

Daylighting Report

Our Lady of Sion College - STEAMD

1065 Whitehorse Rd, Box Hill VIC 3128

4th April 2022 – Rev. 00

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Document Amendments

Rev.	Description	Date	Author	Checked
00	Town Planning Issue	04/04/2022	BP	TP

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1. Executive Summary

Meinhardt has been commissioned to undertake a Daylight modelling assessment for the proposed new development at Our Lady of Sion College, STEAMD and Administration Centre, located at 1065 Whitehorse Rd, Box Hill VIC 3128.

The daylight availability simulation has been undertaken at finished floor level using the Greenstar Buildings tool Spatial Daylight Autonomy (sDA) method. This method has been used in lieu of daylight factor method, as a more robust and realistic output of daylight levels within an occupied space. We note that the Daylight Factor method is not an accepted modelling method for Greenstar assessment under the latest Greenstar Buildings Tool.

Under the Built Environment Sustainability Scorecard (BESS v6), good levels of daylight contribute to the Indoor Environment Quality (IEQ) score. BESS points are awarded where 33% of the regular use areas achieves the target daylighting levels.

Daylight modelling has been undertaken for the Planning phase of the project using the proposed geometry and shading. Glazing visible light transmittance (VLT) has been nominated at 50%. Daylighting was simulated using a climate based weather file for Melbourne.

Table 1 – Spatial Daylight Autonomy Threshold (160lux for 80% of area due to daylight)

Assessed Primary Area	Assessed Area (m ²)	Compliant Area (m ²)	Total %
Overall TOTAL	1881.8	1200.7	64%
Total L0	319.2	224.0	70%
Total L1	895.3	449.3	50%
Total L2	667.4	527.4	79%

We confirm that daylight modelling indicates that high levels of daylight will be available for 64% of the regularly occupied area and that the BESS threshold criteria will exceeded.

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2. Introduction

The aim of daylighting modelling is to assess and demonstrate that the proposed development meets daylight requirements required under the Built Environment Sustainability Scorecard (BESS v6) Indoor Environment Quality (IEQ) score.

The modelling was carried out using the IESVE-2021 (Integrated Environment Solutions Virtual Environment – 2021) developed by Integrated Environment Solutions Limited.

The daylight availability simulation has been undertaken using Greenstar Buildings v1 - Credit 11 Light Quality. Specifically, to show credit achievement to the Light Quality credit, the following guidance is provided:

Applicants must show:-

- For schools, how all classrooms have access to a view and daylight. And;
- For non-residential buildings, at least 40% of the regularly occupied areas across the building must receive high levels of daylight with no less than 20% on any floor or tenancy (whichever is smaller).
- Daylight must be calculated using Daylight Autonomy.

Calculating daylight autonomy

Calculations must be completed for at least every hour during the nominated hours. There are a number of dynamic simulation software programs that can be used to show compliance with the credit criteria. Daysim, ESP-r, Lightswitch Wizard, and SPOT (>Ver 4.0) can be used. Where other programs are used, the project team must demonstrate that the software is based on the Radiance

High levels of daylight

High levels of daylight are deemed to have at least 160 lux due to daylight during 80% of the nominated hours.

Nominated hours

Nominated hours shall be defined by the project team. The project team shall provide a summary of space types, uses, and nominated hours. Projects that are operational outside of daylight hours only need to demonstrate compliance for operational daylight hours.

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The dynamic simulation engine of the software suite is accredited with ASHRAE Standard 140-2001 “Standard Method of Test for Evaluation of Building Energy Analysis Computer Programs” using the International Energy Agency BESTEST. The software has been validated by “Australian Building Codes Board’s protocol of Building Energy Analysis Software (v2006-1) (ABCB, 2006).

The reporting requirements for energy simulation analysis software are tabulated below.

Table 02. Energy Simulation Analysis Software Reporting Requirements

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Energy simulation analysis software reporting requirements	
Software name and version	IES-VE2021 RadiancelES (Radiance Engine)
Software developer	Integrated Environmental Solutions Limited
Software validation standard (evidence of developer's compliance to be provided)	Australian Building Codes Board's Protocol of Building Energy Analysis Software (v2006-1) (ABCB, 2006)
Simulator's name (include description of training and experience with software)	Brendon Pitt (Senior ESD Consultant) Meinhardt Group (March 2020 – Current) Arrow Consulting Engineers Pty Ltd (October 2014 – March 2020) Six years modelling experience with IES-VE and Radiance, with ongoing training.

