

Bankstown North Public School

NCC2019 Section J Report

For Part J1 Compliance

Prepared for: JDH Architects Pty Limited

Attention: Vlad Hripac

Date: 08 May 2020

Prepared by: Ray Leung

Ref: 45342

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Revision

| Revision | Date | Comment | Prepared By | Approved By |
|----------|------------|-------------------|-------------|-------------|
| 1 | 21/01/2020 | Preliminary Issue | RL | ALK |
| 2 | 31/01/2020 | Preliminary Issue | RL | ALK |
| 3 | 08/05/2020 | Preliminary Issue | RL | ALK |

Qualifications to this Report

The following qualifications apply to this report:

- Information has been based on our understanding of the proposed building and documentation provided, as noted.
- This report outlines the scope of works required for NCC 2019 Section J Part J1 compliance only.
- The project design team (including the Architect) will be required to review and consider the implications of these recommendations on their design for the project.
- For example:
 - Glazing selections have considered the thermal rating to the glazing and frame configurations only. The design team should also coordinate these recommendations with any specific acoustic, wind, structural, safety (during design and installation) or Architectural Design requirements for a particular project.
 - Different insulation products will have varying spatial allowances. The design team should coordinate the proposed insulation types, with specified R-values required throughout this report.

Disclaimer

This energy model provides an estimate of the base building's energy performance. This estimate is based on a necessarily simplified and idealised version of the building that does not and cannot fully represent all of the intricacies of the building and its operation. As a result, the energy model results only represent an interpretation of the potential performance of the building. No guarantee or warrantee of building performance in practice can be based on energy modelling results alone.

The results generated from this analysis are based on specific criteria outlined in the NCC 2019 Volume One and are not considered to be a true representation of the actual operation of the building. The intent of these criteria is to permit the comparison of the estimated annual energy consumption of a Proposed Building against that of a Reference Building and therefore determine if a specific building has the ability to be energy efficient.

The thermal properties described in the following report are to meet the minimum energy efficiency requirements stated by the NCC provisions only. It does not directly account for any requirements for the following aspects: Thermal Comfort, Vapour Barriers and Condensation, Wind, Impact and Structural, Acoustic requirements, Fire Requirements.

Prepared by



Ray Leung

Sustainability Engineer

for **Wood & Grieve Engineers now part of Stantec**

Approved by



Alex Kobler

Sustainability Section Managers, Principal

for **Wood & Grieve Engineers now part of Stantec**

File Records

For records the files used in this report are as follows:

All modelling completed on the basis of the following documents:

| Drawing # | Drawing/Revit File Name | Revision |
|-------------|---|----------|
| Floor Plans | SD-011_PROPOSED SITE PLAN | 20 |
| | SD-021_PROPOSED LOWER GROUND FLOOR PLAN 1_200 | 17 |
| | SD-022_PROPOSED GROUND FLOOR PLAN 1_200 | 17 |
| | SD-023_PROPOSED FIRST FLOOR PLAN 1_200 | 15 |
| | SD-024_PROPOSED SECOND FLOOR PLAN 1_200 | 15 |
| | SD-025_PROPOSED ROOF PLAN 1_200 | 15 |
| Elevations | SD-031_PROPOSED ELEVATIONS 1_200 – SHEET 1 | 14 |
| | SD-032_PROPOSED ELEVATIONS 1_200 – SHEET 2 | 14 |
| Sections | SD-041_PROPOSED SECTION 1_200 – SHEET 1 | 12 |
| | SD-045_PROPOSED SECTION DETAILS 1:20 | 03 |

The following inputs and outputs are the basis of assessment for this report:

| Record | Reference | Proposed |
|--|--|-------------------------------|
| IES Thermal Model: | 45342_NCC2019_Reference_Rev002 | 45342_NCC2019_Proposed_Rev002 |
| Apache Vista File: | 45342_Reference_Rev002.aps | 45342_Proposed_Rev002.aps |
| Energy Analysis Results (JV3 assessment) | 30916-3_JV3_Energy Model_Template Rev 6.7_(VE2017)_002.xlsm | |
| Reference Glazing Calculators | 45342_Class 9b_Beta_Calculator_2019_Facade _Volume_One_Rev002.xlsm | NA |

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Appendix E Section J JV3 Modelling Parameters

Appendix F Part J1 – Building Fabric

Appendix G Part J3 – Building Sealing

1. Executive Summary

This report has been prepared at the instruction of JDH Architect for the proposed Bankstown North Public School development located at 322 Hume Hwy, Bankstown NSW 2200. The purpose of this report is to demonstrate the compliance of the works with the NCC 2019 Volume One Section J Part J1 Building fabric requirements using the JV3 – Verification using a Reference Building Performance Solution.

1.1 NCC 2019 Section J Part 1 Findings

Subject to the conditions and requirements noted in this report, the proposed development is considered to comply with the NCC 2019 Volume One Section J JV3 requirements. It is noted that any future variation to the design, conditions and requirements may impact the performance outcomes and potentially impact the level of compliance. The following tables summarise the results of the NCC 2019 Section J energy modelling and thermal comfort level assessment:

Table 1 JV3 Predicted Energy consumption summary and comparison.

| Model | Annual Energy Consumption (MWh) | Greenhouse Gas Emission (kgCO ₂ -e) | Comparison | Compliance |
|--------------------|---------------------------------|--|------------|------------|
| Reference Building | 441.23 | 406,635.5 | - | - |
| Proposed Building | 440.63 | 406,082.6 | 99.86% | Compliant |

This analysis has been carried out in order to confirm the estimated Greenhouse Gas Emission (calculated in accordance with Specification JV(a) – Additional requirements, JV(b) – Modelling parameters and JV(c) Modelling profiles) is compliant with the NCC 2019 Volume One Section J Energy Efficiency JV3 – Verification using a Reference Building.

Based on the results outlined above, it can be stated that the Proposed Building design complies with the NCC 2019 Volume One Section J Part J1 Building fabric requirements using the JV3 – Verification using a Reference Building Performance Solution.

1.2 Conditions and Requirements

1.2.1 Performance Requirements – Façade

The Building Fabric shall comply with the performance requirements outlined within this report;

- Location of insulation and the building fabric thermal performance requirements
- Glazing thermal performance requirements

The thermal performance of all new construction materials associated with this specification has been summarised in Section 3.1.3

Refer to Appendix A for mark-up indicating extent of any added insulation included within the construction specifications.

1.2.2 Prescriptive Requirements

In addition to the performance related compliance requirements outlined above, there are further prescriptive Section J elements which must be complied with. These are outlined below and shall be complied with during the delivery phase of the project.

- Appendix F – Part J1 – Building Fabric
- Appendix G – Part J3 – Building Sealing



1.3 Proposed Thermal Performance Requirements

1.3.1 Building Fabric Thermal Performance Requirements

The overall thermal performance requirements of the building fabric envelope are shown below. Refer to Appendix A for the locations of insulation.

Table 2 Building fabric thermal performance requirements.

| Building Element forming part of Section J Envelope | Minimum Total R-Value* of Building Element (m ² K/W) | Additional Notes |
|---|---|--|
| Roof/Ceiling | R_T 3.2 (Heat flow Downwards) | <ul style="list-style-type: none"> Solar absorptance of the upper surface of a roof must be not more than 0.45. Total Roof-value must be calculated in accordance with AS/NZS 4859.2 |
| External Walls – Brick Veneer Construction | R_T 1.6 | <ul style="list-style-type: none"> Total Wall R-value must be calculated including thermal bridging and in accordance with AS/NZS 4859.2 |
| External Walls – Lightweight Cladding Wall and Spandrel Panel Construction | R_T 1.2 | <ul style="list-style-type: none"> Total Wall R-value must be calculated including thermal bridging and in accordance with AS/NZS 4859.2 |
| Internal Walls | R_T 1.4 | <ul style="list-style-type: none"> Total Wall R-value must be calculated including thermal bridging and in accordance with AS/NZS 4859.2 |
| Suspended Floor Slab (no in-slab heating or cooling) | R_T 2.0 (Heat flow Downwards) | <ul style="list-style-type: none"> Total Floor R-value must be calculated in accordance with NCC2019 Specification J1.6 or Section 3.5 of CIBSE Guide A |
| Slab-on-ground (no in-slab heating or cooling) | No Additional Insulation Requirement | <ul style="list-style-type: none"> Ground Floor Slab insulation has been engineered out by JV3 |

*The Total R-Value is the combination of the R-values of the individual component layers in a composite element including any building material, insulating material, airspace and associated surface resistances



1.3.2 Glazing Thermal Performance Requirements

The overall thermal performance requirements of the external glazing are shown below in table 3.

