors (DT) to achieve over at least 50% of the assessment grid in UK domestic habitable rooms with vertical and/or inclined daylight apertures

Location	D_T for 100 lx (Bedroom)	D_T for 150 lx (Living room)	D_T for 200 lx (Kitchen)
London (Gatwick Airport)	0.7%	1.1%	1.4%

London (Gatwick Airport) location is used here as this location latitude is nearest to the assessment site should

1.6. No-Skyline

Where room layouts are known, the impact on the daylighting distribution in the existing building should be found by plotting the no skyline in each of the main rooms. For dwellings this would include living rooms, dining rooms, and kitchens; bedrooms should also be analysed although they are less important.

The no skyline divides points on the working plane which can and cannot see the sky. (Figure 1-2). (In houses the working plane is assumed to be horizontal and 0.85 m high; in offices 0.7 m high; in special interiors like hospital wards and infant school classrooms a different height may be appropriate.) Areas beyond the no skyline, since they receive no direct daylight, usually look dark and gloomy compared with the rest of the room, however bright it is outside. Supplementary electric lighting will be needed if a significant part of the working plane (20% of the room or more) lies beyond the no skyline.

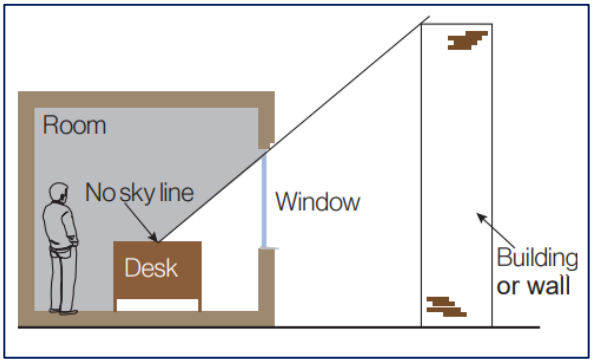

Figure 1-2 - The no skyline divides areas of the working plane which can and cannot receive direct skylight

2. Methodology

A 3-dimensional model of the proposed building was developed using Integrated Environment Solutions Virtual Environment (IES VE) software [Version 2022.1.0.0]. The daylight assessment has been carried out using Radiance IES, which utilise the Radiance engine to produce daylighting assessment results and Flus DL used to carry out no Skyline assessment. The inputs and assumptions used in the model are covered in the following sections.

2.1. Model Geometry

An axonometric view of the IES VE model of the building is provided in Figure 2-1. The geometry and shading are based on the architectural site plans, any detail regarding local shading and the surrounding area not captured by the site plans have not been included.

