




Ecologically Sustainable Development (ESD) Report

To: Mulpha Hotel
Project: Intercontinental Hotel – Stage 2
Date: 06-08-2020
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DOCUMENT CONTROL

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2549-ESD-r3/gz	06-08-2020	NCC Section J Assessment Report		
Revised section-2 Project scope		Prepared by	Checked by	Approved by
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2549-ESD-r1/gz	29-07-2020	Issue for SSDA (100% issue)
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GLOSSARY

Abbreviation	Full term
BASIX	Building Sustainability Index
COP	Coefficient of Performance
DCP	Development Control Plan
DTS	Deemed-to-satisfy
EIS	Environmental Impact Statement
EP&A	Environmental Planning and Assessment
ESD	Ecologically Sustainable Development
HVAC	Heating, Ventilating and Air Conditioning
LEP	Local Environment Plan
NCC	National Construction Code
SEAR	Secretary's Environmental Assessment Requirements
SSD	State Significant Development

EXECUTIVE SUMMARY

This ESD report provides an outline of design initiatives to be incorporated within the proposed stage-2 refurbishment works of the Intercontinental Hotel Sydney. It is intended to address the project design requirements in accordance with the following planning provisions, including:

- NSW Government Planning, Industry & Environment – Clause 9, Ecologically Sustainable Development, Planning Secretary's Environmental Assessment Requirement (SEAR), *SSD 10454 Issued SEARs*
- NSW Environmental Planning and Assessment Regulation 2000 – Clause 7(4), *Schedule 2 Environmental Impact Statements*
- NSW Government Independent Planning Commission – Clause C11, Environmental Performance, *SSD 7693 Stage-1 Development Consent*
- National Construction Code 2019 – Section J Provisions compliance

We note that the proposed stage-2 project has limited scope of work, hence this report only identified relevant ESD options which are workshopped within the detailed design requirements, primarily covering the reductions in energy and water consumptions:

- Façade improvement
- Lighting efficiency
- HVAC replacement efficiency
- Appliances efficiency
- Fitting & fixture efficiency

Table of Contents

GLOSSARY3

EXECUTIVE SUMMARY4

1 PROJECT INTRODUCTION.....6

1.1 Location and Description.....6

1.2 Project Proposals7

1.3 Purpose7

1.4 Report Limitation7

1.5 SSD Regulatory Compliance7

1.6 Project Documentation.....8

2 ESD FRAMEWORK REQUIREMENTS9

2.1 Stage-1 ESD Report (Energy Action dated 24 October 2016)9

2.2 Stage-2 SSD 10454 Issued SEARs9

2.3 NCC2019 Section J Provisions9

3 SUSTAINABILITY DESIGN STRATEGIES13

3.1 Project Best Practice Commitment13

3.2 Passive Design Elements14

3.3 Services System Efficiency14

3.4 Water Efficiency16

3.5 SEARs Requirements17

4 DESIGN SUMMARY18

1 PROJECT INTRODUCTION

1.1 Location and Description

The site comprises two allotments containing the Intercontinental Hotel (incorporating the former NSW Treasury Building) at 115-119 Macquarie Street. The legal description of the site is:

- Lot 40 DP 41315; and
- Lot 4 DP 785393,

The site (115-119 Macquarie Street) contains two interconnected buildings that comprise:

- The 32-storey Intercontinental Hotel tower, which is located on the corner of Phillip and Bridge Streets set above a podium.
- The State Heritage listed former NSW Treasury Building, which is located on the corner of Macquarie and Bridge Streets.

Immediately to the north of the site (99-113 Macquarie Street) is a seven-storey commercial building known as Transport House, which is locally heritage listed. This site was part of the SSD 7693 Concept approval. Works relating to this portion of the Concept SSDA site will be progressed via a separate planning approval/application. The building is separated from the Treasury Buildings by a narrow laneway, known as Macquarie Lane.



1.2 Project Proposals

The proposal is a Stage 2 (Detailed) SSDA that seeks approval for:

- Various refurbishments to the Intercontinental Hotel tower.
- Alterations to the roof of the Intercontinental Hotel, including expansion of the club lounge and terrace – in compliance with the approved envelope under SSD 7693 (the Concept approval).

The proposed land use is 'tourist and visitor accommodation' (including ancillary uses), consistent with the existing use and what was considered/approved under the Concept approval.