Table 3 External glazing thermal performance requirements.

| Window Type (Glazing + Frame) | Total System U-value (W/m ² K)* | Total System SHGC* | Additional Notes |
|---|---|-----------------------|---|
| All Section J Envelope Glazing | 4.6 | 0.46 | <ul style="list-style-type: none">• Possible Single Glazed Low E Neutral Tone with Standard Aluminium Frame as a minimum, TBC by façade contractor or window supplier.• Generally apply to all conditioned areas glazing |

*The Total System performance requirements above are for combined effect of glass + frame in accordance with Australian Fenestration Rating Council (AFRC) requirements



2. Introduction

2.1 NCC 2019 Section J Objective

It is understood that the objective is as follows:

- Confirm compliance with the Parts J1 of Section J of the NCC 2019 Volume One utilizing the “JV3 – Verification using a Reference Building” method.
- Identify Part J3 Section J requirements of the NCC 2019 Volume One

This report should be read in conjunction with all relevant plans and specifications and any supplementary regulatory information.

2.2 Site Context

The Bankstown North Public School development location is outlined below in Figure 1:



Figure 1 : Site Location (Google Maps)



2.3 Development Overview

| Property Title | Bankstown North Public School Development |
|---|--|
| Address | 322 Hume Highway, Bankstown NSW 2200 |
| Number of storeys | 3 |
| Building Description | 3-Storey School Assembly Building (Class 9b) |
| NCC Volume | NCC 2019 Volume One |
| Climate Zone | 5 |
| Name and Version of the Software used in the Analysis | IES Virtual Environment, v2017 |

Figure 2: BCA Climate Map (abcb.gov.au)



3. JV3 Methodology

Compliance is verified when it is determined that the estimated annual greenhouse gas emissions of the Proposed Building with its services is not more than the estimated annual greenhouse gas emission of a (deemed-to-satisfy compliant) Reference Building when:

- I. The Proposed Building is modelled with the proposed services; and
- II. The Proposed Building is modelled with the same services as the Reference Building.

This JV3 for Part J1 analysis concerns building fabric and glazing, and assumes that the proposed building services are DTS compliant and have the same DTS services as the Reference Building. It is also assumed that the Proposed Building and Reference Building are both DTS compliant with Part J3.

As such, only two building models are developed for JV3 assessment with the annual predicted greenhouse gas emissions compared as follows:

- Case 1: The Reference Building (with DTS Building Fabric and DTS Services)
- Case 2: The Proposed Building (with Proposed Building Fabric and DTS Services)

3.1 Energy Modelling Inputs

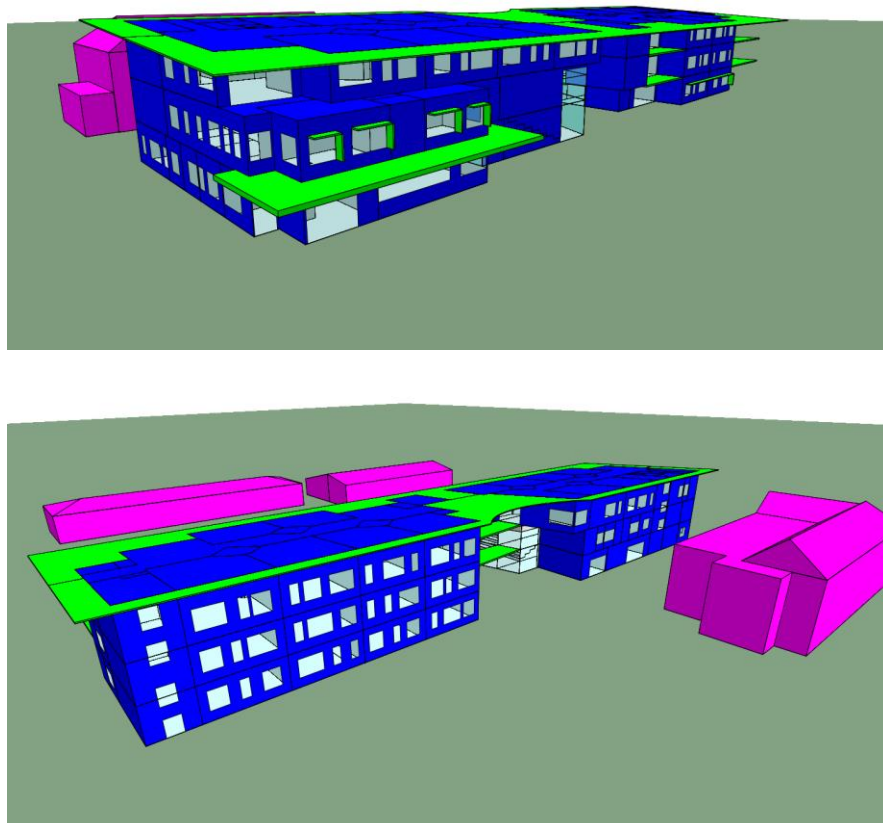


Figure 1 Images of the JV3 model.



3.1.1 Internal Loads

The internal loads for both the Proposed and Reference Buildings are as per the design requirements stipulated in the NCC 2019 Volume One Section J.

Profiles

Occupancy, lighting, equipment and HVAC plant throughout the site were estimated to operate in accordance with the NCC2019 Volume One Specification JV(c) Modelling profiles.

Refer to Appendix C – Occupancy and Operational Profiles for complete summary of modelling inputs.

Lighting Levels

The lighting load allowances incorporated into the energy model were as per allowances within NCC 2019 Volume One Section J, Table J6.2a.

| Zone | Lighting Load (W/m ²) |
|--|-----------------------------------|
| Staff rooms /Home Bases / General purposes learning areas | 4.5 |
| Stairs | 1.5 |
| Control room, switch room and the like – constant monitoring | 4.5 |
| Entry/Circulation | 5.0 |
| Toilets | 3.0 |

Occupant Density & Heat Gains

The occupant densities applied to the model are accordance with the requirements stipulated in the NCC 2019 Volume One Section D, Part D1, Table D1.13.

| Description | Sensible Heat (W/person) | Latent Heat (W/person) |
|---------------|--------------------------|------------------------|
| JV3 Allowance | 75 | 55 |

Appliances and Equipment

The allowances for sensible and latent heat gain from equipment to all heating and cooling zones throughout the site as per the requirements stipulated in NCC Volume One Section J, Specification JVc, Table 21.

| Zone | Sensible (W/m ²) |
|--|------------------------------|
| Administration and Staff Offices | 11 |
| Home Bases / General purposes learning areas | 5 |

3.1.2 Case 1: Reference Building with Reference Services

Construction Thermal Performance

Building fabric constructions are in accordance with the Deemed-to-Satisfy requirements in NCC 2019 Volume One Section J1.



Glazing Thermal Performance

The glazed areas used for the Reference Building were calculated in accordance with the NCC 2019 Volume One Specification J1.5 Calculation of U-value and solar admittance. (See Appendix B for Wall – Glazing Reference Building Results)

Reference Building Services

Heating and Air Conditioning

The following attributes for the HVAC system are in accordance with the Deemed-to-Satisfy requirements in the NCC 2019 Volume One Specifications J5.9 (d)(ii) and J5.10 Table J5.10b – Option 2:

| | |
|---------------------|------------------|
| Cooling COP: | 2.6 |
| Heating Efficiency: | 2.6 |
| Cooling Fuel: | Grid Electricity |
| Heating Fuel: | Grid Electricity |

In accordance with Specification JVb Clause 2 (c) (i) the space temperature of the Reference Building is within the range of 21°C DB to 24°C DB for 98% of the plant operation time.

Space Temperature Range

Cooling Load Set-point: 24°C

Heating Load Set-point: 21°C

Mechanical Ventilation Rate – Outside Air

Mechanical ventilation has been modelled at the rates of introduction of outside air as per the design requirements stipulated in AS 1668.2.

Infiltration Air Change Rate

Infiltration air change rates have been modelled in accordance with NCC 2019 Volume One Specification JVb Clause 2 (d) as follows:

- (i) 0.7 air changes per hour throughout all zones when there is no mechanically supplied outdoor air; and
- (ii) 0.35 air changes per hour at all other times.

Domestic Hot Water and Lifts

Domestic hot water energy consumption, lifts, and escalators have been excluded from the calculation in accordance with the NCC 2019 Volume One Specification JVc Modelling Profiles.



3.1.3 Case 2: Proposed Building with Reference Services

Construction Thermal Performance

The overall thermal performance requirements of the building fabric envelope are shown below. Refer to Appendix A for the locations of insulation.

