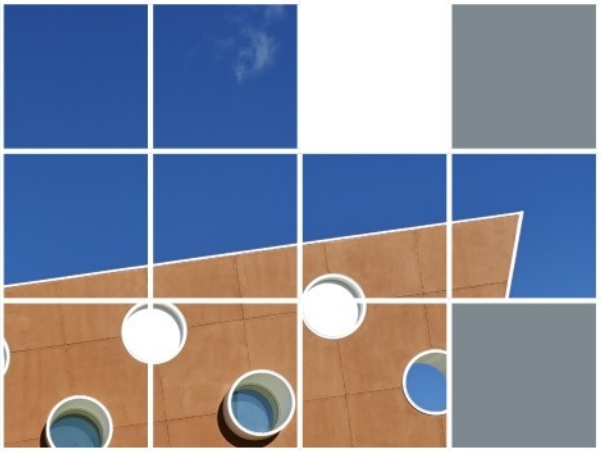
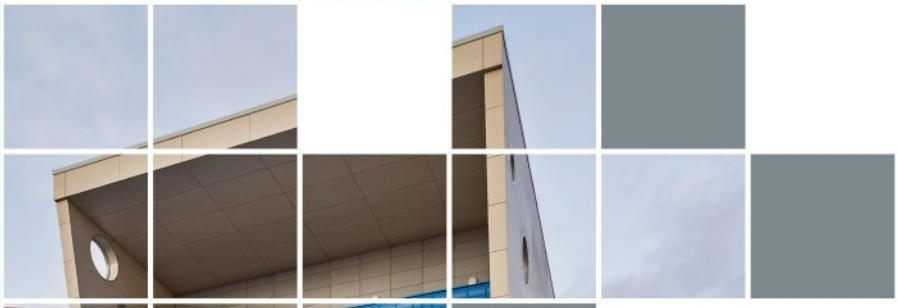
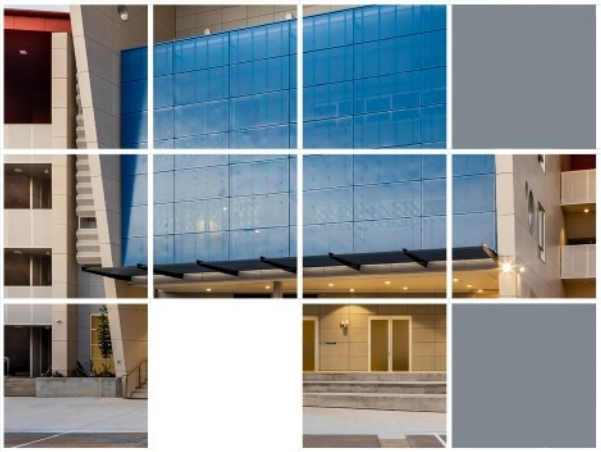


THE GABLES NEW PRIMARY SCHOOL

NCC 2022 Part J4 and J5
Compliance Report





Date: 08 November 2024

Project No.: LCE24495/1

Document No.: LCE24495-1-024

ISSUE REGISTER

PROJECT: THE GABLES NEW PRIMARY SCHOOL

DOCUMENT NO: LCE24495-1-024

Revision	Description	Date Issued	Author	Reviewed
P1	Preliminary Issue	20/09/2024	JS	SR/JM
P2	Preliminary Issue	27/09/2024	JS	SR/JM
P3	Preliminary Issue	08/11/2024	JS	SR/JM

CONTENTS

1. INTRODUCTION

The Section J compliance report has been prepared by Energy & Sustainability Consultants on behalf of the NSW Department of Education (the Applicant) to assess the potential environmental impacts that could arise from the development of The Gables New Primary School at Lot 301 DP 1287967 on Fontana Drive, Gables (the site).

This report has been prepared to evaluate the projects compliance with energy efficiency provisions in the National Construction Code of Australia as mentioned in section "1.1 Scope and Purpose".

This report accompanies a Review of Environment Factors that seeks approval for the construction and operation of a new primary school at the site, which involves the following works:

- Construction of school buildings, including learning hubs, a school hall and an administration and library building.
- Construction and operation of a public preschool.
- Delivery of a sports court and fields.
- Construction of car parking, waste storage and loading area.
- Associated site landscaping and open space improvements.
- Associated off-site infrastructure works to support the school, including (but not limited to) services, driveways and pedestrian crossings.

For a detailed project description, refer to the Review of Environmental Factors prepared by Ethos Urban.

1.1 OVERVIEW

This report has been completed to provide a summary of the building fabric requirements to meet the 'Deemed-to-Satisfy' (DTS) conditions of the National Construction Code (NCC) 2022, Volume One.

Please note as per the NCC 2022, the DTS provisions of Part J4 Building Fabric and Part J3 Building Sealing are only applicable to building elements forming the "envelope", with the definition of "envelope" being parts of a building's fabric that separate actively heated or cooled spaces from (a) the exterior of the building, or (b) other spaces that are not actively heated or cooled.

1.2 SITE DESCRIPTION

The site is located on Cataract Road, Gables, within The Hills Local Government Area (LGA), approximately 50km northwest of the Sydney CBD and 10km north of the Rouse Hill Town Centre. It comprises one lot, legally described as Lot 301 DP 1287967, that measures approximately 2.2ha in area. The site is bound by Pennant Way to the north, Cataract Road to the east, Fontana Drive to the west and a vacant lot to the south.

An aerial image of the site is shown at Figure 1.

Figure 1: Site Aerial (Source: Nearmap, edits by Ethos Urban)

1.3 STATEMENT OF SIGNIFICANCE

Based on the identification of potential issues, and an assessment of the nature and extent of the impacts of the proposed development, it is determined that:

- The extent and nature of potential impacts are low and will not have significant adverse effects on the locality, community and the environment.
- Potential impacts can be appropriately mitigated or managed to ensure that there is minimal effect on the locality, community.

2. REF REPORTING REQUIREMENTS

The following reporting requirements summary table directs to the section of the report that addresses each REF deliverable requirement.

Table 1: REF requirements summary

Item	REF Requirement	Relevant Section of Report
1.0	Section J Compliance Assessment	Section 3.1, 3.2, 3.3, 3.4, 4.0

2.1 PROJECT INFORMATION

Table 2 provides a summary of general project information relevant to our analysis.

Table 2: Summary of general project information.

Address	The Gables New Primary School, Cataract Road, Gables
Primary Building Class	Class 9b
NCC Climate Zone	6
Principal Building Type	School building – Multi-purpose Hall, canteen, classrooms
Construction Type	New Build
Applicable NCC Revision	NCC 2022 Volume One

Figure 2: The Gables Project Site Plan

2.2 REFERENCE DOCUMENTATION

Our review has been completed based on documentation packages listed in Table 3.

Table 3: Reference documentation.

Document / Drawings	Date Received	Custodian
Architectural Drawing Package, Frozen SD Set	09/09/2023	Architectus

2.3 BUILDING ENVELOPE

The building geometry of the Gables New Primary school is modelled for assessment.

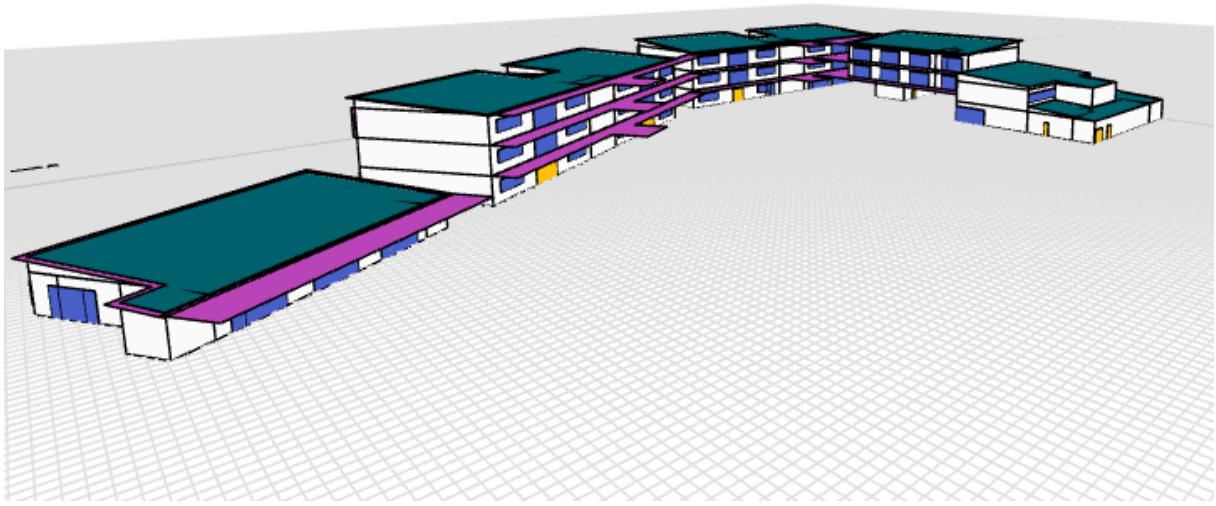


Figure 3: Building Model – Speckel.

2.4 LIMITATIONS

Reporting and analysis are subject to the following notes and limitations:

- Analysis relevant to Section J Parts J6, J7, J8 and J9 is excluded from this report. Compliance with these parts is to be coordinated by the relevant mechanical, hydraulic, and electrical engineers.
- Requirements of Parts J4 and J5 are only applicable to elements forming the thermal envelope of the building. The building's thermal is defined by parts of a building's fabric that separate actively heated or cooled spaces from the exterior of the building, or other spaces that are not actively heated or cooled.
- Nominal solutions for building fabric construction may be provided in this report where architectural details require confirmation. Nominal solutions indicated thermal performance requirements only. Requirements related to constructability, fire safety and condensation performance of nominal solutions would require review by specialist consultants.

3. PART J4 – BUILDING FABRIC

3.1 PART J4D4 ROOF AND CEILING CONTRUCTION

The following roof & ceiling construction has been analysed based on architectural proposals. A nominal solution has been provided for discussion.

Table 4: NCC 2022 Part J4D4 Roof and Ceiling Construction.