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3. Assessment Overview

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3.1 Modelling Parameters

Parameter	Value
Glazing Visible Light Transmission (VLT)	70%
Skylight Properties	N/A
Reflectance Floors	0.3
Reflectance Walls	0.7
Reflectance Ceilings	0.8
Reflectance Ground Plane	0.3
Analysis Grid	0.5m grid at 800mm from FFL
Sky Model	Climate Based Weather File from ASHRAE International Weather for Energy Calculation (IWEC) Melbourne
Modelling Frontend Software	IES VE
Simulation Engine	Radiance, FlucsDL
Adjacent Structures / Topography	Shading and Adjacent structures
Nominated Hours	<u>Melbourne</u> Nominated hours 08:00 to 17:00

Table 2 - Model Inputs

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3.2 Building Geometry

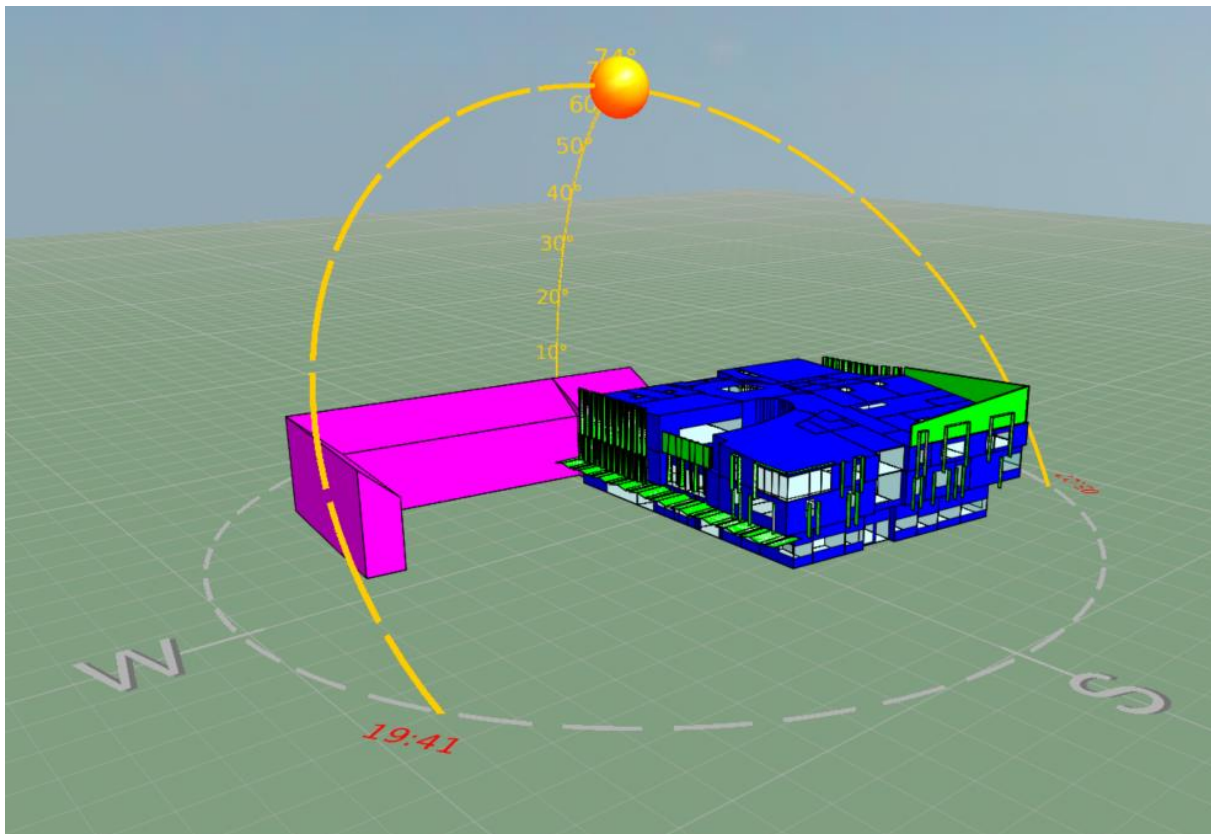
The building physical geometry is modelled in accordance with the following architectural drawings.