Table 4 Building fabric thermal performance requirements.

| Building Element forming part of Section J Envelope | Minimum Total R-Value* of Building Element (m ² K/W) | Additional Notes |
|--|---|--|
| Roof/Ceiling | R _T 3.2 (Heat flow Downwards) | <ul style="list-style-type: none"> Solar absorptance of the upper surface of a roof must be not more than 0.45. Total Roof-value must be calculated in accordance with AS/NZS 4859.2 |
| External Walls – Brick Veneer Construction | R _T 1.6 | <ul style="list-style-type: none"> Total Wall R-value must be calculated including thermal bridging and in accordance with AS/NZS 4859.2 |
| External Walls – Lightweight Cladding Wall and Spandrel Panel Construction | R _T 1.2 | <ul style="list-style-type: none"> Total Wall R-value must be calculated including thermal bridging and in accordance with AS/NZS 4859.2 |
| Internal Walls | R _T 1.4 | <ul style="list-style-type: none"> Total Wall R-value must be calculated including thermal bridging and in accordance with AS/NZS 4859.2 |
| Suspended Floor Slab (no in-slab heating or cooling) | R _T 2.0 (Heat flow Downwards) | <ul style="list-style-type: none"> Total Floor R-value must be calculated in accordance with NCC2019 Specification J1.6 or Section 3.5 of CIBSE Guide A |
| Slab-on-ground (no in-slab heating or cooling) | No Additional Insulation Requirement | <ul style="list-style-type: none"> Ground Floor Slab insulation has been engineered out by JV3 |

*The Total R-Value is the combination of the R-values of the individual component layers in a composite element including any building material, insulating material, airspace and associated surface resistances



Glazing Thermal Performance

The project external glazing shall have the total thermal performance values as outlined in table 5. These are whole of window properties and include the glass and frame combined. An indicative glass and frame type is provided for information only. Final glazing selection must comply with the performance limits set by the whole of window U-value and SHGC.

Table 5 External glazing thermal performance requirements.

| Window Type (Glazing + Frame) | Total System U-value (W/m ² K)* | Total System SHGC* | Additional Notes |
|---|---|-----------------------|---|
| All Section J Envelope Glazing | 4.6 | 0.46 | <ul style="list-style-type: none">Possible Single Glazed Low E Neutral Tone with Standard Aluminium Frame as a minimum, TBC by façade contractor or window supplier. Generally apply to all conditioned areas glazing (refer Appendix A for further detail) |

*The Total System performance requirements above are for combined effect of glass + frame in accordance with Australian Fenestration Rating Council (AFRC) requirements

Reference Building Services

| | |
|---------------------|------------------|
| Cooling COP: | 2.6 |
| Heating Efficiency: | 2.6 |
| Cooling Fuel: | Grid Electricity |
| Heating Fuel: | Grid Electricity |

Space Temperature Range

| | |
|-------------------------|------|
| Cooling Load Set-point: | 24°C |
| Heating Load Set-point: | 21°C |

Mechanical Ventilation Rate – Outside Air

Mechanical ventilation has been modelled at the rates of introduction of outside air as per the design requirements stipulated in AS 1668.2.

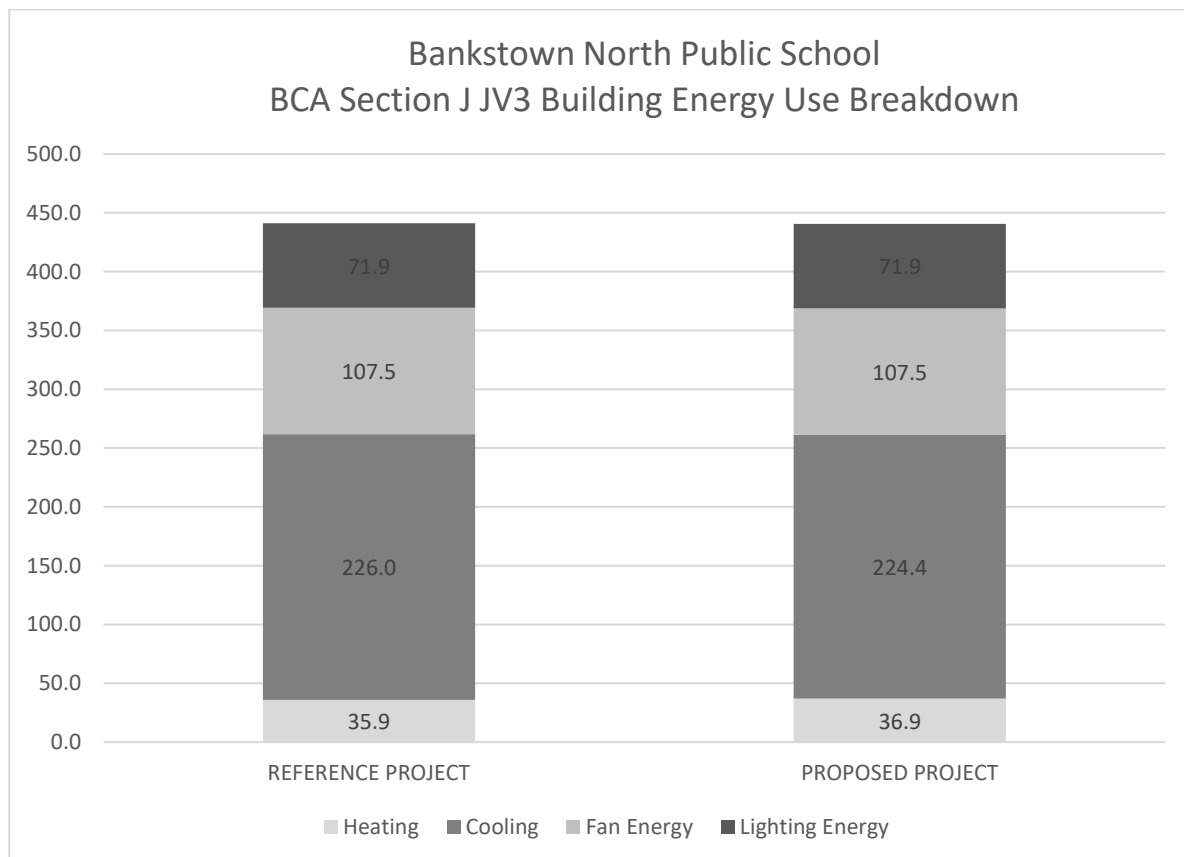


4. Modelling Results

The simulation was undertaken using IES Virtual Environment 2017 incorporating the IES Apache HVAC Module. The following predicted annual energy consumption have been converted from the IES Virtual Environment Vista outputs (MWh) file for the proposed development:

Table 2 Modelling Results – Building Energy Consumption Results

| Energy Consumption | Source | Energy Demand (MWh/annum) | | Energy Demand Improvement on Reference |
|---|------------------|---------------------------|-----------|--|
| | | Reference | Proposed | |
| Heating | Grid Electricity | 35.9 | 36.9 | |
| Cooling | Grid Electricity | 226.0 | 224.4 | |
| Indoor Fan Energy | Grid Electricity | 107.5 | 107.5 | |
| Lighting Energy | Grid Electricity | 71.9 | 71.9 | |
| TOTAL Energy Demand (MWh/annum) | | 441.3 | 440.7 | |
| TOTAL Greenhouse Gas Emission (kgCO_{2-e}) | | 406,082.6 | 406,635.5 | 0.14% |



4.1 Model Verification

In accordance with Specification JVb (c) (i) the space temperature of the Reference Building must be within the range of 21°C DB to 24°C DB for 98% of the plant operation time and must be consistent between Reference and Proposed Buildings.

In order to verify this requirement, IES Virtual Environment's Vista analysis software module was utilised to assess the results for each of the nominated heating and cooling zones. A check was carried out to identify the percentage of total hours per annum (between this range) that the space temperature was outside this specified temperature band during the HVAC profile hours (refer to Appendix C - Occupancy and Operational Profiles). The results of this are noted below.

Table 8 Modelling Results – Model Verification Results

| | Air Temperature (°C) - % Of Hours in Range | | | % Outside Range |
|-------------------|--|-------------------|---------|-----------------|
| | <= 21.00 | >18.00 To <=26.00 | > 24.00 | |
| Reference Project | 0.0% | 100.0% | 0.0% | 0.0% |
| Proposed Project | 0.0% | 100.0% | 0.0% | 0.0% |
| | Section J Compliant | Yes | | |

4.2 Conclusion

The modelling results indicate that the predicted annual greenhouse gas emission of the Proposed Building Case 2 (with Reference DTS Services) does not exceed the predicted annual greenhouse gas emission of the Reference Building Case 1 (with Reference DTS Services), and therefore, complies with the NCC 2019 Volume One Section J Part J1 Building fabric requirements using the JV3 – Verification using a Reference Building Performance Solution.