Roof & Ceiling Construction	NCC 2022 Minimum Total System R-Value	Total System R-Value
Roof & Ceiling Construction Pitched Metal Roof with Horizontal Ceiling. *Non-conditioned space.* ▪ Steel Sheeting. ▪ 120mm Roof insulation spacer. ▪ R3.6 145mm Glasswool insulation with heavy duty foil facing. ▪ 250mm Steel Purlins with Air Cavity. ▪ 500mm Air cavity (Slightly ventilated). ▪ 13mm plasterboard. *Conditioned space.*	**R-Value ≥ 3.2m²K/W** In a downwards direction of heat flow. **Solar Absorptance ≤ 0.45**	**R-Value ~ 3.30m²K/W** In a downwards direction of heat flow. **Solar Absorptance ≤ 0.45** Colorbond Surfmist finish (SA = 0.33).
Roof Construction Below Mechanical Plantroom Concrete slab. *Non-conditioned space (plantroom).* ▪ 150mm Solid Concrete. ▪ 110mm R3.2 mineral fibre slab Insulation. *Conditioned space.*	**R-Value ≥ 3.2m²K/W** In a downwards direction of heat flow. **Solar Absorptance ≤ 0.45**	**R-Value ~ 3.30m²K/W** In a downwards direction of heat flow. **Solar Absorptance ≤ 0.45** (No exposure)

3.2 PART J4D5 ROOF LIGHTS

Table 5 provides a summary of performance requirements for the roof light serving the breakout spaces on ground floor and first floor.

Table 5: NCC 2022 Part J4D5 Roof Light Performance.

Roof Light Performance Requirements	NCC2022 Maximum Compliance Total Glazing System Performance Values
N/A	**N/A**

3.3 PART J4D6 WALL AND GLAZING

Wall & Glazing performance requirements have been determined through building modelling in accordance with Specification 37. Glazing properties and wall thermal insulation requirements are calculated depending on the following factors:

- Wall thermal resistance and solar absorptance.
- Glazing thermal conductivity and solar heat gain coefficient (SHGC).
- Glazing to opaque wall area ratio.
- Wall construction distribution (for example, location and extent of different construction types).
- Shading of glazing elements.

Wall and glazing elements of the façade are assessed concurrently. Calculated performance requirements for walls are influenced by glazing performance and may be subject to change.

Table 6: NCC 2022 Part J4D6 Wall Construction.

Wall Construction	NCC 2022 Minimum Total System R-Value	Total System R-Value
Metal-clad Wall *Outside space.* ▪ Metal sheeting. ▪ 65mm slightly ventilated air cavity. ▪ Vapour membrane ▪ 105mm Steel stud with R2.5 Glasswool insulation. ▪ 13mm Plasterboard. *Conditioned space.*	**R-Value ≥ 1.4m²K/W** Window-wall ratio of <0.20.	**R-Value ~ 1.4m²K/W**
Prefinished CFC Wall *Outside space.* ▪ CFC cladding. ▪ 65mm slightly ventilated air cavity. ▪ Vapour membrane ▪ 105mm Steel stud with R2.5 Glasswool insulation. ▪ 13mm Plasterboard. *Conditioned space.*	**R-Value ≥ 1.4m²K/W** Window-wall ratio of <0.20.	**R-Value ~ 1.4m²K/W**
Internal Plasterboard Wall *Non-conditioned space.* ▪ Plasterboard ▪ 92mm metal studs with R2.5 Glasswool insulation. ▪ Thermal break strips (RM0.2) ▪ 13mm plasterboard. *Conditioned space.*	**R-Value ≥ 1.4m²K/W**	**R-Value ~ 1.4m²K/W**

Glazing

Table 7 provides a summary of overall glazing performance for the project. The minimum thermal glazing requirements which form the building envelope are determined holistically with the wall elements. The following proposed glazing systems achieves compliance, assuming an average wall performance as described above.

Table 7: NCC 2022 Part J4D6 Glazing Performance.

Glazing Performance Requirements	NCC2022 Maximum Compliance Total Glazing System Performance Values
General Glazing	**U-Value ≤ 5.0W/m²K** **SHGC ≤ 0.48**

3.4 PART J4D7 FLOORS

In accordance with the NCC 2022, a floor in Climate Zone 6 (without in-slab heating or cooling) is required to achieve an R-value of 2.0 for downwards heat flow.

Table 8: NCC 2022 Part J4D7 Floor Construction.

Exposed Floor Construction	NCC 2022 Minimum Total System R-Value	Total System R-Value
Exposed Floor *Conditioned space.* ▪ 10mm Carpet/vinyl covering. ▪ 150mm Solid Concrete. ▪ 70mm R2.0 mineral fibre slab Insulation. *Non-conditioned space.*	**R-Value ≥ 2.0m²K/W**	**R-Value ~ 2.16m²K/W**
Slab on Ground *Conditioned space.* ▪ 10mm Carpet/vinyl covering. ▪ 150mm Solid Concrete. *Slab on ground.*	**R-Value ≥ 2.0m²K/W**	**R-Value ~ 2.4m²K/W**

4. PART J5 – BUILDING SEALING

The below provisions are required to ensure Deemed-to-Satisfy compliance with Part J5:

- A door, openable window or the like must be sealed when forming part of the envelope, apart from windows complying with AS 2047, a fire or smoke door or a roller shutter door, roller shutter grille or another security door or device only for out-of-hours security.
- A seal to restrict air infiltration for the bottom edge of a door, must be a draft protection device and for the other edges of a door or the edges of an operable window or other such opening, may be a foam or rubber compression strip, fibrous seal or the like.
- An entrance to a building, if leading to a conditioned space, must have an airlock, self-closing door, rapid roller door, revolving door or the like.
- An exhaust fan must be fitted with a sealing device such as a self-closing damper or the like when serving a conditioned space or habitable room.
- Ceilings, walls, floors and any opening such as a window frame, door frame or the like must be constructed to minimise air leakage. The construction must be enclosed by internal lining systems that are close fitting at ceiling, wall and floor junctions or sealed at junctions and penetrations with a close-fitting architrave, skirting or cornice, expanding foam, rubber compressive strip, caulking or the like.
- In addition, Verification Method J1V4 can be utilised the achieve compliance with Part J5. Verification Method J1V4 pertains to air permeability testing in accordance with AS/NZS ISO 9972 which is performed post construction to ensure the building achieves a suitable air permeability rate.

5. MITIGATION MEASURES

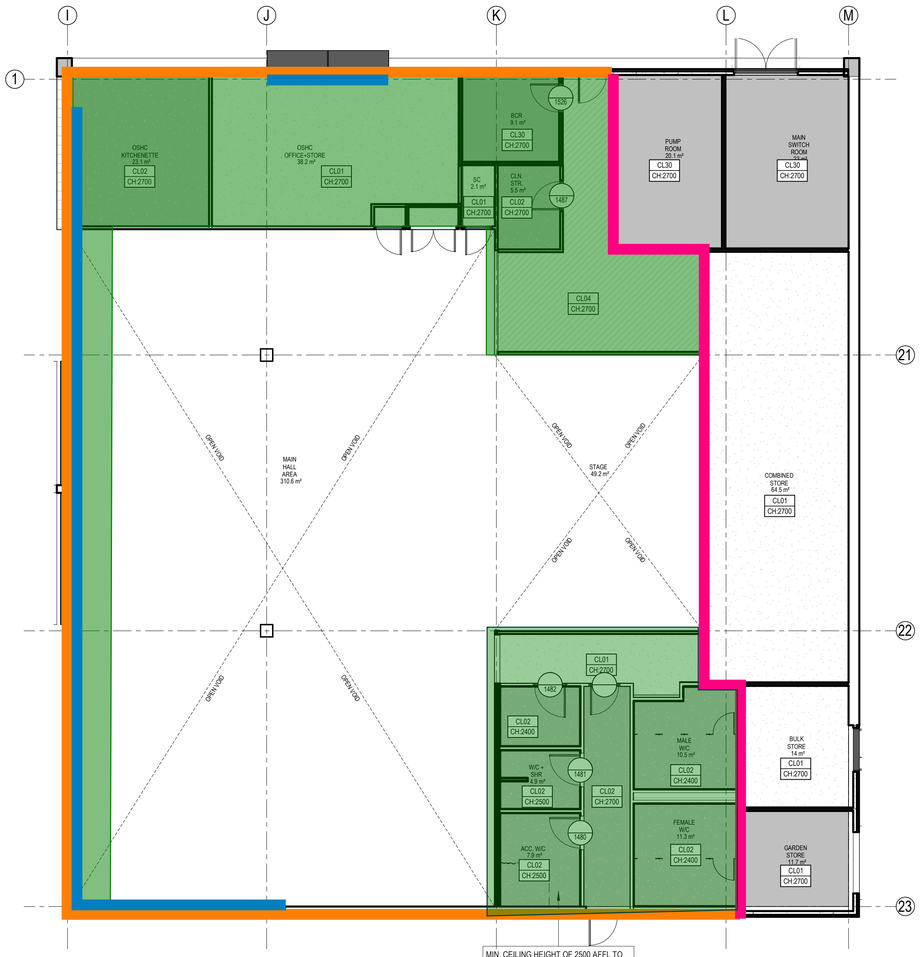
Table 9 summarises the mitigation measures described in this report.

Table 9: Mitigation measure summary.

Project Stage *Design (D) Construction(C) Operation (O)*	**Mitigation Measures**	**Relevant Section of Report**
D	Ensure walls, roofs, and floors have adequate thermal insulation to minimize heat loss or gain and achieve the minimum thermal compliance.	Section 3 (3.1, 3.3, 3.4)
D	Ensure adequate size glazed windows to reduce heat transfer and improve natural lighting while minimizing glare.	Section 3.3
D	Minimise building infiltration and associated energy loss through adequate building sealing	Section 4.0

APPENDIX A – THERMAL MARKUP

Key Value	Description
CL01	PLASTERBOARD CEILING
CL02	MOISTURE RESISTANT PLASTERBOARD CEILING
CL04	PERFORATED PLASTERBOARD CEILING
CL30	CONCRETE SLAB CEILING - 200mm



MIN. CEILING HEIGHT OF 2500 AFFL TO ACCESSIBLE BATHROOMS WITH SHOWERS TO ALIGN WITH EFSG CLAUSE DG 65.07.