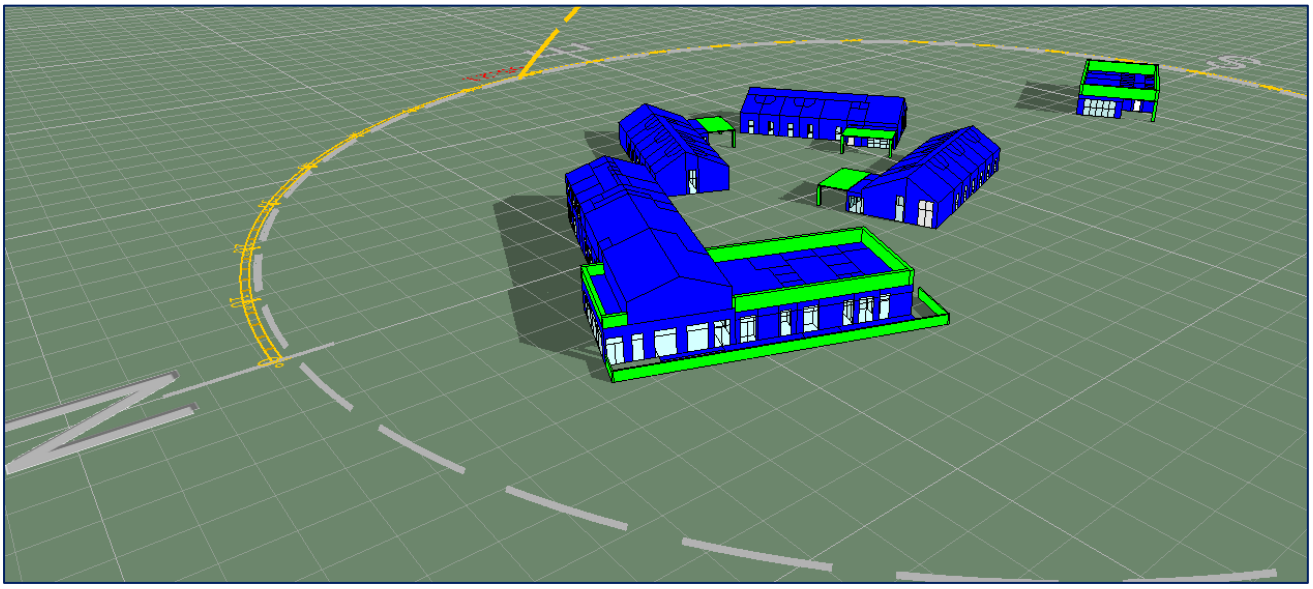

Figure 2-1 - 3-D model of Thames Young Mariners design modelled on IES

3. Inputs, Assumption and Results.

3.1. Inputs.

3.1.1. Recommended default surface reflectance's

Surface	Default Reflectance
Interior Walls	0.7
Ceilings	0.8
Floors	0.25
Exterior Walls and Obstructions	0.2
Exterior Ground	0.2

3.1.2. Diffuse transmittance

For clean, clear double glazing with a low emissivity coating, a value of 0.68 for diffuse transmittance can be used. For other types of glazing, the diffuse transmittance, if needed, can be found by multiplying the manufacturer's normal incidence light transmittance by 0.91. Care needs to be taken to apply the correct values within the calculation software; often software programs use the normal incidence transmittance, which is directly available from the glazing manufacturer, and have inbuilt correction for light coming from oblique angles.

3.1.3. Maintenance factors for difference types of windows

Type of window	Maintenance Factor	
	Rural/Suburban	Urban
Vertical, no overhang	0.96	0.92
Vertical, sheltered from rain, e.g., by balcony or overhang	0.88	0.76
Sloping rooflight	0.92	0.84
Horizontal rooflight	0.88	0.76

3.1.4. Assessment Grid

The calculation of illuminance or daylight factor is carried out on a grid of points on a reference plane within each room assessed. The plane should normally be 0.85m from the floor level (sometimes described as the working plane height). The standard states that the assessment grid should exclude a band of 0.5m from the walls, unless otherwise specified. In dwellings it is recommended that a band of 0.3m should be excluded, to avoid excluding parts of the room that are used by the occupants. Professional judgement is used in cases with irregular shaped spaces or rooms with annex areas.

The calculation is conducted for a 'CIE standard overcast sky', which is 12:00 noon on 21st September as per BRE guidance. It is also to be noted that the simulations have been conducted based on assumptions made from the latest available sectional drawings and elevations for the residence.

3.2. Average Daylight Factor Result.

3.2.1. Calculated ADF for Occupied Spaces

All the tested zones have satisfactory levels of ADF. The results also show that most of the rooms achieve high average daylight factors which are significantly higher than the required minimum average daylight factor criteria.