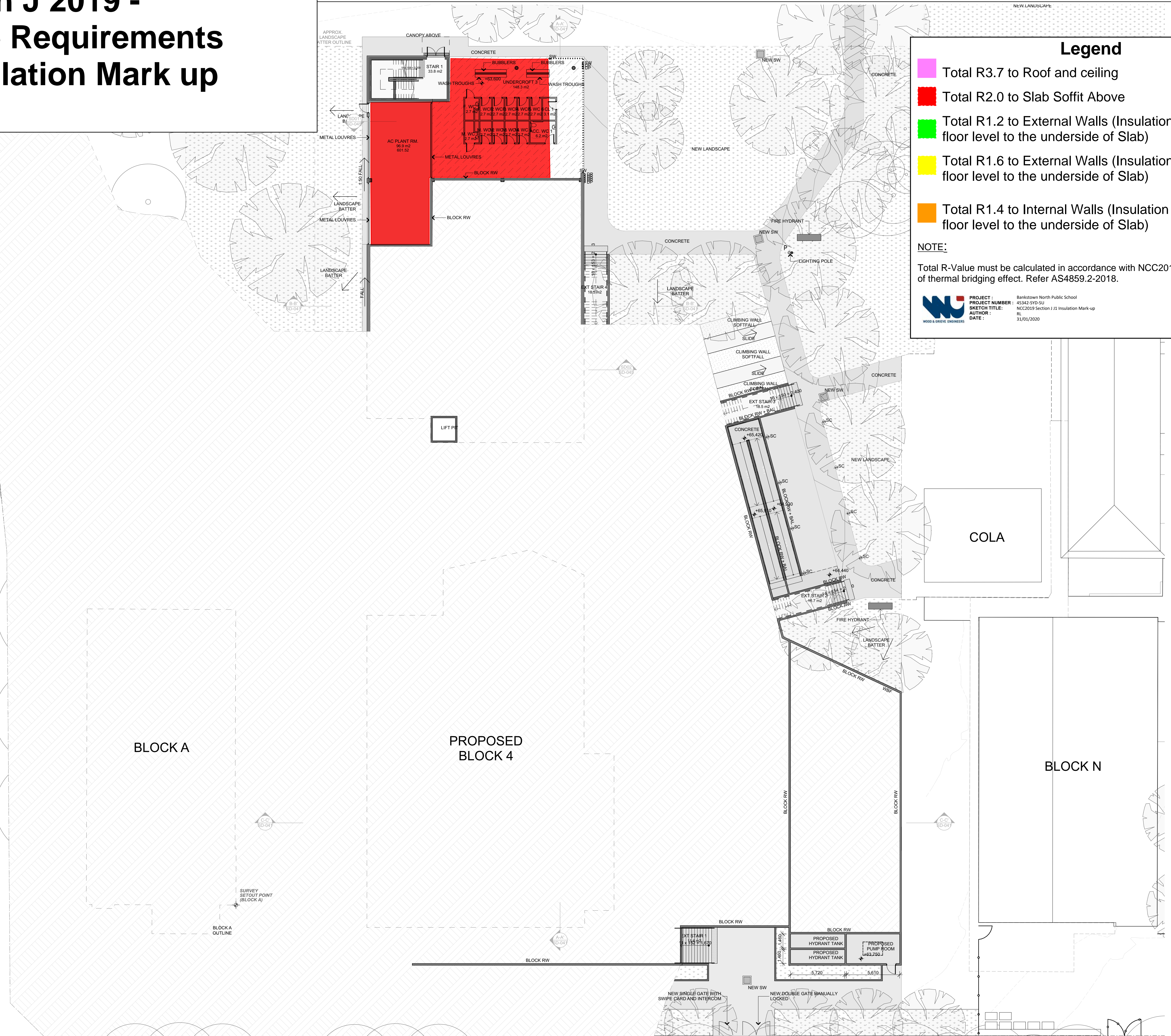
Subject to the limitations and assumptions listed in this report, “JV3 for Part J1” performance solution design compliance can be achieved for the proposed building model as long as:

- The necessary specific thermal performance requirements for the proposed building model envelope (i.e. building fabric and glazing) can be satisfied (as a minimum), AND
- All other design elements not specifically addressed in this report (related to BCA Part J0, i.e. general Part J1, Part J3, J5, J6, J7 & J8) must continue to be compliant with the DTS requirements of NCC 2019 Volume 1 Section J.



Appendix A Insulation Mark-ups

HUME HIGHWAY



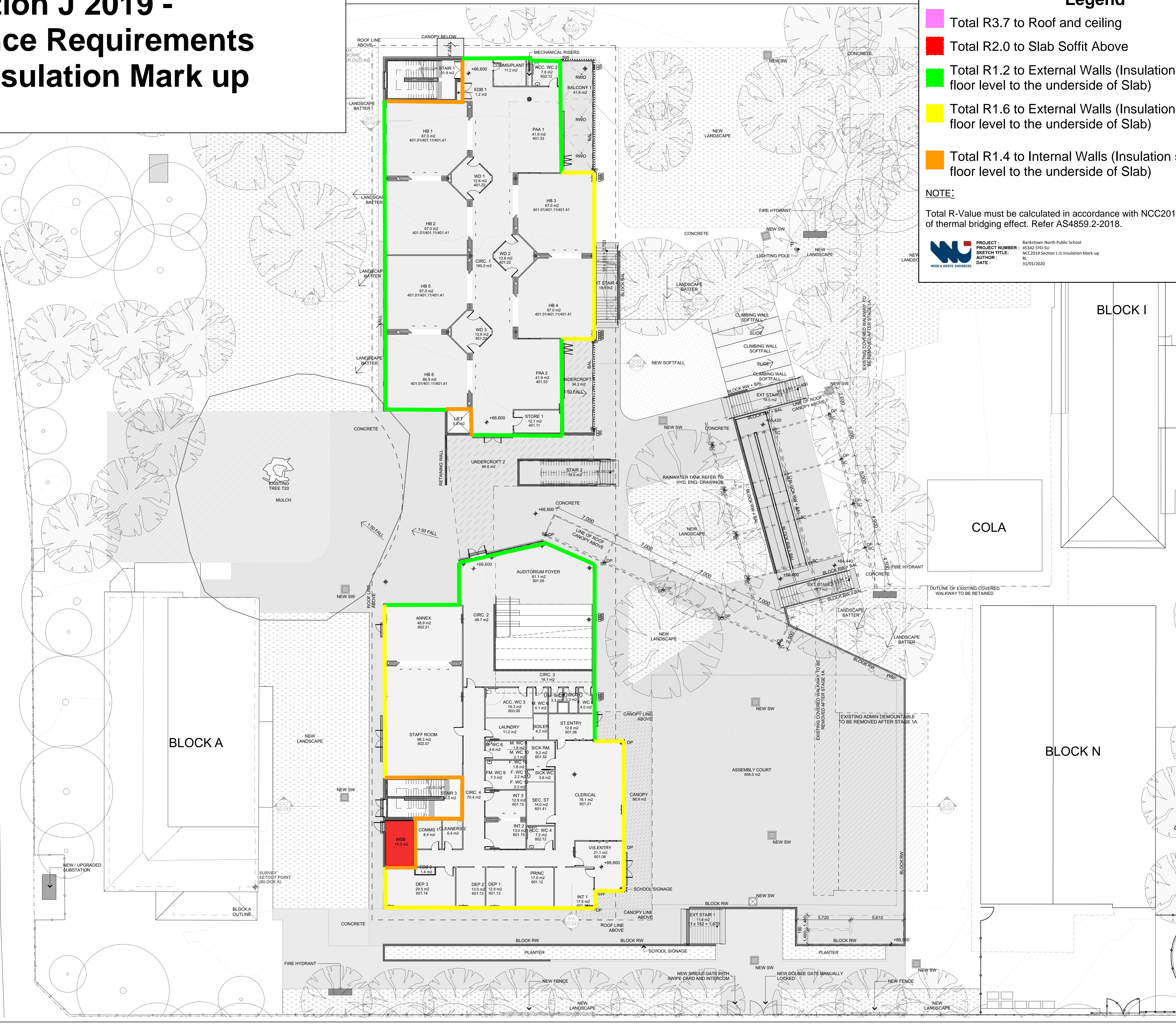
CERTIFIED ISO 9001 CONFIRMS THAT THIS DRAWING HAS BEEN PREPARED IN CONFORMITY WITH JDH ARCHITECTS Q.M.S. PROCEDURES.