1 GROUND - SCHOOL HALL

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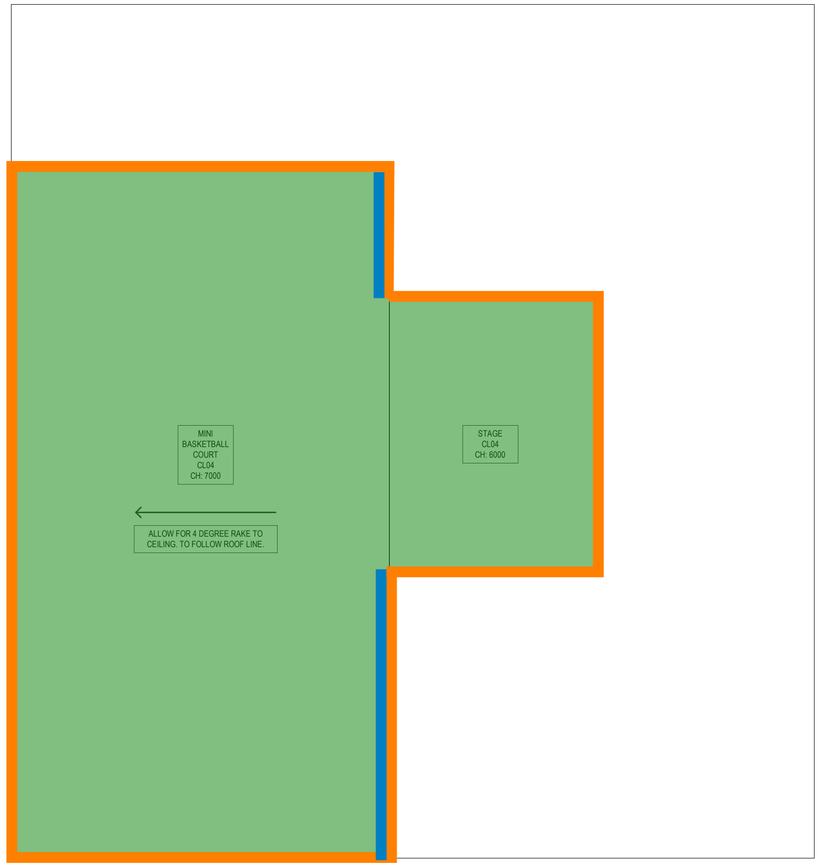

LEVEL 1 - SCHOOL HALL - INDICATIVE ONLY

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PRELIMINARY THERMAL ENVELOPE MARK-UP LCE24495 - Gables New Primary School

27/09/2024

Insulation and glazing solutions equal or better than Section J DTS minimum requirements stipulated are deemed to comply with DTS provisions.

Minimum DTS R-values are in accordance with AS/NZS 4859.2 - **including thermal bridging**

Nominal solutions indicated within this document satisfy Section J requirements only. Architect/Contractor to ensure compliance with other performance requirements as applicable within the NCC.

LEGEND

- Roof
- Exposed Floor (Unconditioned below)
- External Wall
- Internal Wall
- External Glazing

Nominated Architect
Ray Brown, NSWARB 6359

0 1 2 3 5 m

Do not scale drawings. Verify all dimensions on site

revision	purpose of issue	checked	date
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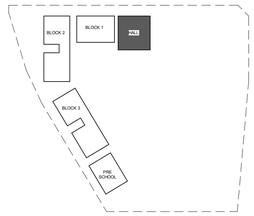

REFLECTED CEILING PLAN LEGEND:

- PLASTERBOARD CEILING
- MOISTURE RESISTANT PLASTERBOARD CEILING
- FIRE RATED PLASTERBOARD CEILING
- PERFORATED PLASTERBOARD CEILING
- CEILING TILE GRID CEILING - 600 x 1200mm
- CONCRETE SLAB CEILING - 200mm

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ABN 90 131 245 684

approved	scale
RF/AC	1 : 100 @A1
prepared	project no
SA/VL	210463.01

project

SINSW Gables New Primary School

Lot 301 - Fontana Drive, The Gables (Box Hill North)

drawing

REFLECTED CEILING PLAN - SCHOOL HALL - GROUND LEVEL

drawing no.	revision
AR-SD2301	**P.01**

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Key Value	Description
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CL02	MOISTURE RESISTANT PLASTERBOARD CEILING
CL04	PERFORATED PLASTERBOARD CEILING
CL10	CEILING TILE GRID CEILING - 600 x 1200mm
CL30	CONCRETE SLAB CEILING - 200mm

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PRELIMINARY THERMAL ENVELOPE MARK-UP
LCE24495 - Gables New Primary School

27/09/2024

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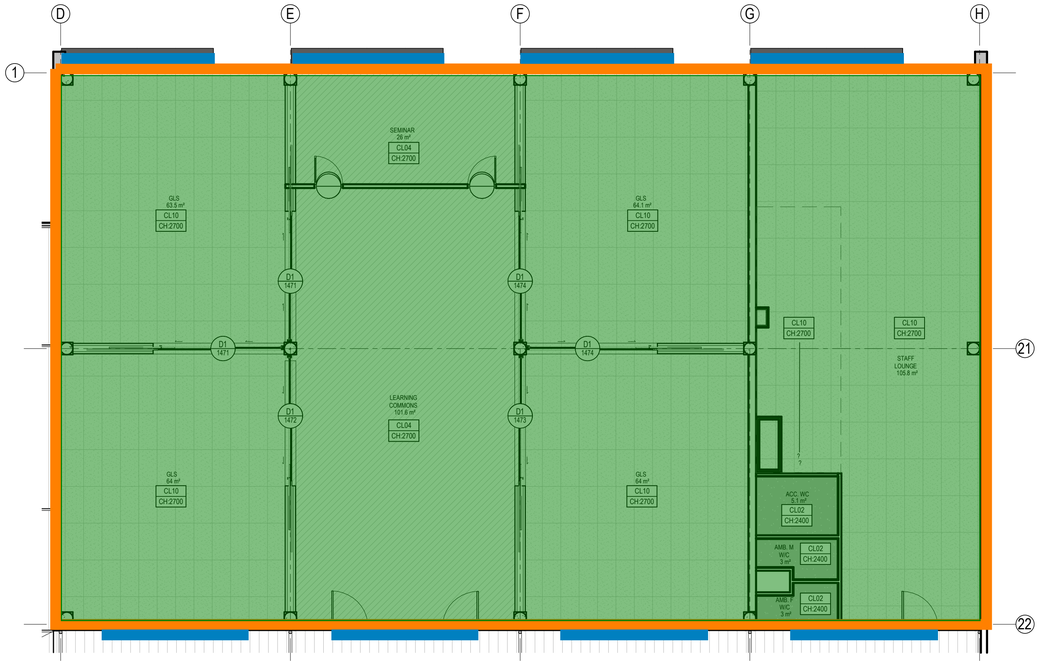
- Internal Wall
- External Glazing



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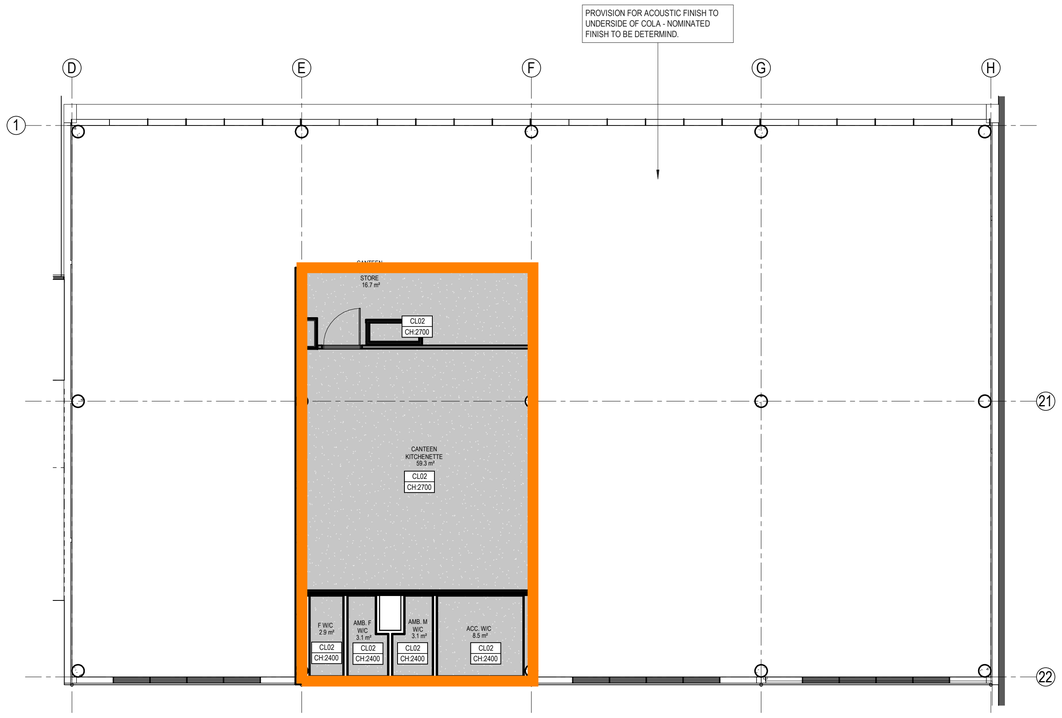

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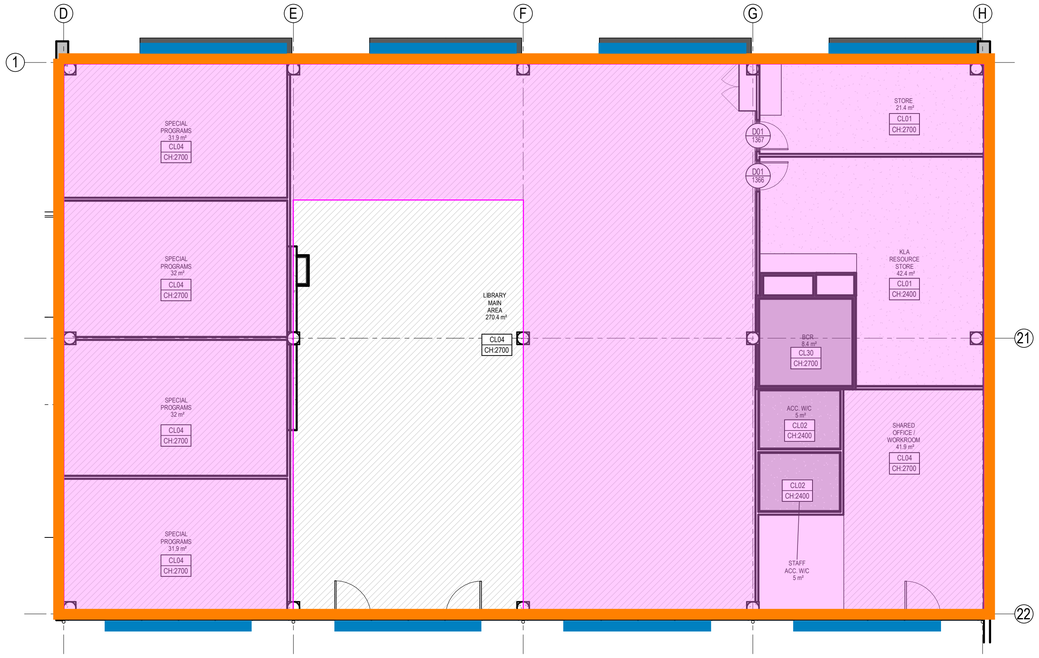

2 2300 BLOCK 1 - LEVEL 1

SCALE: 1 : 100

REFLECTED CEILING PLAN LEGEND:

- PLASTERBOARD CEILING
- MOISTURE RESISTANT PLASTERBOARD CEILING
- FIRE RATED PLASTERBOARD CEILING
- PERFORATED PLASTERBOARD CEILING
- CEILING TILE GRID CEILING - 600 x 1200mm
- CONCRETE SLAB CEILING - 200mm

Nominated Architect
Ray Brown, NSWARB 6359

0 1 2 3 5 m

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revision	purpose of issue	checked	date
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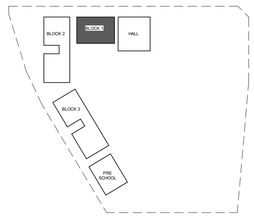

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SA/VL	210463.01

project

SINSW Gables New Primary School

Lot 301 - Fontana Drive, The Gables (Box Hill North)

drawing

REFLECTED CEILING PLAN - TEACHING BLOCK 1 - SHEET 1

drawing no.	revision
AR-SD2302	**P.01**

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1 2300 BLOCK 2 - GROUND LEVEL

SCALE: 1 : 100

2 2300 BLOCK 2 - LEVEL 1

SCALE: 1 : 100

Key Value	Description
CL01	PLASTERBOARD CEILING
CL02	MOISTURE RESISTANT PLASTERBOARD CEILING
CL04	PERFORATED PLASTERBOARD CEILING
CL10	CEILING TILE GRID CEILING - 600 x 1200mm
CL30	CONCRETE SLAB CEILING - 200mm

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PRELIMINARY THERMAL ENVELOPE MARK-UP LCE24495 - Gables New Primary School

27/09/2024

Insulation and glazing solutions equal or better than Section J DTS minimum requirements stipulated are deemed to comply with DTS provisions.