From a staging perspective, no works will be undertaken to Transport House due to its sensitivity and requirement for more consideration, including a competitive design process. It is also noted that internal fit outs to hotel rooms has been progressed via a Complying Development Certificate (CDC) process.

The proposal would increase the GFA of the Intercontinental Hotel tower by 250sqm. The proposal also provides a maximum height of building of RL 114.55 (consistent with the envelope approved under the Concept approval).

1.3 Purpose

The purpose of this report is to assess the project's proposed design against the environmentally sustainable design, water and energy efficiency components in line with the SSD planning standards and conditions. This report addresses:

- Sustainability drivers stipulated from relevant regulatory and project requirements
- Project's design responses corresponding to the sustainability drivers.

1.4 Report Limitation

This report intends to provide the project with ESD guidance developed in accordance to the State Significant Development (SSD) planning framework, overarching project design strategies conform to development objectives and controls. Section-J compliance must refer to designated Section-J DTS and JV3 assessments.

1.5 SSD Regulatory Compliance

The development site is identified as an 'Environmentally sensitive area of State significance' and deemed as a *State Significant Development* under Schedule 1, Clause 13 of the State and Regional Development (SEPP) 2011. The relevant ESD compliance requirements include:

- NSW Government Planning, Industry & Environment – Clause 9, Ecologically Sustainable Development, Planning Secretary's Environmental Assessment Requirement (SEAR), *SSD 10454 Issued SEARs*
- NSW Environmental Planning and Assessment Regulation 2000 – Clause 7(4), *Schedule 2 Environmental Impact Statements*
- NSW Government Independent Planning Commission – Clause C11, Environmental Performance, *SSD 7693 Stage-1 Development Consent*
- National Construction Code 2019 – Section J Provisions compliance

It is noteworthy SSD 7693 Stage-1 DA ESD report was established to address above ESD compliance provisions as an overarching framework for the Intercontinental Hotel related upgrade works; additionally, under Condition C11 of the approved consent, it specifically states '*all future development applications related to the consent must demonstrate the incorporation of ESD principles in accordance with ESD report prepared by Energy Action dated 24 October 2016*', which means stage-2 development must be assessed in accordance to stage-1 ESD framework.

1.6 Project Documentation

This report has been prepared from the following architectural design and compliance specifications:

- Architectural drawing set For SSDA (100% Issue – 24/07/2020) by *Woods Bagot*
- Planning Secretary's Environmental Assessment Requirement (SEARs), SSD 10454
- Development Consent (Stage-1), SSD 7693

2 ESD FRAMEWORK REQUIREMENTS

The following regulatory frameworks are incorporated to the development of Stage-2 upgrade works:

2.1 Stage-1 ESD Report (Energy Action dated 24 October 2016)

This report has identified a range of ESD options covering to the scope of work within this refurbishment project, including:

- Building fabric elements
- HVAC systems
- Electrical services
- Hydraulic services

It is intended the Stage-1 DA ESD options form the basis to assess the relevant ESD elements required within stage-2 scope of works.

2.2 Stage-2 SSD 10454 Issued SEARs

Clause 9 of the SEARs has identified the needs for ESD principles to be incorporated in the design, construction and operation of the development. As a refurbishment work to the existing building, such requirements are limited to the replaced and new building components only.