Spaces	Average Daylight Factor	Criteria	Decision	Recommendation
Non residential				
CB_018 Classroom / Social	5.84	2.1	PASS	
FF_017n Overnight Bedroom	2.27	2.1	PASS	
FF_017o Bed 01	3.39	2.1	PASS	
FF_017p Bed 01	3.17	2.1	PASS	
FF_017q Bed 03 (Acc.)	2.55	2.1	PASS	
FF_017v Living Area	1.99	2.1	FAILED	if window area is enlarged this room will Pass
GF_002 Visitors Waiting	7.55	2.1	PASS	
GF_005 General Office	9.23	2.1	PASS	
GF_010 Flexible Meeting/Learning Room	2.07	2.1	FAILED	if window area is enlarged this room will Pass
GF_016 Staff Room	2.08	2.1	FAILED	if window area is enlarged this room will Pass
GF_018 Main Hall	4.82	2.1	PASS	
GF_019 Kitchen + Servery	1.16	2.1	FAILED	Introduction some window in the north will help (the cleaner store can be placed in some other location as that is blocking the north side of the kitchen)
GF_006 Staff Accom. Access	0.5	2.1	FAILED	Introduce window
Residential				
RB1_002 Social & Learning	3.08	1.1	PASS	
RB1_003 Acc Dormitory	1.1	0.7	PASS	
RB1_004 Guardian Dormitory	2.09	0.7	PASS	
RB1_005 Dormitory	2.06	0.7	PASS	
RB1_006 Dormitory	2.1	0.7	PASS	
RB1_007 Dormitory	2.08	0.7	PASS	
RB1_008 Guardian Dormitory	2.1	0.7	PASS	
RB1_009 Dormitory	2.21	0.7	PASS	
RB1_010 Dormitory	2.21	0.7	PASS	
RB1_011 Dormitory	2.22	0.7	PASS	
RB1_012 Dormitory	2.22	0.7	PASS	
RB1_013 Guardian Dormitory	2.26	0.7	PASS	
RB2_002 Social & Learning	3.11	1.1	PASS	

RB2_003 Acc Dormitory	1.01	0.7	PASS	
RB2_004 Guardian Dormitory	2.12	0.7	PASS	
RB2_005 Dormitory	2.07	0.7	PASS	
RB2_006 Dormitory	2.09	0.7	PASS	
RB2_007 Dormitory	2.12	0.7	PASS	
RB2_008 Guardian Dormitory	2.12	0.7	PASS	
RB2_009 Dormitory	2.17	0.7	PASS	
RB2_010 Dormitory	2.28	0.7	PASS	
RB2_011 Dormitory	2.18	0.7	PASS	
RB2_012 Dormitory	2.29	0.7	PASS	
RB2_013 Guardian Dormitory	2.17	0.7	PASS	
RB3_002 Social & Learning	3.02	1.1	PASS	
RB3_003 Acc Dormitory	1.09	0.7	PASS	
RB3_004 Guardian Dormitory	2.09	0.7	PASS	
RB3_005 Dormitory	2.02	0.7	PASS	
RB3_006 Dormitory	2.07	0.7	PASS	
RB3_007 Dormitory	1.95	0.7	PASS	
RB3_008 Guardian Dormitory	2.19	0.7	PASS	
RB3_009 Dormitory	2.1	0.7	PASS	
RB3_010 Dormitory	2.21	0.7	PASS	
RB3_011 Dormitory	2.28	0.7	PASS	
RB3_012 Dormitory	2.27	0.7	PASS	
RB3_013 Guardian Dormitory	2.1	0.7	PASS	

As per the criteria most of the rooms are passing except five rooms highlighted in Red, to fix the rooms that are failing new windows can be introduced to it or resizing of the windows will help.

3.3. No-Skyline / Sky View Result.

The calculated sky view factors for the dwellings and communal areas are presented in the table below. The sky view is represented as a percentage of the floor area that has access to a clear view of the sky.

Spaces		Min	Avg	Max
CB_018 Classroom / Social	Margin=0.50 m	100%	100%	100%
FF_017n Overnight Bedroom	Margin=0.50 m	100%	100%	100%
FF_017o Bed 01	Margin=0.50 m	100%	100%	100%
FF_017p Bed 01	Margin=0.50 m	100%	100%	100%
FF_017q Bed 03	Margin=0.50 m	100%	100%	100%
FF_017v Living Area	Margin=0.50 m	100%	100%	100%
GF_002 Visitors Waiting	Margin=0.50 m	100%	100%	100%
GF_005 General Office	Margin=0.50 m	100%	100%	100%
GF_010 Flexible Meeting/Learning Room	Margin=0.50 m	100%	100%	100%
GF_016 Staff Room	Margin=0.50 m	0%	98%	100%