Minimum DTS R-values are in accordance with AS/NZS 4859.2 - **including thermal bridging**

Nominal solutions indicated within this document satisfy Section J requirements only. Architect/Contractor to ensure compliance with other performance requirements as applicable within the NCC.

LEGEND

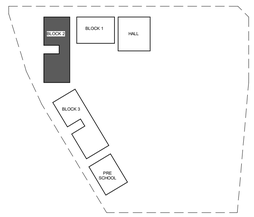
- Roof
- Exposed Floor (Unconditioned below)
- External Wall
- Internal Wall
- External Glazing

Nominated Architect
Ray Brown, NSWARB 6359

0 1 2 3 5 m

Do not scale drawings. Verify all dimensions on site

revision	purpose of issue	checked	date
P.01	FOR INFORMATION		23/08/24



REFLECTED CEILING PLAN LEGEND:

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- MOISTURE RESISTANT PLASTERBOARD CEILING
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SA/VL	210463.01

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SINSW Gables New Primary School

Lot 301 - Fontana Drive, The Gables (Box Hill North)

drawing

REFLECTED CEILING PLAN - TEACHING BLOCK 2 - SHEET 1

drawing no.	revision
AR-SD2303	**P.01**

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Key Value	Description
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CL04	PERFORATED PLASTERBOARD CEILING
CL10	CEILING TILE GRID CEILING - 600 x 1200mm

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PRELIMINARY THERMAL ENVELOPE MARK-UP
LCE24495 - Gables New Primary School

27/09/2024

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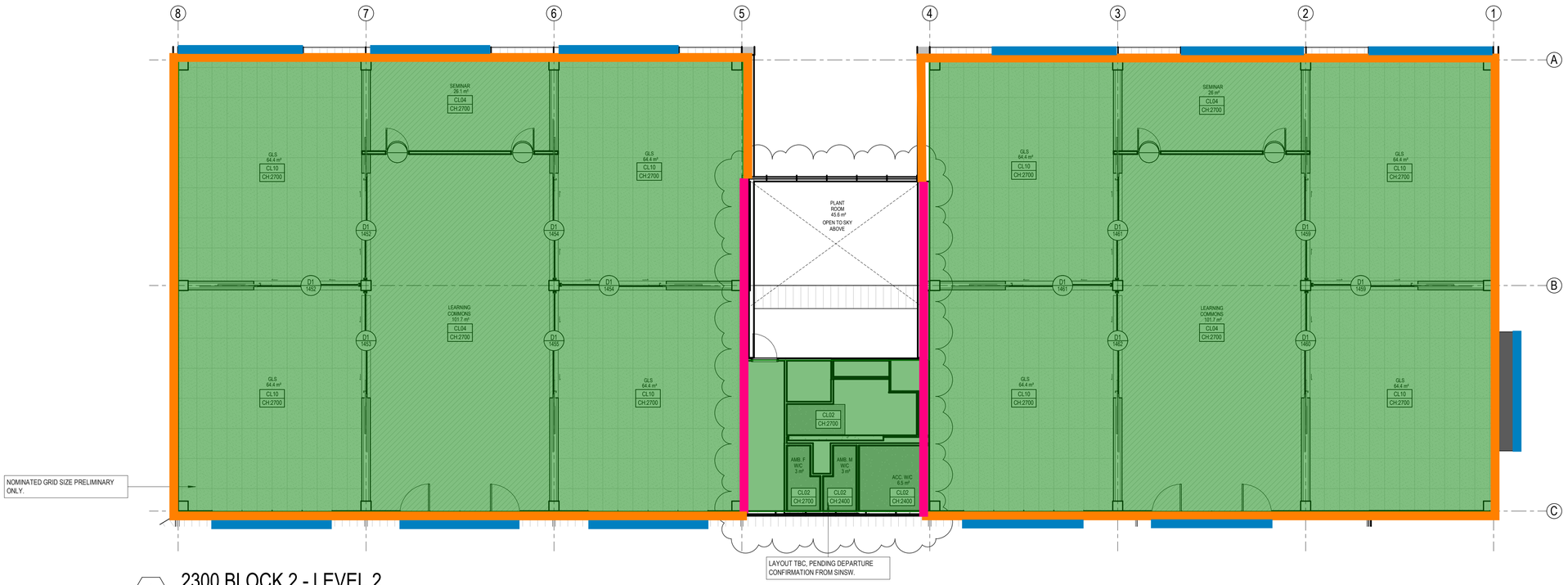
- External Glazing



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SCALE: 1 : 100

Nominated Architect
Ray Brown, NSWARB 6359

0 1 2 3 5 m

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revision	purpose of issue	checked	date
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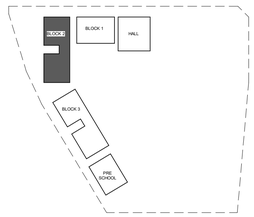

REFLECTED CEILING PLAN LEGEND:

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- FIRE RATED PLASTERBOARD CEILING
- PERFORATED PLASTERBOARD CEILING
- CEILING TILE GRID CEILING - 600 x 1200mm
- CONCRETE SLAB CEILING - 200mm

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Sydney

approved RF/AC
scale 1 : 100 @A1
prepared SA/VL
project no 210463.01

project
SINSW Gables New Primary School

Lot 301 - Fontana Drive, The Gables (Box Hill North)

drawing
REFLECTED CEILING PLAN - TEACHING BLOCK 2 - SHEET 2

drawing no. **AR-SD2304**
revision **P.01**

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SCALE: 1 : 100

2 2300 TEACHING BLOCK 3 - LEVEL 1

SCALE: 1 : 100

Key Value	Description
CL01	PLASTERBOARD CEILING
CL02	MOISTURE RESISTANT PLASTERBOARD CEILING
CL04	PERFORATED PLASTERBOARD CEILING
CL10	CEILING TILE GRID CEILING - 600 x 1200mm
CL30	CONCRETE SLAB CEILING - 200mm

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PRELIMINARY THERMAL ENVELOPE MARK-UP LCE24495 - Gables New Primary School

27/09/2024

Insulation and glazing solutions equal or better than Section J DTS minimum requirements stipulated are deemed to comply with DTS provisions.

Minimum DTS R-values are in accordance with AS/NZS 4859.2 - **including thermal bridging**

Nominal solutions indicated within this document satisfy Section J requirements only. Architect/Contractor to ensure compliance with other performance requirements as applicable within the NCC.

LEGEND

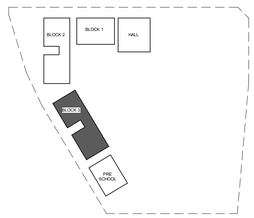
- Roof
- Exposed Floor (Unconditioned below)
- External Wall
- Internal Wall
- External Glazing

Nominated Architect
Ray Brown, NSWARB 6359

0 1 2 3 5m

Do not scale drawings. Verify all dimensions on site

revision	purpose of issue	checked	date
P.01	FOR INFORMATION		23/08/24



REFLECTED CEILING PLAN LEGEND:

- PLASTERBOARD CEILING
- MOISTURE RESISTANT PLASTERBOARD CEILING
- FIRE RATED PLASTERBOARD CEILING
- PERFORATED PLASTERBOARD CEILING
- CEILING TILE GRID CEILING - 600 x 1200mm
- CONCRETE SLAB CEILING - 200mm

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Perth
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approved	scale
RF/AC	1 : 100 @A1
prepared	project no
SA/VL	210463.01

project

SINSW Gables New Primary School

Lot 301 - Fontana Drive, The Gables (Box Hill North)

drawing

REFLECTED CEILING PLAN - TEACHING BLOCK 3 - SHEET 1

drawing no.	revision
AR-SD2305	**P.01**

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Key Value	Description
CL02	MOISTURE RESISTANT PLASTERBOARD CEILING
CL04	PERFORATED PLASTERBOARD CEILING
CL10	CEILING TILE GRID CEILING - 600 x 1200mm
CL30	CONCRETE SLAB CEILING - 200mm

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PRELIMINARY THERMAL ENVELOPE MARK-UP
LCE24495 - Gables New Primary School

27/09/2024

Insulation and glazing solutions equal or better than Section J DTS minimum requirements stipulated are deemed to comply with DTS provisions.