SCHEMATIC DESIGN

NCC Section J 2019 - Compliance Requirements Part J1 Insulation Mark up

HUME HIGHWAY

HUME HIGHWAY



Legend

- Total R3.7 to Roof and ceiling
- Total R2.0 to Slab Soffit Above
- Total R1.2 to External Walls (Insulation shall be installed from floor level to the underside of Slab)
- Total R1.6 to External Walls (Insulation shall be installed from floor level to the underside of Slab)
- Total R1.4 to Internal Walls (Insulation shall be installed from floor level to the underside of Slab)

NOTE:
Total R-Value must be calculated in accordance with NCC2019 Volume One Definition inclusive of thermal bridging effect. Refer AS4859.2-2018.

PROJECT : Bankstown North Public School
PROJECT NUMBER : 45342-SYD-SU
SKETCH TITLE : NCC2019 Section J1 Insulation Mark-up
AUTHOR : RL
DATE : 31/01/2020

BLOCK I

COLA

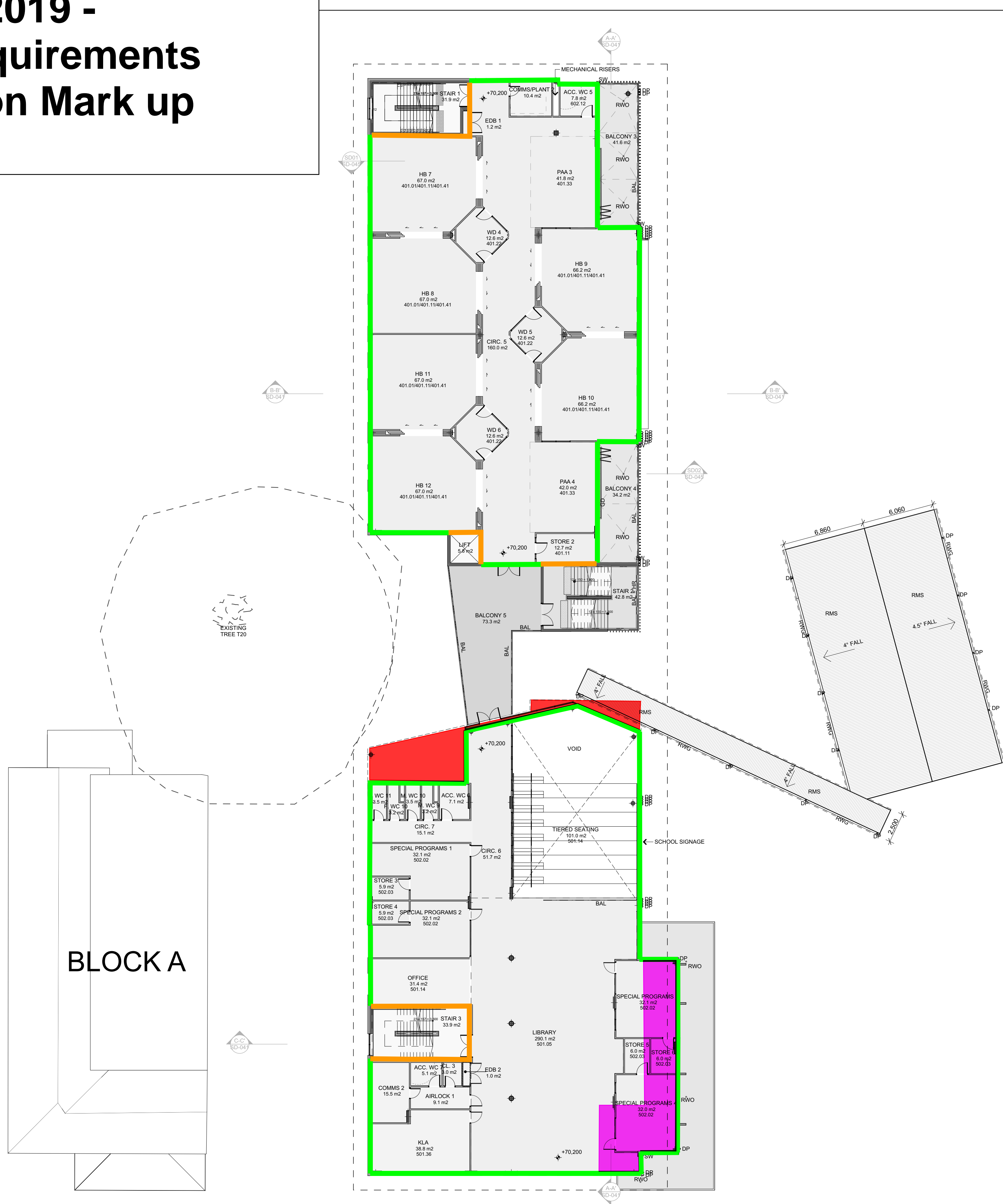
BLOCK N

PROPOSED LANDSCAPE
PROPOSED TREES
EXISTING TREES
BOUNDARY






BAL BALUSTRADE
EGL EXISTING GROUND LEVEL
FLL FINISHED FLOOR LEVEL
FHR FIRE HOSE REEL
FRN FINISHED ROOF LINE
FRS FIXED SUN SHADING DEVICE
GRD GRATED DRAIN
HRS HAND RAIL
LX LOCKER
LAM LAMINATE ON MDF BOARD
LT LIGHTING BAR
ME MECHANICAL
MM METAL MESH
PC PINBOARD
RC REINFORCED CONCRETE
RT RETAINING WALL
RW ROOF WALL
SSL STRUCTURAL SLAB LEVEL
ST STACK
TG TRENCH GRILLE
TV FLAT SCREEN TELEVISION
VP VENT PIPE
WB WHITEBOARD
WVB WATERPROOF GLASS
WPM WATERPROOF MEMBRANE

Project Manager: **rps**
Planning: **dip**
Building Certifier: **BLACKETT MAGUIRE GOLDSMITH**
Landscape: **GALLAGHER STUDIO**
Mechanical, Electrical & Hydraulic Engineering Consultant: **erbas**
Structural & Civil Engineer Consultant: **NORTHROP**
Architect: **JDH architects**
JDH ARCHITECTS PTY. LTD.
ABN: 27 110 978 802
ACN: 110 978 802
NOMINATED ARCHITECT: JAYNE HARRISON (7403)
44 Little Oxford Street, Darlinghurst, NSW 2010
Telephone: 02 9281 8697
www.jdharchitects.com.au
Client: **NSW Education School Infrastructure**
Level 8, 259 George Street, Sydney, NSW, 2000
Project Name: **BANKSTOWN NORTH PUBLIC SCHOOL**
322 Hume Hwy, Bankstown NSW 2200
Drawing Title: **PROPOSED GROUND FLOOR PLAN 1:200**
Scale: 1:200 @A1 Date: 6/05/2020
Drawn: GL Checked: VH
Project No. 1082 Drawing No. SD-022 Rev. 17
QUALITY CERTIFIED ISO 9001
INITIALLYING THE DRAWING AND THE CHECK BOXES CONFIRMS THAT THIS DRAWING HAS BEEN PREPARED IN CONFORMITY WITH JDH ARCHITECTS Q.M.S. PROCEDURES
Status: **SCHEMATIC DESIGN**

NCC Section J 2019 - Compliance Requirements Part J1 Insulation Mark up



Legend

-  Total R3.7 to Roof and ceiling
-  Total R2.0 to Slab Soffit Above
-  Total R1.2 to External Walls (Insulation shall be installed from floor level to the underside of Slab)
-  Total R1.6 to External Walls (Insulation shall be installed from floor level to the underside of Slab)
-  Total R1.4 to Internal Walls (Insulation shall be installed from floor level to the underside of Slab)

NOTE:

Total R-Value must be calculated in accordance with NCC2019 Volume One Definition inclusive of thermal bridging effect. Refer AS4859.2-2018.