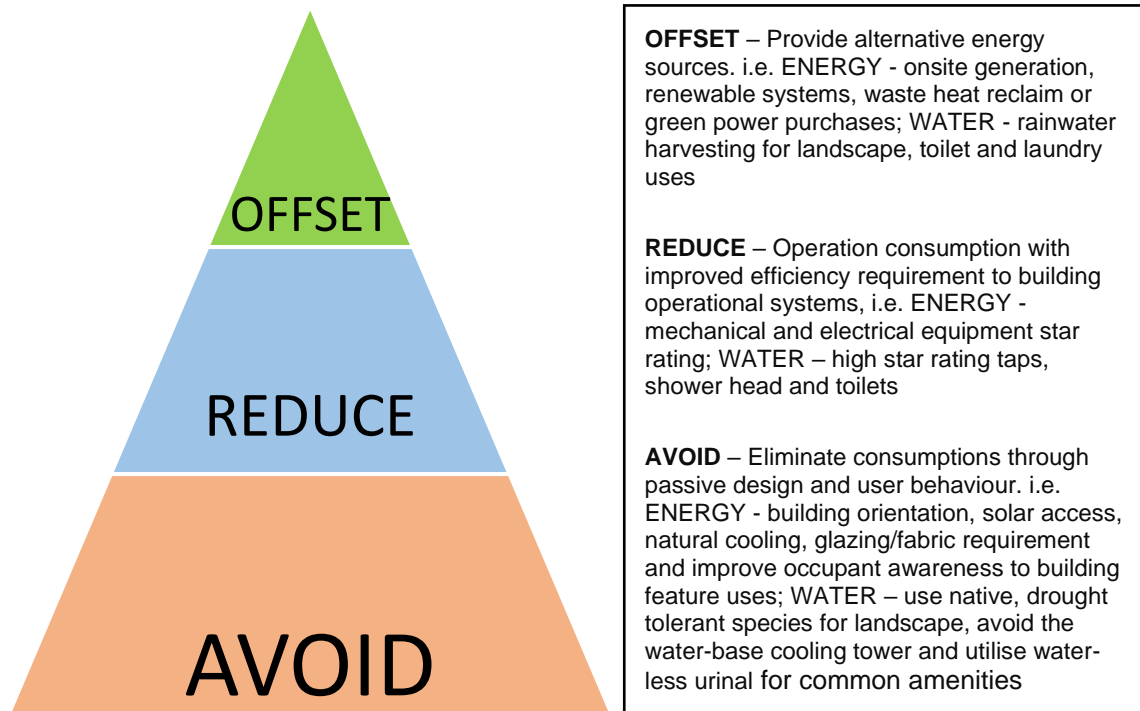
The required ESD principles are defined in clause 7(4) of the EP&A regulation 2000.

2.3 NCC2019 Section J Provisions

The primary objective of Section J provisions is designed to reduce greenhouse gas emissions through improved performance of building fabric elements and operational services systems in the following categories. Deemed-to-Satisfy (DTS) compliance is mandated for project's minimum provision, but it is recommended to exceed the baseline requirement where reasonable, refer to project specific section-J and JV3 compliance requirement in addressing the following provisions:

- J1-Building Fabric
- J3-Building Sealing
- J5-Air-conditioning & ventilation systems
- J6-Artificial lighting & power
- J7-Heated water supply and swimming pool and span pool plant
- J8-Facilities for energy monitoring

Based on above ESD frameworks, our interpretation of this SSD objectives is to ensure project's energy and water resource reduction targets are achieved through means of AVOID, REDUCE and OFFSET design hierarchy action; where the foremost effective strategy is to minimise resource demand through building element design, followed by improving the efficiency of building systems and finally replace non-renewable sources with alternative substitutes. The combined design principles shall reduce the consumptions for energy and water resources, which will minimise the overall building's environmental impact and cost over its lifetime.



From proposed refurbishment scope of work, potential ESD opportunities have been identified as below:

Floor	Proposed work scope	Potential ESD opportunities
L-5 (G)	<ol style="list-style-type: none"> 1. Finishes upgrade to existing Porte cochere with new built-in seating element, water feature, bell desk and lighting. 2. Architectural and finishes upgrade to facade entry of Phillip and Bridge street corner. new balustrade and handrail. 3. DDA compliant ramp. 4. Refurbishment of existing arcade. 5. Repurpose existing retail and circulation space to concierge lounge with concierge desk and BOH/store area. 6. Finishes upgrade to lift lobby, arcade and main circulation area. 7. New floor finish and handrail to existing ramp. 8. Replanning and refurbishment of existing cortile with new bar and banquette seating joinery, some minor changes in floor levels and new steps. 9. Compliance upgrade to existing balustrade 10. Demolition of existing retail space and finishes upgrade to airlock and reception area with new reception counter. 11. Replanning and refurbishment of reception, luggage store and BOH offices. 12. Refurbished air lock and entry glass doors. 13. New entry door to concierge lounge with new half-height wall adjacent to driveway. 	<ul style="list-style-type: none"> • Insulation upgrade to envelope wall • Use zero or low pollutant paints, adhesives and finishes to improve indoor environment • Lighting system upgrade - LED light fitting & control system • Automatic self-closing door and distant air outlet from entry door to minimise conditioned air escape • Existing single glazed, entry door to be replaced with high performance low-E system • New fixtures and fittings must be equal or better than the required rating • Where rainwater harvesting system is available, connect to rainwater for all new toilet flushes