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LEGEND

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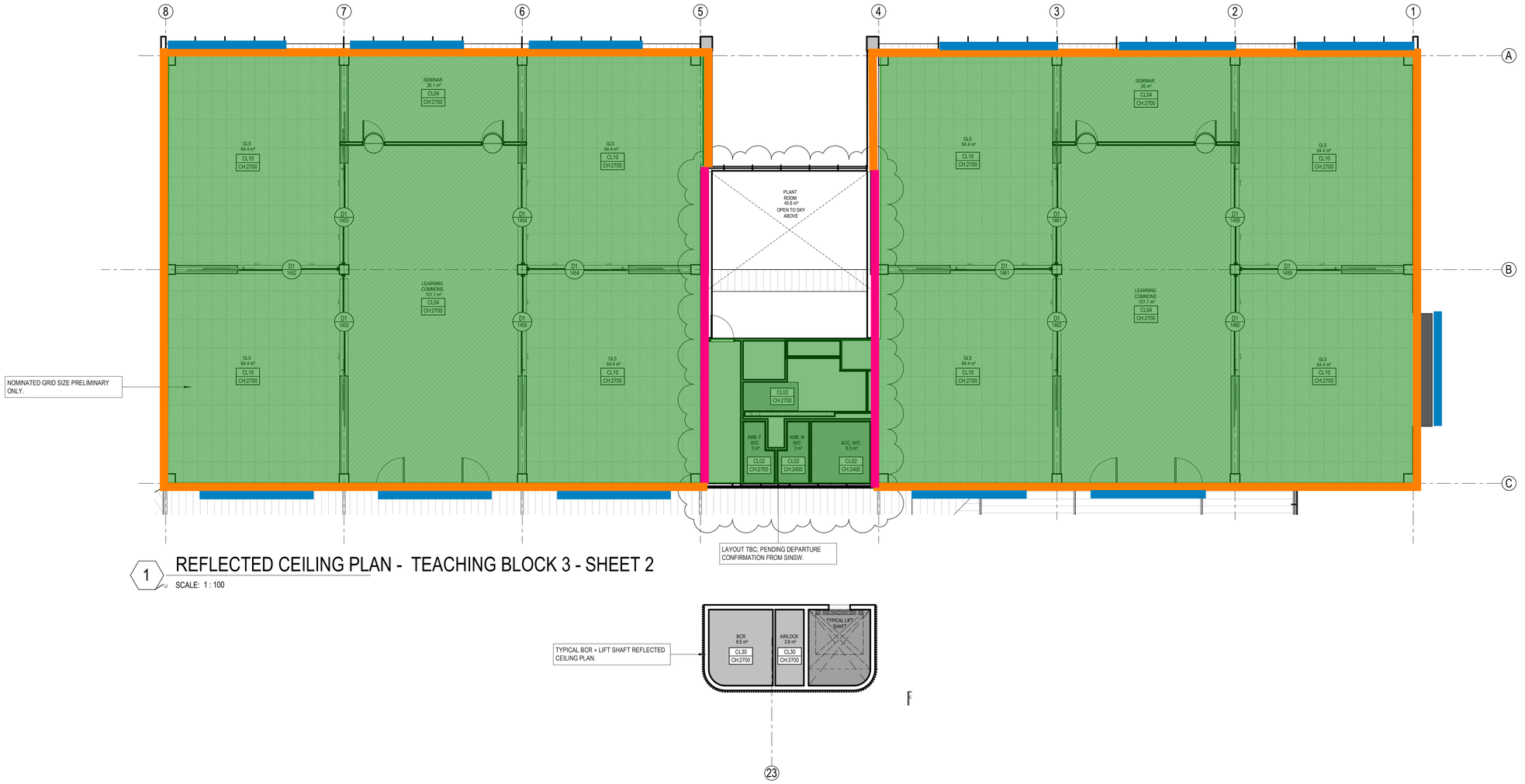

1 REFLECTED CEILING PLAN - TEACHING BLOCK 3 - SHEET 2

SCALE: 1 : 100

Nominated Architect
Ray Brown, NSWARB 6359

0 1 2 3 5m

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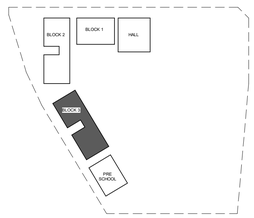
revision	purpose of issue	checked	date
P.01	FOR INFORMATION		23/08/24



REFLECTED CEILING PLAN LEGEND:

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- FIRE RATED PLASTERBOARD CEILING
- PERFORATED PLASTERBOARD CEILING
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approved	scale
RF/AC	1 : 100 @A1
prepared	project no
SA/VL	210463.01

project

SINSW Gables New Primary School

Lot 301 - Fontana Drive, The Gables (Box Hill North)

drawing

REFLECTED CEILING PLAN - TEACHING BLOCK 3 - SHEET 2

drawing no.	revision
AR-SD2306	**P.01**

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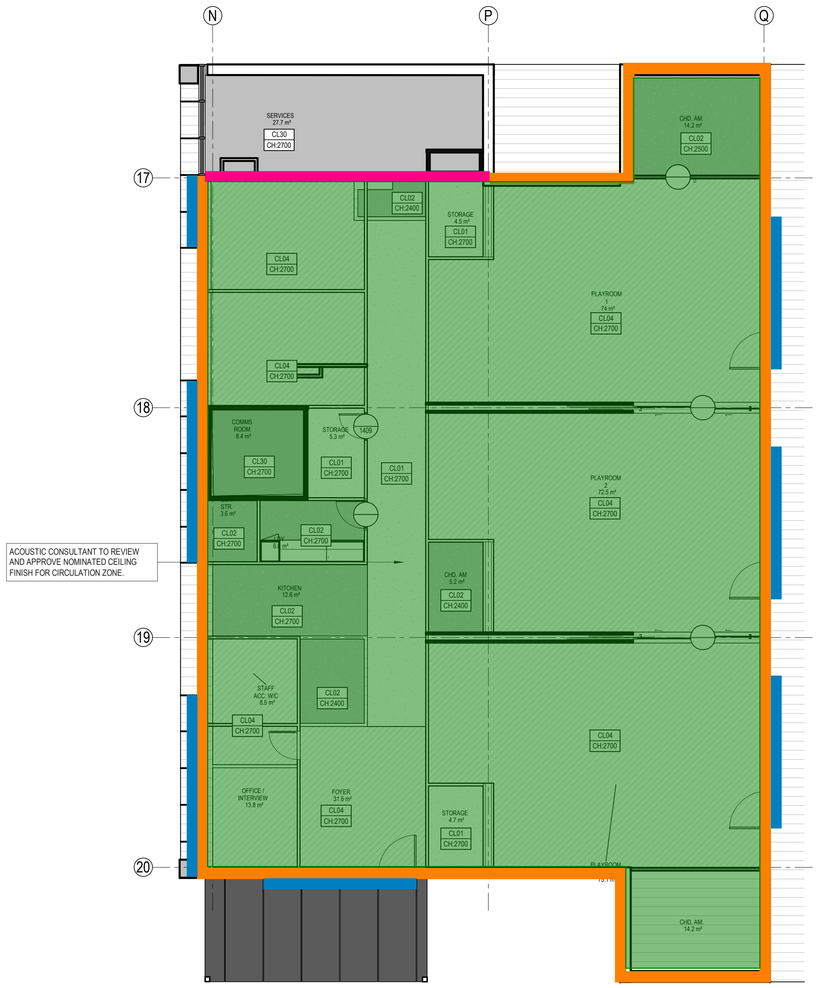

ACOUSTIC CONSULTANT TO REVIEW AND APPROVE NOMINATED CEILING FINISH FOR CIRCULATION ZONE.

1 REFLECTED CEILING PLAN - PRESCHOOL - GROUND LEVEL

SCALE: 1 : 100

Key Value	Description
CL01	PLASTERBOARD CEILING
CL02	MOISTURE RESISTANT PLASTERBOARD CEILING
CL04	PERFORATED PLASTERBOARD CEILING
CL30	CONCRETE SLAB CEILING - 200mm

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PRELIMINARY THERMAL ENVELOPE MARK-UP
LCE24495 - Gables New Primary School

27/09/2024

Insulation and glazing solutions equal or better than Section J DTS minimum requirements stipulated are deemed to comply with DTS provisions.

Minimum DTS R-values are in accordance with AS/NZS 4859.2 - **including thermal bridging**

Nominal solutions indicated within this document satisfy Section J requirements only. Architect/Contractor to ensure compliance with other performance requirements as applicable within the NCC.

LEGEND

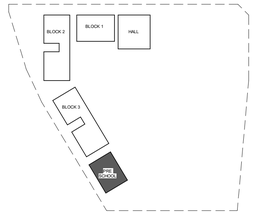
- Roof
- Exposed Floor (Unconditioned below)
- External Wall
- Internal Wall
- External Glazing

Nominated Architect
Ray Brown, NSWARB 6359

0 1 2 3 5m

Do not scale drawings. Verify all dimensions on site

revision	purpose of issue	checked	date
P.01	FOR INFORMATION		23/08/24



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ABN 90 131 245 684

approved: RF/AC
scale: 1 : 100 @A1
prepared: SA/VL
project no: 210463.01

project
SINSW Gables New Primary School
Lot 301 - Fontana Drive, The Gables (Box Hill North)

drawing
REFLECTED CEILING PLAN - PRESCHOOL - GROUND LEVEL

drawing no. **AR-SD2307**
revision **P.01**

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APPENDIX B – COMPLIANCE MODELLING REPORT

J4D6 Deemed to Satisfy

National Construction Code 2022 - Volume 1

Project	The Gables New Primary School
Address	27 Red Gables Rd, Gables NSW 2765, Australia (33.63° S, 150.91° E)
Date	2024-09-27, 04:20 PM
Author	rosemary.hallam@lucidconsulting.com.au
Scope	National Construction Code 2022
Performance Requirements	J1P1 Energy Use
Assessment Process	Comparison with the Deemed-to-Satisfy Provisions
Building Class	9B
Climate Zone	6
Storeys	3
Floor to Floor Height	3600 mm

Using Speckel

Speckel provides various calculations in line with the National Construction Code 2022 - Volume 1 - Section J Energy Efficiency. These calculations are tested in line with all applicable NCC equations or NCC referenced primary or secondary documents, for them to represent an accurate Performance Solution against the Performance Requirements - J1P1 Energy Use. A Performance Solution must be shown to comply with the relevant Performance Requirements through one or a combination of Assessment Methods. Speckel is a valid Assessment Method by comparison with the Deemed-to-Satisfy Provisions of each relevant area.

Results

Class 9B Generic Building - Method 1

Wall R-Value (m²K°/W)

Aspects	Performance (m²K°/W)	Requirement (m²K°/W)		Pass
North	1.40	1.40	min	✓
East	1.40	1.00	min	✓
South	1.40	1.40	min	✓
West	1.40	1.00	min	✓

Solar Admittance

Aspects	Performance	Requirement		Pass
North	0.06	0.13	max	✓
East	0.12	0.13	max	✓
South	0.05	0.13	max	✓
West	0.13	0.13	max	✓

Wall-glazing U-Value (W/m²K°)

Aspects	Performance (W/m²K°)	Requirement (W/m²K°)		Pass
North	1.15	2.00	max	✓
East	1.86	2.00	max	✓
South	1.11	2.00	max	✓
West	1.87	2.00	max	✓

Class 9B Generic Building - Method 2

	Performance	Requirement		Pass
R-Value (m²K°/W)	1.40	1.40	min	✓

	Performance	Requirement		Pass
U-Value (W/m²K°)	1.53	2.00	max	✓
AC Value	599.77	632.98	max	✓

Method

Approach

- This assessment represents whole-façade performance (Method 2) and single aspect of whole-façade performance (Method 1) according to NCC2022 (Vol 1) J4D6 Walls and glazing and as per Specification 37 Calculation of U-Value and solar admittance
- Each elevation (in degrees) is mapped to one of the four aspects (N, E, S, W) as defined in Specification 37 Calculation of U-Value and solar admittance
- Total U-value (ISO 15099), and Wall R-value (AS/NZS 4859.2:2018) is calculated as defined in Specification 37 Calculation of U-Value and solar admittance and Specification 38 Spandrel panel thermal performance. Solar Admittance (when applicable), Solar Admittance Weight, Wall/Glazing ratio, and threshold Solar Admittance are calculated for the four aspects (N, E, S, W).
- When the Simulated Shading Multipliers feature is enabled, each window is simulated in EnergyPlus twice, to compare a completely unshaded window, to a window affected by attached shading, building self-shading, and surrounding structures. The multiplier is based on the ratio of shaded versus unshaded annual average external incident solar radiation, limited between 0.0 and 1.0.