GF_018 Main Hall	Margin=0.50 m	100%	100%	100%
GF_019 Kitchen + Servery	Margin=0.50 m	0%	81%	100%
RB1_002 Social & Learning	Margin=0.50 m	100%	100%	100%
RB1_003 Acc Dormitory	Margin=0.50 m	0%	95%	100%
RB1_004 Guardian Dormitory	Margin=0.50 m	100%	100%	100%
RB1_005 Dormitory	Margin=0.50 m	100%	100%	100%
RB1_006 Dormitory	Margin=0.50 m	100%	100%	100%
RB1_007 Dormitory	Margin=0.50 m	100%	100%	100%
RB1_008 Guardian Dormitory	Margin=0.50 m	100%	100%	100%
RB1_009 Dormitory	Margin=0.50 m	100%	100%	100%
RB1_010 Dormitory	Margin=0.50 m	100%	100%	100%
RB1_011 Dormitory	Margin=0.50 m	100%	100%	100%
RB1_012 Dormitory	Margin=0.50 m	100%	100%	100%
RB1_013 Guardian Dormitory	Margin=0.50 m	100%	100%	100%
RB2_002 Social & Learning	Margin=0.50 m	100%	100%	100%
RB2_003 Acc Dormitory	Margin=0.50 m	0%	88%	100%
RB2_004 Guardian Dormitory	Margin=0.50 m	100%	100%	100%
RB2_005 Dormitory	Margin=0.50 m	100%	100%	100%
RB2_006 Dormitory	Margin=0.50 m	100%	100%	100%
RB2_007 Dormitory	Margin=0.50 m	100%	100%	100%
RB2_008 Guardian Dormitory	Margin=0.50 m	100%	100%	100%
RB2_009 Dormitory	Margin=0.50 m	100%	100%	100%
RB2_010 Dormitory	Margin=0.50 m	100%	100%	100%
RB2_011 Dormitory	Margin=0.50 m	100%	100%	100%
RB2_012 Dormitory	Margin=0.50 m	100%	100%	100%
RB2_013 Guardian Dormitory	Margin=0.50 m	100%	100%	100%
RB3_002 Social & Learning	Margin=0.50 m	100%	100%	100%
RB3_003 Acc Dormitory	Margin=0.50 m	0%	98%	100%
RB3_004 Guardian Dormitory	Margin=0.50 m	0%	94%	100%
RB3_005 Dormitory	Margin=0.50 m	100%	100%	100%
RB3_006 Dormitory	Margin=0.50 m	100%	100%	100%
RB3_007 Dormitory	Margin=0.50 m	100%	100%	100%
RB3_008 Guardian Dormitory	Margin=0.50 m	100%	100%	100%
RB3_009 Dormitory	Margin=0.50 m	100%	100%	100%
RB3_010 Dormitory	Margin=0.50 m	100%	100%	100%
RB3_011 Dormitory	Margin=0.50 m	100%	100%	100%
RB3_012 Dormitory	Margin=0.50 m	100%	100%	100%
RB3_013 Guardian Dormitory	Margin=0.50 m	100%	100%	100%
GF_006 Staff Accom. Access	Margin=0.50 m	0%	33%	100%

All the tested zones have satisfactory views to the sky (more than 80% of each zone's floor area) and are hence complaint with BRE's guideline on No-Skyline.

4. Summary and Conclusions

A daylighting assessment has been carried out to analyse the amount and quality of daylight available to the applicable rooms in the proposed Thames Young Mariners development.

The development is designed to achieve ADF and No-Sky line performance criteria described in the best practice guidance provided in BRE 209. The calculations have been carried out using Flucs DL and Radiance IES modules of the Integrated Environment Solutions (IES) software.

The daylight modelling has been carried out for dwellings and communal areas. The results indicate that all the tested rooms comply with BRE's daylight factor guidance.

In addition, the analysis of the Sky View also indicates that at least 80% of the floor area of all tested habitable rooms have a view of the sky, thus complying with BRE's guidance.