	16. Demolition of existing balustrade and replace with new planter boxes	
L-6	<ol style="list-style-type: none"> 1. Architectural upgrade to facade entry of Phillip and Bridge street corner. 2. Compliance upgrade to existing balustrade 3. Soft refurbishment of existing restaurant. 	<ul style="list-style-type: none"> • Existing single glazed, fixed window to be replaced with high performance low-E system • Use zero or low pollutant paints, adhesives and finishes
L-7	<ol style="list-style-type: none"> 1. Compliance upgrade to cortile balustrade. 2. Architectural upgrade to facade entry of Phillip and Bridge street corner. 3. Compliance upgrade to existing balustrade 4. Compliance upgrade to void balustrade. 	<ul style="list-style-type: none"> • Existing single glazed, fixed window to be replaced with high performance low-E system • Use zero or low pollutant paints, adhesives and finishes
L-32	<ol style="list-style-type: none"> 1. Replanning and refurbishment of existing club lounge. 2. Repurpose existing plant space and lounge to be kitchen. 3. Repurpose existing kitchen to be accessible shower/WC and part of female toilet. replanning and refurbishment of existing bathrooms, including new shower facilities. 4. Western extension of club lounge to align with building line below, including new interior fitout as part of club lounge. 5. Extension of eastern club lounge over existing roof slab to build new deck and enclosed space. 6. Glazed sliding door suites to replace existing doors. 7. Fire egress stair to extend from level 31 to level 32. 8. Finishes upgrade to existing stairs and lift lobby. 9. Relocate existing stairs to BOH area. demolition of existing lintel to create new door opening. 10. Glass & stainless steel balustrade & handrail with dark bronze PVD finish. 	<ul style="list-style-type: none"> • Existing single glazed, door & window to be replaced with high performance double glazed, low-E system • Provision of adaptive shading profiles to all skylight design • Use zero or low pollutant paints, adhesives and finishes • Ensure higher HVAC system efficiency & better control where existing equipment replacement is required • Improve electrical appliances rating and replace old inefficient systems • New fixtures and fittings must be equal or better than the required rating • Improve insulation provision to existing building elements and provide thermal break where metal frame walls are used.
Roof	<ol style="list-style-type: none"> 1. Balustrade & handrail below 2. Dark bronze coloured metal cladding 3. Cladding for new structural support 4. Glazed roof 5. Metal roof 6. Existing metal deck roof - make good interface with existing 7. Existing pre-cast concrete cladding 8. Existing exposed structure proposed to be re-painted 9. Refurbished aluminium louvres to roof top plant 10. All existing composite aluminium cladding to be replaced with solid aluminium cladding 	<ul style="list-style-type: none"> • Provision of light colour finish to all new extended roof

	11. Refurbished building signage 12. Existing gutter 13. Cooling tower plant area - open to sky 14. Metal gutter to engineer's requirements 15. Existing timber deck to be replaced	
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Based on the proposed scope of works, with the exception of level-32 façade replacement and new extensions, other floor works primarily involve minor alterations to existing interior fit-out, hence minimum impact to project's sustainability objectives.

3 SUSTAINABILITY DESIGN STRATEGIES

With the intent to satisfy the SSD sustainability objectives (Section 1.5, and 2) and minimise the environmental impact of this refurbishment and extension development, the following preliminary ESD strategies are proposed to govern the design, construction and operational phases of the project. The proposed design strategies below intend to address recommendations made within Stage-1 DA ESD (S1-ESD) report where relevant.

3.1 Project Best Practice Commitment

Beyond the SSD mandatory requirements, the project is also committed to industry best practices, including early responsible procurements planning, and commitment to minimise long term environmental impact and improve occupant health, such reused, recycled and sustainable sourcing options.