Assumptions / Limitations

- No overshadowing is assumed from buildings or landscapes
- Generic materials (Specification 36 Material properties) are only adopted where actual tested materials have not been selected by the user. It is up to the user to determine the relevance of these materials for their project.
- Interpolation is necessary to determine shading multipliers when ratios do not exactly match Specification 37 Calculation of U-Value and solar admittance - Table 7a Shading multipliers — Northern, eastern and western aspect
- To ensure the J4D6 deemed-to-satisfy (DTS) method can be calculated, windows are limited to a maximum of 99% window-to-wall ratio (WWR).

Inputs

The NCC 2022 - Vol 1 contains technical design and construction requirements for all commercial buildings and their associated structures. The following Building Classes have been adopted in this assessment.

Wall Area (m²)	4787.30
Window Area (m²)	1087.68
Opaque Door (m²)	1.67
Glazed Door (m²)	34.34
Window-Wall Ratio (%)	18.51

Levels

Level	Drawing	# Zones	Floor Area (m²)	Wall (m²)	Window (m²)
1	Ground Floor Site	45	3069.7	1719.7	399.3
2	1F	16	3522.4	1517.5	357.2
3	2F	12	2725.2	1283.0	331.2

Zones

Level	Zone	Area (m²)	Volume (m³)	Treated Area (m²)
1	1. G-B3-GLS Area S	399.67	1358.89	399.67
1	2. G-B3-GLS Area N	397.63	1351.95	397.63
1	3. G-SH-Main Hall_Stage	354.58	1205.56	354.58
1	4. G-B1-GLS Areas	336.28	1143.37	336.28
1	5. G-PS-Playroom Areas	223.80	760.90	223.80
1	6. G-B2-Student Services	110.87	376.96	110.87
1	7. G-SH-Stores	90.09	306.31	0.00

Level	Zone	Area (m²)	Volume (m³)	Treated Area (m²)
1	8. G-PS-Hallway	76.87	261.34	76.87
1	9. G-B3-WCs	63.88	217.19	0.00
1	10. G-B2-WCs Student	63.53	215.99	0.00
1	11. G-B1-Canteen	56.81	193.15	56.81
1	12. G-SH-WCs	55.58	188.97	0.00
1	13. G-B2-DPs	48.08	163.46	48.08
1	14. G-B2-Meeting	47.04	159.94	47.04
1	15. G-B2-Hallway	41.34	140.54	41.34
1	16. G-SH-M&E_Room	41.24	140.21	0.00
1	17. G-SH-Office_Store	38.59	131.20	38.59
1	18. G-PS-?	33.00	112.20	33.00
1	19. G-B1- WCs S	31.73	107.89	0.00
1	20. G-B2-Comms	32.41	110.19	32.41
1	21. G-B2-Plant	30.92	105.13	0.00
1	22. G-B2-Security Store	30.26	102.90	30.26
1	23. G-B3-Plant	30.22	102.76	0.00
1	24. G-PS-Services	29.90	101.67	0.00
1	25. G-SH-Lobby N	29.63	100.75	29.63
1	26. G-B1_SLSO Office	27.94	94.98	27.94
1	27. G-SH-Lobby S	20.72	70.45	20.72
1	28. G-SH-OSHC Kitchen	20.84	70.87	20.84
1	29. G-B1-WCs	19.36	65.82	19.36
1	30. G-B2-Entry	19.53	66.42	19.53
1	31. G-SH-BCR_CLNS	16.81	57.15	16.81

Level	Zone	Area (m²)	Volume (m³)	Treated Area (m²)
1	32. G-B2-WCs Staff	16.54	56.22	0.00
1	33. G-B2-Interview W	16.56	56.30	16.56
1	34. G-B1-Canteen Office_Store	16.23	55.18	16.23
1	35. G-PS-Office	13.01	44.25	13.01
1	36. G-B2-ACC_WCs	12.98	44.12	12.98
1	37. G-PS-CHD_AM N	12.54	42.65	12.54
1	38. G-PS-CHD_AM S	12.52	42.58	12.52
1	39. G-PS-Kitchen	11.53	39.22	11.53
1	40. G-PS-CLNS	10.01	34.05	10.01
1	41. G-B2-Kitchenette	8.90	30.24	8.90
1	42. G-PS-Comms	8.72	29.64	8.72
1	43. G-PS-Staff WC	8.02	27.27	0.00
1	44. G-PS-WC 2	5.81	19.74	5.81
1	45. G-PS-WC 1	2.95	10.04	2.95
2	1. 1F-B2-GLS Areas S	400.73	1380.83	400.73
2	2. 1F-B3-GLS Areas S	399.81	1379.34	399.81
2	3. 1F-B2-Library Area	399.30	1362.42	399.30
2	4. 1F-B2-GLS Areas N	397.16	1369.34	397.16
2	5. 1F-B3-GLS Areas N	396.48	1367.87	396.48
2	6. 1F-SH-Hall_Stage Double Height	0.00	1313.09	0.00
2	7. 1F-B3- Plant Areas	74.60	257.38	0.00
2	8. 1F-B2-Plant Area	73.05	252.04	0.00
2	9. 1F-B1-Stores Area	67.07	228.04	67.07

Level	Zone	Area (m²)	Volume (m³)	Treated Area (m²)
2	10. 1F-B1-Office	41.32	140.48	41.32
2	11. 1F-B2-WCs	21.25	73.32	0.00
2	12. 1F-B3-WCs	19.83	68.41	0.00
2	13. 1F-B1-WCs	10.77	36.62	10.77
2	14. 1F-B1-BCR	8.92	30.33	8.92
3	1. 2F-B2-GLS Area S	400.73	1382.53	400.73
3	2. 2F-B3-GLS Areas S	399.65	1378.79	399.65
3	3. 2F-B1-GLS Areas	399.21	1377.27	399.21
3	4. 2F-B2-GLS Area N	397.16	1370.21	397.16
3	5. 2F-B3-GLS Area N	397.00	1369.65	397.00
3	6. 2F-B1-Staff Lounge	116.36	401.43	116.36
3	7. 2F-B3-Plant Area	74.60	257.38	0.00
3	8. 2F-B2-Plant Area	73.05	252.04	0.00
3	9. 2F-B2-WCs	21.25	73.32	0.00
3	10. 2F-B3-WCs	19.83	68.41	0.00
3	11. 2F-B1-WCs	13.06	43.76	0.00
		7597.69		6745.50

Walls

Total System R-values of all walls include the effects of thermal bridging, which are calculated in accordance with AS/NZS 4859.2 and NZ 4214:2006 (as per J4D3 Thermal Construction — General (5)) or are stated values.

Proposed	Title	Aspect	Class	R-Value (m²K°/W)	Area (m²)
Exposed to	Concept	East	9B	1.40	147.24

Proposed Unconditioned	Title	Aspect	Class	R-Value (m²K°/W)	Area (m²)
Exposed to Unconditioned	Concept	North	9B	1.40	381.81
Exposed to Unconditioned	Concept	South	9B	1.40	332.51
Exposed to Unconditioned	Concept	West	9B	1.40	73.38
External	CD-20 Metal Cladding	East	9B	1.40	64.80
External	CD-20 Metal Cladding	North	9B	1.40	192.70
External	CD-20 Metal Cladding	South	9B	1.40	256.21
External	CD-20 Metal Cladding	West	9B	1.40	64.80
External	Concept	East	9B	1.40	873.66
External	Concept	North	9B	1.40	669.72
External	Concept	South	9B	1.40	632.49
External	Concept	West	9B	1.40	1097.97

Windows

Total system U-values of all windows include the effects of thermal bridging at the frame, which are calculated in accordance with ISO 15099, as per J4D3 Thermal Construction — General (5).

Proposed	Title	Aspect	Class	U-value	SHGC	Shading Multiplier	Area (m²)
External	Concept	East	9B	5.00	0.48	0.52	16.23

Proposed	Title	Aspect	Class	U-value	SHGC	Shading Multiplier	Area (m²)
External	Concept	East	9B	5.00	0.48	0.53	35.80
External	Concept	East	9B	5.00	0.48	0.55	13.51
External	Concept	East	9B	5.00	0.48	0.58	13.48
External	Concept	East	9B	5.00	0.48	0.58	12.76
External	Concept	East	9B	5.00	0.48	0.65	29.91
External	Concept	East	9B	5.00	0.48	0.67	29.06
External	Concept	East	9B	5.00	0.48	0.79	64.14
External	Concept	East	9B	5.00	0.48	0.94	22.05
External	Concept	East	9B	5.00	0.48	0.94	6.97
External	Concept	East	9B	5.00	0.48	0.94	7.08
External	Concept	East	9B	5.00	0.48	0.94	7.33
External	Concept	East	9B	5.00	0.48	0.96	13.23
External	Concept	East	9B	5.00	0.48	0.96	13.29
External	Concept	East	9B	5.00	0.48	0.96	13.22
External	Concept	East	9B	5.00	0.48	0.98	18.78
External	Concept	East	9B	5.00	0.48	0.98	7.40
External	Concept	East	9B	5.00	0.48	0.98	7.55
External	Concept	East	9B	5.00	0.48	0.98	6.75
External	Concept	East	9B	5.00	0.48	0.99	3.15
External	Concept	North	9B	5.00	0.48	0.78	9.43
External	Concept	North	9B	5.00	0.48	0.84	49.48
External	Concept	North	9B	5.00	0.48	0.84	49.09
External	Concept	North	9B	5.00	0.48	0.94	10.30
External	Concept	North	9B	5.00	0.48	0.95	10.05