PROJECT : Bankstown North Public School
PROJECT NUMBER : 45342-SYD-SU
SKETCH TITLE: NCC2019 Section J J1 Insulation Mark-up
AUTHOR : RL
DATE : 31/01/2020

BLOCK I


PROPOSED LANDSCAPE

PROPOSED TREES

EXISTING TREES

BOUNDARY

| | |
|-----|-----------------------------|
| BAL | BALLUSTRADE |
| EGL | EXISTING GROUND LEVEL |
| FFL | FINISHED FLOOR LEVEL |
| FHR | FIRE HOSE REEL |
| FN | FAN |
| FR | ADJUSTABLE FLOOR RISER |
| FSF | FIXED SINK SHAVING DEVICE |
| GD | GRATED DRAIN |
| HR | HAND RAIL |
| LK | LOCKER |
| LM | LAMINATE ON MDF BOARD |
| LB | LIGHTING BAR |
| LT | LINE UP OF CHARGING STATION |
| ME | MECHANICAL |
| MM | METAL MESH |
| PM | PINBOARD |
| RC | REINFORCED CONCRETE |
| RT | WIRELESS ROUTER |
| RW | RETAINING WALL |
| SP | SPEAKER |
| SSL | STRUCTURAL SLAB LEVEL |
| ST | STACK |
| TR | TRENCH GRILLE |
| TV | FLAT SCREEN TELEVISION |
| VP | VENT PIPE |
| WB | WHITEBOARD |
| WGB | WHITEBOARD GLASS |
| WPM | WATERPROOF MEMBRANE |

| | | |
|---|---|-------------|
|  | <div style="border: 1px solid black; padding: 2px;">RL +1,000</div> | EXISTING RL |
| | RL +1,000 | PROPOSED RL |

Project Manager

Planning

Building Certifier

Landscape

Mechanical, Electrical &
Hydraulic Engineering
Consultant

Structural & Civil
Engineer Consultant

Architect
LBI

UBI
IDU ARCHITECTS P.A.

ABN 27 110 978 802
ACN 110 978 802
NOMINATED ARCHITECT

| | |
|--------|--|
| Client | |
|--------|--|



Level 8, 259 Geo
Sydney

| |
|--------------|
| Project Name |
|--------------|

BANKSTO
SCHOOL

Bankstown

Drawing Title
PROPOSED

Scale : 1:200 @

| | |
|-------------|------|
| Project No. | Draw |
|-------------|------|

| | |
|------|----|
| 1082 | SD |
|------|----|

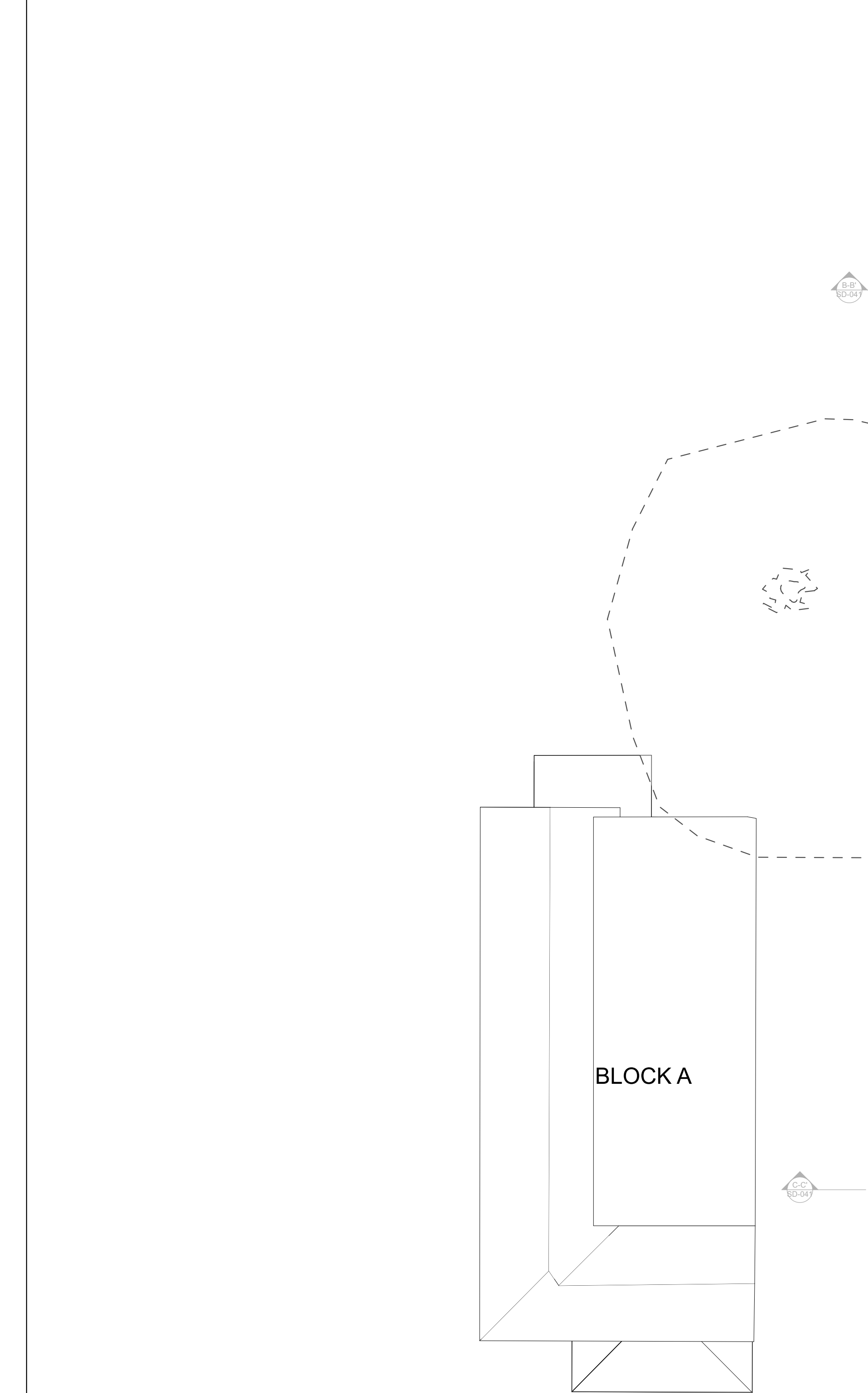
QUALITY
CERTIFIED ISO
9001

| | |
|---------|--|
| Status: | |
|---------|--|

CHALLENGING THE DRAWING AND THE CHECK BOXES
CONFIRMS THAT THIS DRAWING HAS BEEN
PREPARED IN CONFORMITY WITH JDH
ARCHITECTS Q.M.S. PROCEDURES.

SCHEMATIC DESIGN

NCC Section J 2019 - Compliance Requirements Part J1 Insulation Mark up



Legend

Total R3.7 to Roof and ceiling

Total R2.0 to Slab Soffit Above

Total R1.2 to External Walls (Insulation shall be installed from floor level to the underside of Slab)

Total R1.6 to External Walls (Insulation shall be installed from floor level to the underside of Slab)

Total R1.4 to Internal Walls (Insulation shall be installed from floor level to the underside of Slab)

NOTE:

Total R-Value must be calculated in accordance with NCC2019 Volume One Definition inclusive of thermal bridging effect. Refer AS4859.2-2018.

WOOD & GREVE ENGINEERS

PROJECT :

PROJECT NUMBER :

SKETCH TITLE :

AUTHOR :

DATE :

Bankstown North Public School

45342-910-SU

NCC2019 Section J J1 Insulation Mark-up

RL

31/01/2020

BLOCK I

PROPOSED TREES

EXISTING TREES

BOUNDARY

BAL

BALUSTRADE

BGL

EXISTING GROUND LEVEL

FIL

FINISHED FLOOR LEVEL

FHR

FIRE HOSE REEL

FR

FAN

FR

ADJUSTABLE FLOOR RISER

FSS

FIXED SUN SHADING DEVICE

GD

GRATED DRAIN

HR

HAND RAIL

LK

LOCKER

LT

LAMINATE ON MDF BOARD

LB

LIGHTING BAR

LT

MOBILE LAPTOP CHARGING STATION

ME

MECHANICAL

MM

METAL MESH

PC

PINBOARD

RC

REINFORCED CONCRETE

RT

WIRELESS ROUTER

RW

RETAINING WALL

SP

SPEAKER

SSL

STRUCTURAL SLAB LEVEL

ST

STACK

TG

TRENCH GRILLE

TV

FLAT SCREEN TELEVISION

VP

VENT PIPE

WB

WHITEBOARD

WGB

WHITEBOARD GLASS

WPM

WATERPROOF MEMBRANE

RL +1,000

EXISTING RL

RL +1,000

PROPOSED RL

Project Manager

rps

Planning

dfp

Building Certifier

BLACKETT MAGUIRE & GOLDSMITH

Landscape

GALLAGHER STUDIO

Mechanical, Electrical & Hydraulic Engineering Consultant

erbas

Structural & Civil Engineer Consultant

NORTHROP

Architect

JDH architects

JDH ARCHITECTS PTY. LTD.

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NOMINATED ARCHITECT

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Darlinghurst, NSW 2010

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Client

NSW

Education

School Infrastructure

Level 8, 259 George Street

Sydney

NSW, 2000

Project Name

BANKSTOWN NORTH PUBLIC SCHOOL

322 Hume Hwy,

Bankstown NSW 2200

Drawing Title

PROPOSED SECOND FLOOR PLAN

1:200

Scale : 1:200 @A1

Date : 6/05/2020

Drawn : GL

Checked : VH

Project No.