Feature	Design Strategy	Impact
Indoor quality	<ul style="list-style-type: none"> Low/Zero emission interior materials – paint, sealant, adhesive, carpet and engineered wood products 	Promote better indoor environment quality.
Material sourcing	<ul style="list-style-type: none"> Timber products sourced from FSC or PEFC certified supplies, or recycled timber Reuse formwork from another project where relevant Steel products sourced from responsible steel maker Use recycled concrete aggregate reclaimed water for concrete mix Building products used meet Best Practice Guideline for PVC, or contain no PVC content 	Minimise waste, reduce environmental footprint.
Sustainability Rating Scheme	<p>S1-ESD report has highlighted two potential rating systems which the project may target to improve its building performance, minimise environmental impact and boost its market credentials.</p> <ul style="list-style-type: none"> <u>5 star Green Star Design & As-Built rating</u> – The proposed work scope consists of minimal changes to existing building fabrics and overall service systems, a green star rating will not provide significant environmental improvement or operational benefits to the project, therefore green star rating is considered for Stage-2 SSDA <u>NABERS Hotels rating</u> – This rating system translates direct monetary saving by improving its benchmark energy & water score, and also City of Sydney has made it a DA prerequisite for post-construction NABERS rating, as such a NABERS rating is highly recommended for the overall Intercontinental Hotel operation. However, due to Stage-2 limited scope of work, the NABERS rating requirement to be discussed and confirmed with the planning authority. 	<p>Promote better environmental practice and encourage to continuous building improvement through direct financial saving.</p> <p>[S1-ESD: Section 3]</p>
Commissioning	<p>Independent Commissioning Agent must be engaged to ensure new/replacement service systems to deliver the intended performance as per proposed design, such as:</p> <ul style="list-style-type: none"> Building monitoring system & Sub-metering Lighting and control system 	<p>AVOID energy wasted for un-intended or in-efficient uses</p> <p>[S1-ESD: Section 4]</p>

	<ul style="list-style-type: none"> Central plant replacement HVAC system operation Building appliances 	
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3.2 Passive Design Elements

Passive building design have direct influence on thermal comfort and visual quality of the indoor environment. Effective passive design strategy can minimise the energy demands for internal heating and cooling, air-ventilation and artificial lighting throughout the year, which can reduce the local grid supply pressure.

Feature	Design Strategy	Impact
Glazing & shading	<p>Level 5 to 7 – Replace existing standard, single layer glazed entry doors with:</p> <ul style="list-style-type: none"> Low-E high performance type Addition of airlock to minimise infiltration Provision of automatic operated door to all new entrance <p>Level 32 – Replace existing standard, single glazed window & door with:</p> <ul style="list-style-type: none"> Double glazed, low-E, tinted high performance system Retain all existing awning shading to minimise landfill waste. New shading option is unfeasible due to close proximity of building boundary limit. Provision of large skylight for daylight and external view, careful shading design and tinting options to be considered to minimise heat load during summer months 	<p>REDUCE energy required for heating, cooling and lighting needs.</p> <p>[S1-ESD: Section 2.1] [NCC Section-J1 & J3]</p>
Wall & Roof	<p>No provision for existing building elements, but improvement is recommended where fit-out work to be taken:</p> <ul style="list-style-type: none"> Add insulation to existing, un-insulated enveloped walls & roof Provide seal upgrade to leaky building elements Light coloured roof material for rooftop dwellings to reduce heat loads on internal space. 	<p>REDUCE energy required for heating and cooling</p> <p>[S1-ESD: Section 2.1] [NCC Section-J1 & J3]</p>

3.3 Services System Efficiency

Services systems account for the main operational energy consumption during the lifetime of the building. Using highly efficient mechanical, lighting, electrical and hydraulic services systems, can significantly minimise energy demand:

Feature	Design Strategy	Impact
Efficient light system	<ul style="list-style-type: none"> Provision of high output LED light fitting to all replacement lighting system, with design target for 65% of DTS maximum power density provision Provision of efficient lighting controls to relevant areas: <ul style="list-style-type: none"> Motion sensor with manual off/auto-off Control zone no larger than 100m², with stage down the lighting load via dimming levels Daylight sensor/control to perimeter zone 	<p>AVOID energy wasted when spaces are unoccupied, and REDUCE energy required during operation</p> <p>[S1-ESD: Section 2.3] [NCC Section-J6]</p>