Proposed	Title	Aspect	Class	U-value	SHGC	Shading Multiplier	Area (m²)
External	Concept	North	9B	5.00	0.48	1.00	7.32
External	Concept	South	9B	5.00	0.48	0.73	47.76
External	Concept	South	9B	5.00	0.48	0.97	49.42
External	Concept	South	9B	5.00	0.48	1.00	3.22
External	Concept	West	9B	5.00	0.48	0.94	143.84
External	Concept	West	9B	5.00	0.48	0.94	122.44
External	Concept	West	9B	5.00	0.48	0.95	119.20
External	GT01 Window	East	9B	5.00	0.48	1.00	17.80
External	GT01 Window	North	9B	5.00	0.48	0.57	4.00
External	WT-01 Glazing	East	9B	5.00	0.48	0.79	6.96
External	WT-01 Glazing	South	9B	5.00	0.48	1.00	9.82
External	WT-01 Glazing	South	9B	5.00	0.48	1.00	15.36
External	WT-01 Glazing	West	9B	5.00	0.48	1.00	70.49

Opaque Doors

Proposed	Title	Aspect	Class	R-Value (m²K°/W)	Area (m²)
External	Concept	East	9B	1.00	1.67

Glazed Doors

Proposed	Title	Aspect	Class	U-value	SHGC	Shading Multiplier	Area (m²)
External	Concept	North	9B	5.00	0.48	1.00	2.36

Proposed	Title	Aspect	Class	U-value	SHGC	Shading Multiplier	Area (m²)
External	GLS New Doors	East	9B	5.00	0.60	0.99	6.80
External	GLS New Doors	East	9B	5.00	0.60	0.99	25.18

Detailed Results

Building Class 9B

Method Two

AC Energy Threshold	632.98
U-Value Threshold (W/m².K)	5.00
Total U-Value (W/m².K)	1.53
Wall R-Value (m².K/W)	1.40
Total Area (m²)	5909.32
Window-Wall Ratio	0.19

Method One - North Aspect

Total U-Value (W/m².K)	1.15
Wall R-Value (m².K/W)	1.40
Solar Admittance Threshold	0.13
Solar Admittance Weighting	0.00
Aspect Area (m²)	1386.25
Window-Wall Ratio	0.10

Title	Heading (°)	U-value (W/m²K°)	SHGC	Area (m²)	P (m)	G (m)	H (m)	SC
Concept	0.0	5.00	0.48	7.32	0.00	0.10	2.10	1.00
Concept	0.0	5.00	0.48	49.48	0.50	0.15	2.15	0.84
Concept	0.0	5.00	0.48	49.09	0.50	0.16	2.15	0.84
Concept	0.0	5.00	0.48	9.43	0.60	0.10	2.15	0.78
Concept	328.8	5.00	0.48	10.30	0.15	0.05	2.10	0.94
Concept	328.8	5.00	0.48	10.05	0.15	0.10	2.10	0.95

Title	Heading (°)	U-value (W/m²K°)	SHGC	Area (m²)	P (m)	G (m)	H (m)	SC
GT01 Window	0.0	5.00	0.48	4.00	0.50	0.00	1.00	0.57
Concept	0.0	5.00	0.48	2.36	0.00	0.00	0.00	1.00

Method One - East Aspect

Total U-Value (W/m².K)	1.86
Wall R-Value (m².K/W)	1.40
Solar Admittance Threshold	0.13
Solar Admittance Weighting	1.62
Aspect Area (m²)	1484.15
Window-Wall Ratio	0.27

Title	Heading (°)	U-value (W/m²K°)	SHGC	Area (m²)	P (m)	G (m)	H (m)	SC
Concept	58.4	5.00	0.48	3.07	5.21	0.90	3.60	0.52
Concept	58.4	5.00	0.48	10.05	5.23	0.94	3.63	0.53
Concept	58.6	5.00	0.48	7.20	3.33	4.57	6.07	0.94
Concept	58.6	5.00	0.48	2.91	5.27	0.94	3.63	0.53
Concept	58.6	5.00	0.48	9.94	5.28	0.94	3.63	0.53
Concept	58.8	5.00	0.48	7.54	3.16	0.96	2.46	0.67
Concept	58.9	5.00	0.48	7.55	3.24	8.16	9.66	0.98
Concept	59.0	5.00	0.48	7.13	3.21	0.96	2.46	0.67
Concept	59.0	5.00	0.48	6.75	3.21	8.16	9.66	0.98
Concept	59.0	5.00	0.48	13.48	3.26	0.96	3.67	0.58
Concept	59.0	5.00	0.48	13.29	3.26	4.57	7.26	0.96
Concept	59.0	5.00	0.48	7.13	3.31	0.96	2.46	0.67

Title	Heading (°)	U-value (W/m²K°)	SHGC	Area (m²)	P (m)	G (m)	H (m)	SC
Concept	59.0	5.00	0.48	6.75	3.32	8.16	9.66	0.98
Concept	59.0	5.00	0.48	7.40	3.27	8.16	9.66	0.98
Concept	59.1	5.00	0.48	7.08	3.22	4.57	6.07	0.94
Concept	59.1	5.00	0.48	12.76	3.24	0.96	3.67	0.58
Concept	59.1	5.00	0.48	13.22	3.24	4.57	7.26	0.96
Concept	59.1	5.00	0.48	7.26	3.26	0.96	2.46	0.67
Concept	59.1	5.00	0.48	6.97	3.26	4.57	6.07	0.94
Concept	59.2	5.00	0.48	7.33	3.17	4.57	6.07	0.94
Concept	59.3	5.00	0.48	9.76	5.26	0.94	3.63	0.53
Concept	59.3	5.00	0.48	3.14	5.28	0.94	3.63	0.53
Concept	90.0	5.00	0.48	14.96	3.30	0.90	2.40	0.65
Concept	90.0	5.00	0.48	13.51	3.30	0.90	3.60	0.55
Concept	90.0	5.00	0.48	14.85	3.30	4.50	6.00	0.94
Concept	90.0	5.00	0.48	13.23	3.30	4.50	7.20	0.96
Concept	90.0	5.00	0.48	12.04	3.30	8.10	9.60	0.98
Concept	90.0	5.00	0.48	3.15	3.30	8.10	10.80	0.99
Concept	90.0	5.00	0.48	14.95	8.90	0.90	2.40	0.65
Concept	90.0	5.00	0.48	13.17	8.90	0.90	3.60	0.52
Concept	90.0	5.00	0.48	14.85	8.90	4.50	6.00	0.79
Concept	90.0	5.00	0.48	13.23	8.90	4.50	7.20	0.79
Concept	90.0	5.00	0.48	2.67	38.90	8.10	10.80	0.79
Concept	90.0	5.00	0.48	14.20	38.90	9.40	12.10	0.79
Concept	90.0	5.00	0.48	2.96	39.52	9.40	12.10	0.79
Concept	90.0	5.00	0.48	13.57	39.53	9.40	12.10	0.79

Title	Heading (°)	U-value (W/m²K°)	SHGC	Area (m²)	P (m)	G (m)	H (m)	SC
Concept	90.0	5.00	0.48	2.66	39.58	9.40	12.10	0.79
GT01 Window	90.0	5.00	0.48	17.80	0.00	0.00	0.00	1.00
WT-01 Glazing	90.0	5.00	0.48	6.96	39.59	9.40	12.10	0.79
GLS New Doors	59.0	5.00	0.60	12.54	3.26	8.16	10.87	0.99
GLS New Doors	59.1	5.00	0.60	12.63	3.24	8.16	10.87	0.99
GLS New Doors	90.0	5.00	0.60	6.80	3.30	8.10	10.80	0.99

Method One - South Aspect

Total U-Value (W/m².K)	1.11
Wall R-Value (m².K/W)	1.40
Solar Admittance Threshold	0.13
Solar Admittance Weighting	0.00
Aspect Area (m²)	1346.79
Window-Wall Ratio	0.09

Title	Heading (°)	U-value (W/m²K°)	SHGC	Area (m²)	P (m)	G (m)	H (m)	SC
Concept	148.6	5.00	0.48	3.22	0.56	2.21	4.91	1.00
Concept	180.0	5.00	0.48	47.76	3.30	0.90	3.60	0.73
Concept	180.0	5.00	0.48	49.42	3.30	4.50	7.20	0.97
WT-01 Glazing	148.6	5.00	0.48	6.93	0.55	2.21	4.91	1.00
WT-01	150.0	5.00	0.48	2.89	0.55	2.21	4.91	1.00

Title Glazing	Heading (°)	U-value (W/m²K°)	SHGC	Area (m²)	P (m)	G (m)	H (m)	SC
WT-01 Glazing	180.0	5.00	0.48	15.36	0.00	0.00	0.00	1.00

Method One - West Aspect

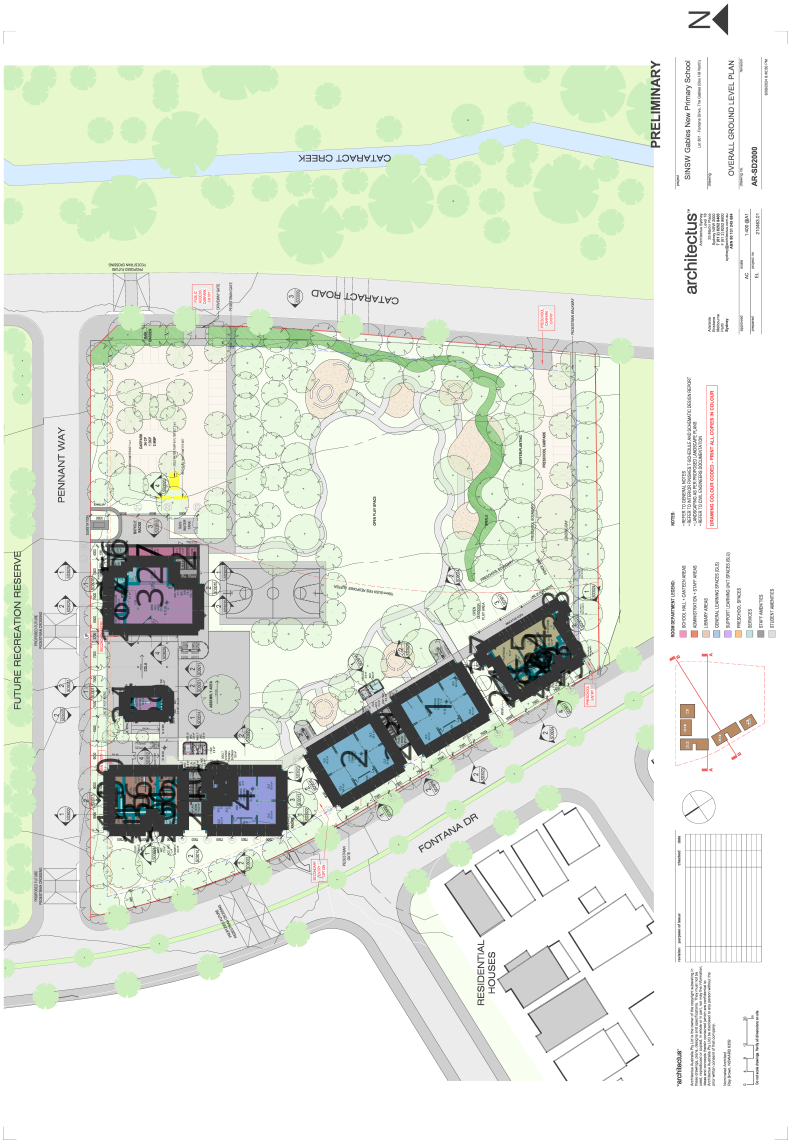
Total U-Value (W/m².K)	1.87
Wall R-Value (m².K/W)	1.40
Solar Admittance Threshold	0.13
Solar Admittance Weighting	1.67
Aspect Area (m²)	1692.14
Window-Wall Ratio	0.27