Drawing No.

Rev.

1082

SD-024

15

QUALITY CERTIFIED ISO 9001

INITIALLYING THE 'DRAWN AND THE 'CHECK' BOXES CONFIRMS THAT THIS DRAWING HAS BEEN PREPARED IN CONFORMANCE WITH JDH ARCHITECTS Q.M.S. PROCEDURES.

Status:

SCHEMATIC DESIGN

Appendix B Wall Glazing Calculation





Faade

Report



Calculator

Project Summary

Date
30/01/2020

Name
Ray Leung

Company
WGE

Position
Engineer

Building Name / Address
Bankstown North Public School
322 Hume Hwy, Bankstown, New South Wales

Building State

NSW

Climate Zone

Climate Zone 5 - Warm
temperate

Building Classification

Class 9b - schools

Storeys Above Ground
3

The summary below provides an overview of where compliance has been achieved for Specification J1.5a - Calculation of U-Value and solar admittance - Method 1 (Single Aspect) and Method 2 (Multiple Aspects).

Compliant Solution =
Non-Compliant Solution =

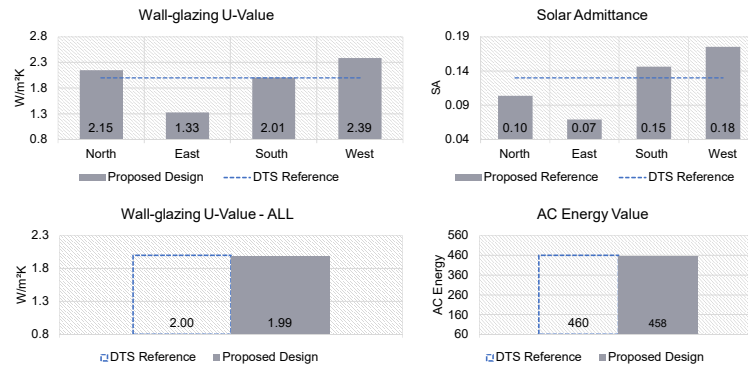
Wall-glazing U-Value (W/m².K)

Solar Admittance

AC Energy Value

458

Method 1



Project Details

| | North | East | South | West |
|---|---|-------------------------|--------------------------------------|---|
| Glazing Area (m ²) | 274.5365 | 82.207 | 222.4293 | 173.321 |
| Glazing to Faade Ratio | 32% | 16% | 28% | 39% |
| Glazing References | G01 + G02 + G03 + G04 + G05 + G06 + G07 + G08 + G09 + | G01 + G02 + G03 + G04 + | G01 + G02 + | G01 + G02 + G03 + G04 + G05 + G06 + G07 + G08 + |
| Glazing System Types | Casement + | Casement + | Casement + | Casement + |
| Glass Types | USER (DEFINED) + | USER (DEFINED) + | USER (DEFINED) + | USER (DEFINED) + |
| Frame Types | Aluminium + | Aluminium + | Aluminium + | Aluminium + |
| Methodology | User Defined | | | |
| Average Glazing U-Value (W/m ² .K) | 4.60 | 4.60 | 4.60 | 4.60 |
| Average Glazing SHGC | 0.53 | 0.53 | 0.53 | 0.53 |
| Shading Systems | Horizontal | Horizontal | Horizontal | Horizontal |
| Wall Area (m ²) | 584.8945 | 436.495 | 569.02 | 276.17 |
| Wall Types | Wall + Spandrel + | Wall + | Wall + Spandrel + | Wall + |
| Methodology | NCC Specification J1.5b | | | |
| Wall Construction | Typical + Spandrel Config 4 - R0.5 + | Typical 1.4 + | Typical + Spandrel Config 4 - R0.5 + | Typical + Spandrel Config 4 - R0.5 + |
| Wall Thickness | 200 + | 200 + | 200 + | 200 + |
| Average Wall R-value (m ² K/W) | 1.00 | 1.40 | 1.00 | 1.00 |
| Solar Absorptance | 0.4 | 0.4 | 0.4 | 0.4 |

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Appendix C Occupancy and Operational Profiles

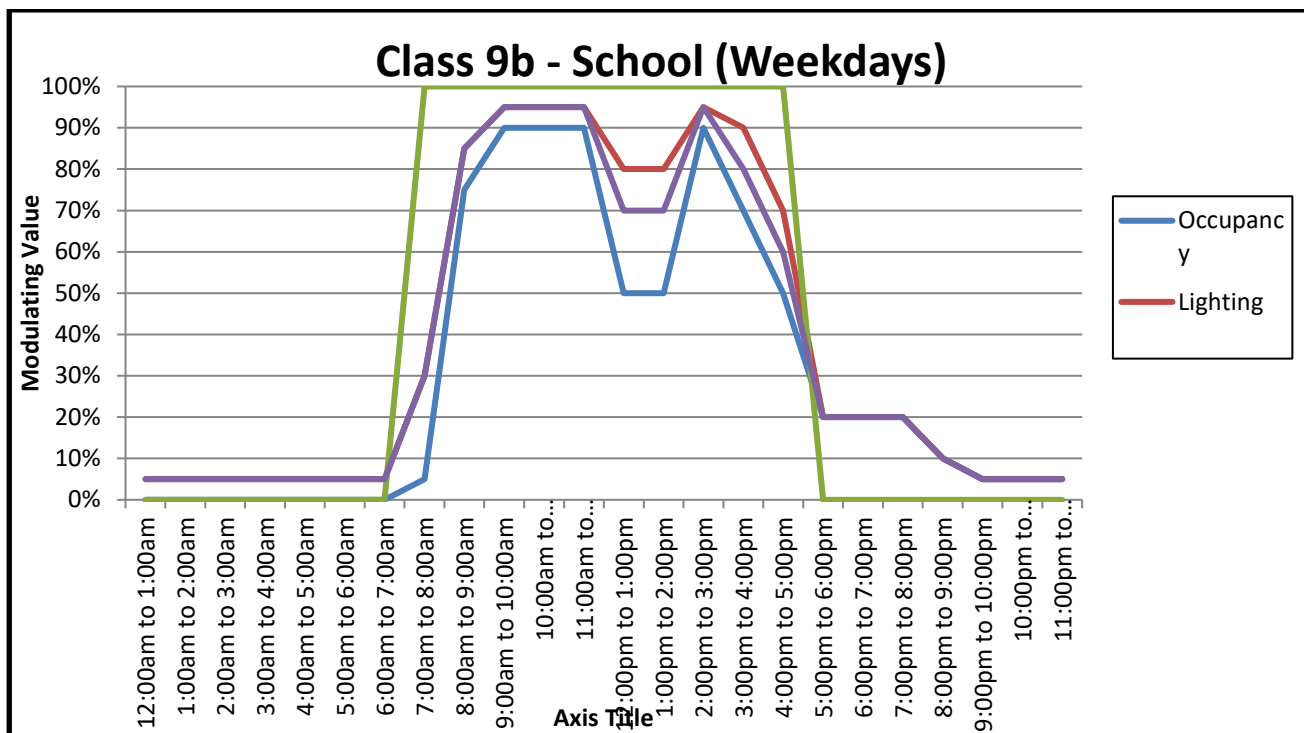
The below tables are an extract from NCC 2019 Volume One Section J, Specification JC, Occupancy and Operational profiles.

Class 9b (School) Profiles

| Hours of Day | Occupancy | Lighting | Equipment | HVAC |
|------------------------------|-------------------|-------------------|-------------------|-------------------|
| (Local Standard Time) | (Monday – Friday) | (Monday – Friday) | (Monday – Friday) | (Monday – Friday) |
| 12:00am to 1:00am | 0% | 5% | 5% | Off |
| 1:00am to 2:00am | 0% | 5% | 5% | Off |
| 2:00am to 3:00am | 0% | 5% | 5% | Off |
| 3:00am to 4:00am | 0% | 5% | 5% | Off |
| 4:00am to 5:00am | 0% | 5% | 5% | Off |
| 5:00am to 6:00am | 0% | 5% | 5% | Off |
| 6:00am to 7:00am | 0% | 5% | 5% | Off |
| 7:00am to 8:00am | 5% | 30% | 30% | On |
| 8:00am to 9:00am | 75% | 85% | 85% | On |
| 9:00am to 10:00am | 90% | 95% | 95% | On |
| 10:00am to 11:00am | 90% | 95% | 95% | On |
| 11:00am to 12:00am | 90% | 95% | 95% | On |
| 12:00pm to 1:00pm | 50% | 80% | 70% | On |
| 1:00pm to 2:00pm | 50% | 80% | 70% | On |
| 2:00pm to 3:00pm | 90% | 95% | 95% | On |
| 3:00pm to 4:00pm | 70% | 90% | 80% | On |
| 4:00pm to 5:00pm | 50% | 70% | 60% | On |
| 5:00pm to 6:00pm | 20% | 20% | 20% | Off |
| 6:00pm to 7:00pm | 20% | 20% | 20% | Off |
| 7:00pm to 8:00pm | 20% | 20% | 20% | Off |
| 8:00pm to 9:00pm | 10% | 10% | 10% | Off |
| 9:00pm to 10:00pm | 5% | 5% | 5% | Off |
| 10:00pm to 11:00pm | 5% | 5% | 5% | Off |
| 11:00pm to 12:00pm | 5% | 5% | 5% | Off |
| Equivalent Peak Hours | 7.5 | 9.4 | 9.0 | 10.0 |

* Saturday and Sunday profiles are 5% continuous artificial lighting and 5% continuous appliances and equipment. There is no occupancy and the air-conditioning is “off”.