	<ul style="list-style-type: none"> ○ Specific design needs for any bump-in and bump-out function lighting ○ Motion sensor and timer for back of house lighting 	
Central plant	<p>The detail for plant upgrade has yet to be confirmed, the following provides guideline for any replacement system:</p> <ul style="list-style-type: none"> • Plant size – adjust sizing of the chiller and boiler needs as consequent improved lighting, high performance glazing system • Chiller plant – selection must be minimum IPLV of 9 • Boiler plant – remove any existing steam boiler where possible, recommended with condensing boiler type • Cooling tower – recommended with induced draft cooling tower and cooling fans must be equipped with variable speed drive 	<p>AVOID energy wasted due to oversized system, and REDUCE energy required to cool and heat during operation</p> <p>[S1-ESD: Section 2.2] [NCC Section-J5]</p>
Efficient air-conditioning, ventilation, and heated hot water systems	<p>The main HVAC system upgrade is expected for L32 major works. The energy use of L32 restaurant/bar will be dictated by outside air provision, and solar load from the glazed facade. Consideration of HVAC system selection should be given to high cooling COP, heat recovery system improve performance, other considerations may include:</p> <ul style="list-style-type: none"> • Use indirect evaporative dewpoint cooler on the outside air supply and reduce cooling load • Addition of shut-off dampers to adjust outside air supply in the period of low/non-occupancy • Replacement fans and pumps must be at least 70% efficient at design point • Replacement motor must be high efficiency defined as per AS1359 • Capable to be fully integrated with the BMS where available • Zone grouping & control for area with similar demands 	<p>REDUCE operational energy required for heating, cooling and ventilation needs.</p> <p>[S1-ESD: Section 2.2] [NCC Section-J5]</p>
Insulation Needs	<p>Provision of insulation to the replaced services pipes, including:</p> <ul style="list-style-type: none"> • Air-conditioning ductwork and pipework • Heated hot water pipework 	<p>REDUCE unwanted heat loss and AVOID reheat energy demand</p> <p>[NCC Section-J5]</p>
Appliances	<p>Replacement of electrical appliances to be at the highest efficiency under the federal government's energy rating scheme at the time of the development</p>	<p>REDUCE operational energy usage.</p>
Hot water	<p>Provision of heat pump or condensing boiler type</p>	<p>REDUCE operational energy usage.</p> <p>[NCC Section-J7]</p>
Renewable Energy	<p>Provision of Solar PV panels to offset grid power, however due to the close proximity of existing roof to the building boundary, such option is deemed unfeasible for stage-2 works but may be considered for future intermediate floor upgrade works.</p>	<p>REDUCE grid energy usage and OFFSET greenhouse gas emission</p> <p>[S1-ESD: Section 2.6]</p>
Building Monitoring	<p>It is not known if building monitoring system upgrade to be included as part of Stage-2 or for future works, but the minimum requirement of section-J compliance is for L32 to</p>	<p>Provide fault detection and optimisation opportunities to AVOID</p>

System & Metering	<p>have energy meter configured to record the time-of-use for gas and electricity consumption.</p> <p>However, it is recommended the entire hotel to be upgraded with a central monitoring system with designated sub-metering to record, analyse and review energy and water consumed by specified services, which can be used to optimise ongoing operation.</p> <ul style="list-style-type: none"> ○ HVAC ○ Lighting ○ Equipment & appliances ○ Hot water ○ Lift & other transport devices ○ Ancillary plants 	<p>waste energy and REDUCE operational demand.</p> <p>[S1-ESD: Section 2.1 & Section 2.4]</p> <p>[NCC Section-J8]</p>
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3.4 Water Efficiency

The reduction of potable water on-site can be achieved through avoid, reduce and reuse saving strategies as the following:

Feature	Design Strategy	Impact
Fittings & Fixtures	<p>Highest efficiency WELS rating fittings and fixtures where practical</p> <ul style="list-style-type: none"> ○ 4 star toilet ○ 6 star urinal (waterless) ○ 4 star shower ○ 6 star tap 	<p>REDUCE the potable water consumption</p> <p>[S1-ESD: Section 2.4]</p>
Appliances & Equipment	<p>Highest efficiency appliances & equipment, WELS 4 star or higher where practical</p> <ul style="list-style-type: none"> ○ Laundry – washer and dryer ○ Kitchen – dishwasher 	<p>REDUCE the potable water consumption</p> <p>[S1-ESD: Section 2.4]</p>
Rainwater Tank	<p>Where existing rainwater harvesting system is available, connect for the following uses (where practical):</p> <ul style="list-style-type: none"> • New toilet flushes • Ground level landscape • Fire sprinkler test system • Cooling towers 	<p>OFFSET potable water consumption with rainwater</p> <p>[S1-ESD: Section 2.4]</p>

3.5 SEARs Requirements

Project responses to section 2.1 SEARs provisions for ESD principles are outlined below:

3.5.1 **Precautionary Principle** – *To avoid where practicable, damage to the environment*

- Review of inherent hazardous materials within the existing building and implement safe practice protocol from site removal to end disposal.
- For existing HVAC system replacement and upgrade, review refrigerant type and the associated environmental impact, assess suitable upgrade options to minimise the risks of refrigerant leaks.
- Promote responsible sourcing, reduce waste through recycled and reduced materials usage during construction, provide high performance glazing to passively reduce building heating and cooling loads which reduce carbon emission.