Table 3 - Drawing Register

Drawing No.	Revision	Revision	Date
TP-205	PROPOSED FLOOR PLAN -GROUND	TP	21-03-2022
TP-206	PROPOSED FLOOR PLAN -LEVEL 1	TP	21-03-2022
TP-207	PROPOSED FLOOR PLAN -LEVEL 2	TP	21-03-2022
TP-208	PROPOSED FLOOR PLAN -LEVEL 3	TP	21-03-2022
TP-209	PROPOSED FLOOR PLAN -LEVEL 4	TP	21-03-2022
TP-209.5	PROPOSED FLOOR PLAN -LEVEL 5	TP	21-03-2022
TP-210	PROPOSED FLOOR PLAN -LEVEL 6	TP	21-03-2022
TP-211	PROPOSED FLOOR PLAN - TERRACE	TP	21-03-2022
TP-301	WEST ELEVATION	TP	21-03-2022
TP-302	SOUTH ELEVATION	TP	21-03-2022
TP-303	EAST ELEVATION	TP	21-03-2022
TP-304	NORTH ELEVATION	TP	21-03-2022

TP-401	SECTION 01	TP	21-03-2022
TP-402	SECTION 02	TP	21-03-2022
TP-403	SECTION 03	TP	21-03-2022

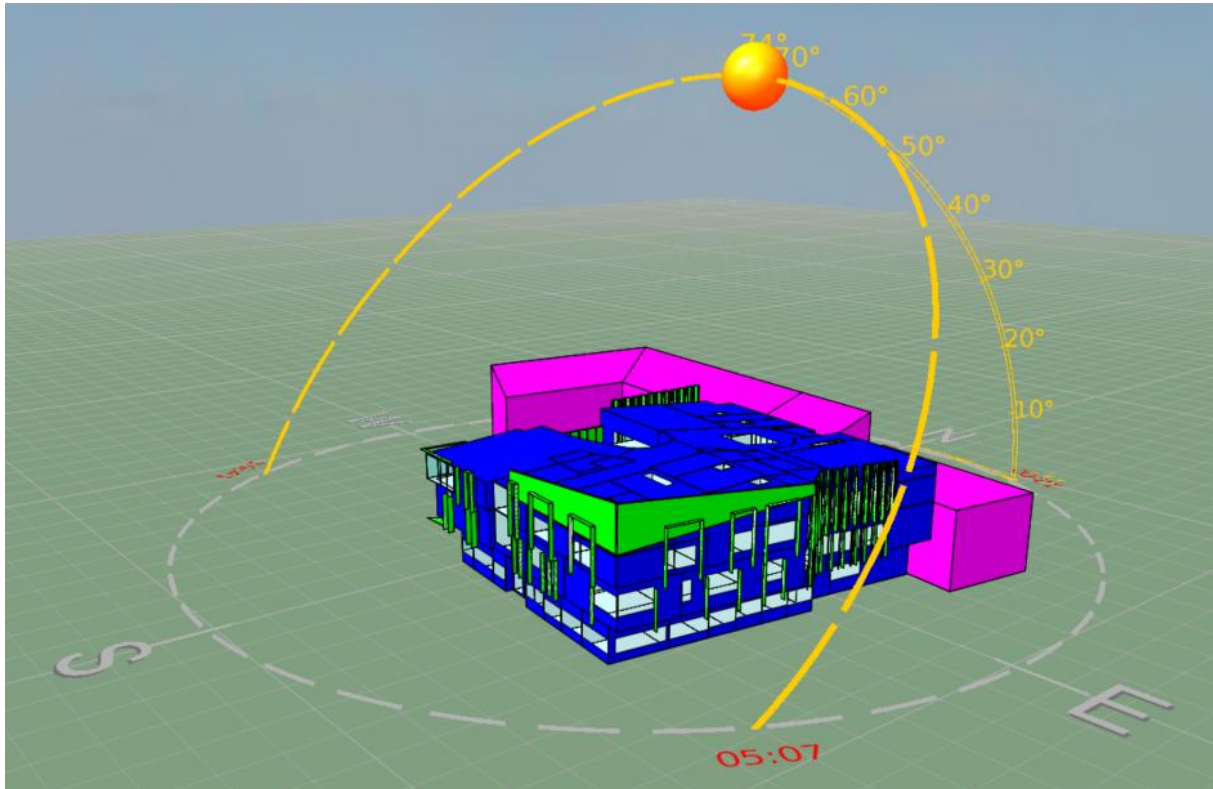
Figure 1. South-West Perspective View of the Model, Proposed Development Adjacent