Appendix D JV3 Verification Using a Reference Building

- (a) For a Class 3, 5, 6, 7, 8 or 9 building or common area of a Class 2 building, compliance with [JP1](#) is verified when—
 - (i) it is determined that the [annual greenhouse gas emissions](#) of the proposed building are not more than the [annual greenhouse gas emissions](#) of a [reference building](#) when—
 - (A) the proposed building is modelled with the proposed [services](#); and
 - (B) the proposed building is modelled with the same [services](#) as the [reference building](#); and
 - (ii) in the proposed building, a [thermal comfort level](#) of between a [Predicted Mean Vote](#) of -1 to +1 is achieved across not less than 95% of the [floor area](#) of all occupied zones for not less than 98% of the annual [hours of operation](#) of the building; and
 - (iii) the building complies with the additional requirements in [Specification JVa](#).
- (b) The [annual greenhouse gas emissions](#) of the proposed building may be offset by—
 - (i) [renewable energy](#) generated and used on [site](#); and
 - (ii) another process such as reclaimed energy, used on [site](#).
- (c) The calculation method used for (a) and (b) must comply with—
 - (i) ANSI/ASHRAE Standard 140; and
 - (ii) [Specification JVb](#).



Appendix E Section J JV3 Modelling Parameters

| Parameter | Verification Reference | Value | Comment |
|--|------------------------------|-----------------------------------|---|
| Thermostat Setpoint | JVb (2)(c)(i)(A) | 21°C to 24°C (98% of time) | Reference and Proposed Models |
| Daily Occupancy | JVc (2)(a)(i) | Profiles per BCA | As per BCA Class specification |
| Operating Profiles | JVc (2)(a)(i) | Profiles per BCA | As per BCA Class specification |
| Illumination power density | Table J6.2a | As per BCA provisions | See Section 2: Modelling Inputs |
| Ventilation | JVb (2)(a)(ii) | As per BCA provisions | NCC BCA Part F4, and AS1668.2 |
| Internal Heat Gains | JVb (2)(c)(v) | As per BCA provisions | See Section 3: Modelling Inputs |
| Infiltration (perimeter) | JVb (2)(d)(i)(F) | 0.35 Air Changes per Hour (ACH) | Plant on |
| | | 0.7 ACH | Plant off |
| Operation of blinds | | Excluded from assessment | Reference and Proposed Models |
| Furniture and fittings | | Excluded from assessment | Reference and Proposed Models |
| R-Value of air films | | As per J1.2 | As per Calculation methodology |
| Heat Migration | | Migration across HVAC zones - On. | As per Calculation methodology |
| Artificial Lighting | | As per BCA provisions | See Section 3: Modelling Inputs |
| Lifts | | Excluded from assessment | Reference and Proposed Models |
| Hot Water | | Excluded from assessment | Reference and Proposed Models |
| Non-Greenhouse Gas emitting energy sources | | Excluded from assessment | Reference and Proposed Models |
| Thermal Calculation Method | JV3 (c), (d) (ii) (B) | IES-VE, ASHRAE Perth TRY | Complies with the ABCB Protocol for Building Modelling and Analysis (Software). |



Appendix F Part J1 – Building Fabric

The following prescriptive performance requirements for the façade must be adhered to, as per the NCC:

J1.2 Thermal construction — general

- (a) Where *required*, insulation must comply with AS/NZS 4859.1 and be installed so that it—
 - (i) abuts or overlaps adjoining insulation other than at supporting members such as studs, noggings, joists, furring channels and the like where the insulation must be against the member; and
 - (ii) forms a continuous barrier with ceilings, walls, bulkheads, floors or the like that inherently contribute to the thermal barrier; and
 - (iii) does not affect the safe or effective operation of a *service* or fitting.
- (b) Where *required*, *reflective insulation* must be installed with—
 - (i) the necessary airspace to achieve the *required R-Value* between a reflective side of the *reflective insulation* and a building lining or cladding; and
 - (ii) the *reflective insulation* closely fitted against any penetration, door or *window* opening; and
 - (iii) the *reflective insulation* adequately supported by framing members; and
 - (iv) each adjoining sheet of roll membrane being—
 - (A) overlapped not less than 50 mm; or
 - (B) taped together.
- (c) Where *required*, bulk insulation must be installed so that—
 - (i) it maintains its position and thickness, other than where it is compressed between cladding and supporting members, water pipes, electrical cabling or the like; and
 - (ii) in a ceiling, where there is no bulk insulation or *reflective insulation* in the wall beneath, it overlaps the wall by not less than 50 mm.
- (d) Roof, ceiling, wall and floor materials, and associated surfaces are deemed to have the thermal properties listed in *Specification J1.2*.
- (e) The *required Total R-Value* and *Total System U-Value*, including allowance for thermal bridging, must be—
 - (i) calculated in accordance with AS/NZS 4859.2 for a roof or floor; or
 - (ii) determined in accordance with *Specification J1.5a* for *wall-glazing construction*; or
 - (iii) determined in accordance with *Specification J1.6* or Section 3.5 of CIBSE Guide A for soil or sub-floor spaces.



Appendix G Part J3 – Building Sealing

The following prescriptive performance requirements for the façade must be adhered to, as per the NCC:

J3.4 Windows and doors

- (a) A door, openable *window* or the like must be sealed—
 - (i) when forming part of the *envelope*; or
 - (ii) in *climate zones* 4, 5, 6, 7 or 8.
- (b) The requirements of (a) do not apply to—
 - (i) a *window* complying with AS 2047; or
 - (ii) a fire door or smoke door; or
 - (iii) a roller shutter door, roller shutter grille or other security door or device installed only for out-of-hours security.
- (c) A seal to restrict air infiltration—
 - (i) for the bottom edge of a door, must be a draft protection device; and
 - (ii) for the other edges of a door or the edges of an openable *window* or other such opening, may be a foam or rubber compression strip, fibrous seal or the like.
- (d) 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, other than—
 - (i) where the *conditioned space* has a *floor area* of not more than 50 m²; or
 - (ii) where a café, restaurant, open front shop or the like has—
 - (A) a 3 m deep un-conditioned zone between the main entrance, including an open front, and the *conditioned space*; and
 - (B) at all other entrances to the café, restaurant, open front shop or the like, *self-closing* doors.
- (e) A loading dock entrance, if leading to a *conditioned space*, must be fitted with a *rapid roller door* or the like.

J3.5 Exhaust fans

- (a) An exhaust fan must be fitted with a sealing device such as a self-closing damper or the like when serving—
 - (i) a *conditioned space*; or
 - (ii) a *habitable room* in *climate zones* 4, 5, 6, 7 or 8.

J3.6 Construction of ceilings, walls and floors

- (a) Ceilings, walls, floors and any opening such as a *window* frame, door frame, *roof light* frame or the like must be constructed to minimise air leakage in accordance with (b) when forming part of—
 - (i) the *envelope*; or
 - (ii) in *climate zones* 4, 5, 6, 7 or 8.
- (b) Construction *required* by (a) must be—
 - (i) enclosed by internal lining systems that are close fitting at ceiling, wall and floor junctions; or
 - (ii) sealed at junctions and penetrations with—
 - (A) close fitting architrave, skirting or cornice; or
 - (B) expanding foam, rubber compressible strip, caulking or the like.
- (c) The requirements of (a) do not apply to openings, grilles or the like *required* for smoke hazard management.



Design with
community in mind

Level 6, Building B
207 Pacific Highway
St Leonards NSW 2065
Tel +61 +61 2 8484 7000
E sydney@wge.com.au

For more information please visit
www.wge.com.au



WOOD & GRIEVE ENGINEERS

NOW PART OF