Title	Heading (°)	U-value (W/m²K°)	SHGC	Area (m²)	P (m)	G (m)	H (m)	SC
Concept	238.1	5.00	0.48	10.12	0.15	0.09	2.12	0.94
Concept	238.4	5.00	0.48	9.39	0.15	0.05	2.10	0.94
Concept	238.6	5.00	0.48	4.32	0.15	0.05	2.10	0.94
Concept	238.6	5.00	0.48	6.13	0.15	0.05	2.10	0.94
Concept	238.8	5.00	0.48	10.30	0.15	0.05	2.10	0.94
Concept	238.8	5.00	0.48	10.05	0.15	0.10	2.10	0.95
Concept	239.0	5.00	0.48	9.88	0.15	0.09	2.12	0.94
Concept	239.0	5.00	0.48	20.05	0.15	0.10	2.10	0.95
Concept	239.0	5.00	0.48	5.98	0.15	0.05	2.10	0.94
Concept	239.1	5.00	0.48	30.96	0.15	0.09	2.12	0.94
Concept	239.1	5.00	0.48	29.50	0.15	0.10	2.10	0.95
Concept	239.2	5.00	0.48	40.08	0.15	0.05	2.10	0.94

Title	Heading (°)	U-value (W/m²K°)	SHGC	Area (m²)	P (m)	G (m)	H (m)	SC
Concept	239.4	5.00	0.48	10.25	0.15	0.09	2.12	0.94
Concept	239.8	5.00	0.48	10.20	0.15	0.05	2.10	0.94
Concept	270.0	5.00	0.48	57.45	0.15	0.05	2.10	0.94
Concept	270.0	5.00	0.48	61.23	0.15	0.09	2.12	0.94
Concept	270.0	5.00	0.48	59.60	0.15	0.10	2.10	0.95
WT-01 Glazing	270.0	5.00	0.48	70.49	0.00	0.00	0.00	1.00

Drawings

Level 1 - Ground Floor Site



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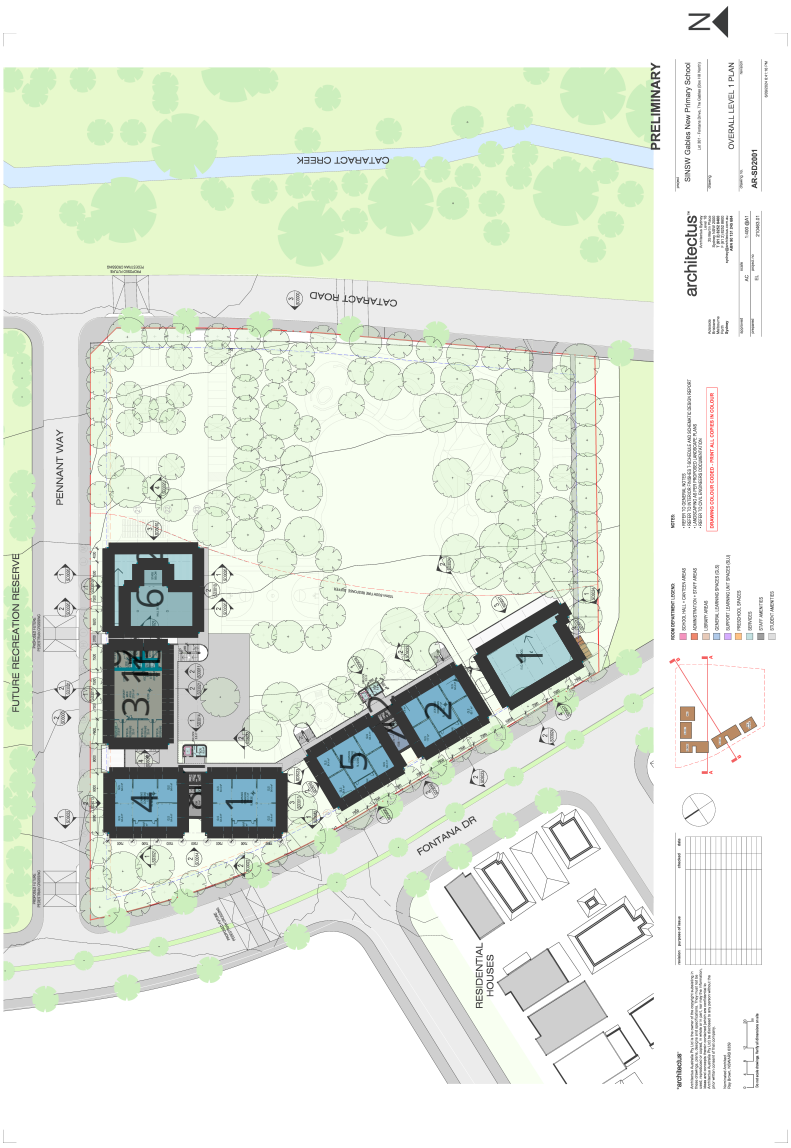
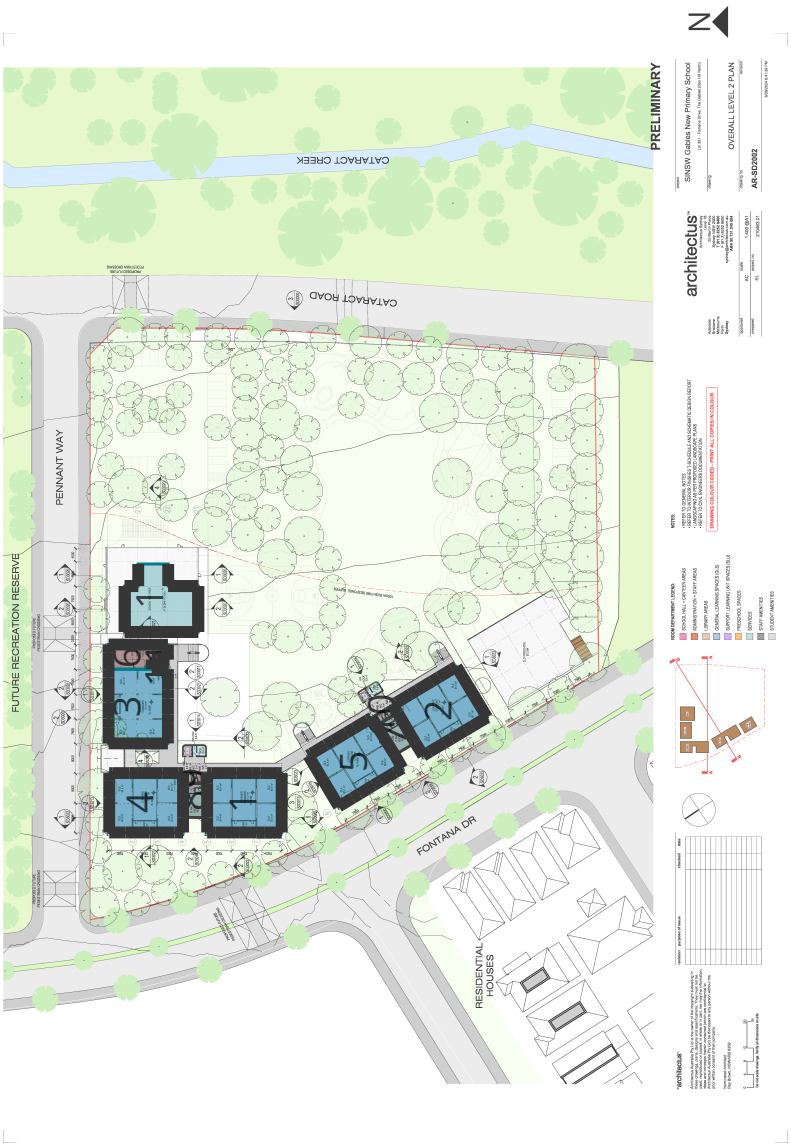
Level 2 - 1F



Thermal Line Windows Class 9B Unconditioned

Level 3 - 2F



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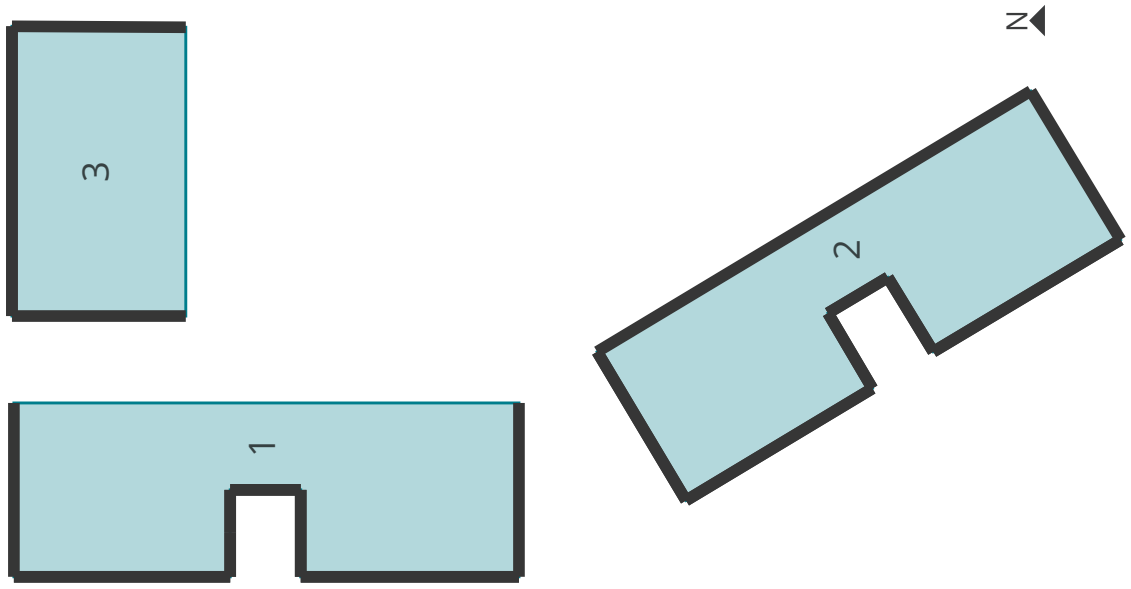
Level 4 - Untitled Roof



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