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Figure 2. South-East Perspective View of the Model, Proposed Development Adjacent



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4. Modelling Results

Spatial Daylight Autonomy outcomes are tabulated in Table 5

Table 4 -

Assessed Primary Area	Assssed Area (m ²)	% Area meeting sDA requirement	Compliant Area (m ²)	Total %
Overall TOTAL	1881.8		1200.7	64%
LO - DP L&T	18.1	93%	16.8	
LO - DIR. ORG	16.0	89%	14.2	
LO - DP FAITH	17.1	93%	15.9	
LO - DP PA	10.9	0%	0.0	
LO - DP PA	10.9	0%	0.0	
LO - PRINCIPAL PA	18.8	100%	18.8	
LO - PRINCIPAL	31.2	97%	30.1	
LO - BM	18.3	100%	18.3	
LO - D. BM & ASSIST BM	18.1	95%	17.2	
LO - ACCOUNTS REC.	14.5	98%	14.3	
LO - ACCOUNTS PAY	14.3	83%	11.9	
LO - RISK MAN	14.8	95%	14.1	
LO - HR MAN	15.2	92%	13.9	
LO - COLLEGE REG	14.9	100%	14.9	
LO - COMMS & DEV	17.8	61%	10.8	
LO - DP STUDENTS	15.6	10%	1.6	
LO - DP PA	12.7	88%	11.1	
LO - RECEPTION	22.0	0	0	
LO - RECEPTION	18.0	0	0	
Total L0	319.2		224.0	70%
L1 - ART 1 (SENIOR)	108.9	100%	108.9	
L1 - DRAMA	113.9	27%	30.9	
L1 - TEXTILES	109.6	38%	41.1	
L1 - ART 2 (JUNIOR)	115.9	69%	79.6	
L1 - ART & DESIGN HUB	65.9	0%	0.0	
L1 - PROJECT LAB	66.4	80%	53.5	
L1 - STAFF WORKROOM	251.8	54%	135.4	
L1 - ART & DESIGN HUB	63.0	0	0	
Total L1	895.3		449.3	50%
L2 - PROJECT LAB	109.6	100%	109.6	
L2 - SCIENCE 1	150.5	65%	97.9	
L2 - SCIENCE 3	126.7	90%	114.5	
L2 - SCIENCE 4	140.3	47%	66.6	
L2 - SCIENCE 2	140.2	99%	138.8	
Total L2	667.4		527.4	79%

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5. Conclusion and Recommendations

A daylight simulation using RadianceIES engine for daylighting has been undertaken to assess daylighting levels for the Living and Bedroom areas under the criteria required by BESS v6.

The results show that **64%** of regularly occupied spaces meet the threshold limits for high levels of daylighting under the Greenstar spatial Daylight Autonomy assessment.

This method stipulates that high levels of daylight are considered to be maintained when fenestration and skylights provide 160lux for 80% of the occupied hours due to daylight.

This assessment indicates that the proposed daylighting levels are SUFFICIENT to pass the BESS v6 IEQ credit.

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Appendix A –sDA Threshold Images

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LEGEND

	New building extension over multiple levels		College Title Boundary
	Existing Buildings		Existing Trees
	Refurbish works		New Trees

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LEGEND

- ASSESSMENT CONDUCTED FOR REGULARLY OCCUPIED AREAS
- NOMINATED HOURS: 08:00 - 17:00

DAYLIGHT LEVELS

	MEETS GREENSTAR SPATIAL DAYLIGHT AUTONOMY (sDA) CRITERIA 160LUX FOR 80% OF NOMINATED HOURS
	DOES NOT NOT MEET sDA CRITERIA

	PROJECT	CLIENT	DESIGNED	DRAWN	APPROVED	SCALE @ A
	Our Lady of Sion - STEAM D		BP			N/A
	TITLE	PROJECT NO	SKETCH NO	REV		
	Daylighting Analysis	124085	SK-ESD-002	01		

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OLSC STEAMD & Administration Centre

**STEAMD & Administration
L2 Floor Plan**

MARCH 2022
1:100, 1:1
2107
TP10

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LEGEND

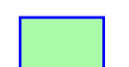

-  New building extension over multiple levels
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	PROJECT	CLIENT	DESIGNED	DRAWN	APPROVED	SCALE @ A
	Our Lady of Sion - STEAM D		BP			N/A
	TITLE	PROJECT No	SKETCH NO	REV		
	Daylighting Analysis	124085	SK-ESD-002	01		