3.5.2 **Inter-generational equity** – *To increase health and enhance environmental benefits for future generation*

- Requirement for zero/low-toxicity material for interior fitout, improve indoor environmental quality.
- Use of high-performance glazing system to enhance occupant thermal comfort.
- Recycled and recovered construction materials where possible to mitigate the embodied carbon associated with manufacturing and transportation.
- Where possible, all new toilet flush to be supplemented with onsite rain-water system, minimise stormwater runoff. Provision of best in class water fitting and appliances to further reduce potable water demand.

3.5.3 **Conservation of biological diversity and ecological integrity** – *To conserve biological diversity and ecological integrity of the project site*

- The existing building is located on developed site with limited biological and ecological values. The proposed scope aims to enhance the current biological and ecological value by converting existing ground water features on Phillip St into landscape and planter boxes.
- Use native plant species which promote environmental health with minimum water demand.

3.5.4 **Improved valuation, pricing and incentive mechanisms** – *Environmental benefits to be included in valuation of assets and services*

- The value of maximise building sustainability performance can create long term both monetary and non-monetary benefits to occupants, owners and other stakeholders. This refurbishment project aims to improve the level of sustainability performance on the existing building which will impose additional capital costs to the development; but the benefits in improved occupant health and comfort, reduced carbon emission through passive reduction to operational loads, and decreased potable water demand, over the life cycle of the building, which ultimately contribute to the increased asset value and improved financial performance.

4 DESIGN SUMMARY

The design approach as referred to in this report has been prepared against SSD provisions and provided a high-level overview of the proposed Stage-2 project's environmentally sustainable design strategies and proposed energy and water efficiency components.

In response to detailed requirements outlined within energy and water reduction criteria of approved *Stage-1 DA ESD report*, *SEARs requirements* and *NCC2019 Section-J* provisions, the report has included:

- Effective passive design elements, highly efficient systems and alternative resource substitutions to address sustainable design requirements set out under the SSD's objectives and controls
- An outline of SSD's energy efficiency requirements and water reduction measures through combination of approved stage-1 DA ESD framework and project specific proposed strategies, to achieve AVOID, REDUCE and OFFSET in energy and water consumptions.

In summary, based on the proposed design strategies and the commitment to full NCC2019 Section-J compliance, we believe the project shall satisfy the sustainable performance and energy & water conservation criteria as stipulated under Section-1.5 SSD regulatory compliance provisions.




SSD's ESD Provisions	Proposed Compliance Strategies	SSD Compliance Achieved?
Objectives to minimise energy/water usage & environmental impact through hierarchy actions: - AVOID / REDUCE / OFFSET	<p><u>NCC Section J</u> - J1 to J8 DTS compliance design requirements to AVOID & REDUCE energy/emission <input checked="" type="checkbox"/></p> <p><u>Issue condition 9, SSD-10454 Issued SEARs</u> – Demonstrate ESD principles are incorporated in the design, construction and ongoing phase of the development. <input checked="" type="checkbox"/></p> <p><u>Clause C11, SSD 7693 Development Consent</u> – Demonstrate project's ESD principles incorporated in accordance with Stage-1 ESD report prepared by Energy Action dated 24 Oct 2016. <input checked="" type="checkbox"/></p>	Yes

NCC 2019 SECTION-J REPORT

Intercontinental Hotel Refurbishment - Stage 2

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		Greg Zheng	Rob Romanous	Greg Zheng
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Table of Contents

EXECUTIVE SUMMARY	4
1 BASIS OF ASSESSMENT	5
1.1 Location and Description.....	5
1.2 Project Proposals	6
1.3 Purpose	6
1.4 Building Code of Australia	6
1.5 Limitations	6
1.6 Design Documentation.....	7
2 BUILDING DESCRIPTION	8
2.1 Classification (Clause A3.2)	8
2.2 Climate Zone (Clause A1.1).....	9
3 SUMMARY OF PROVISIONS TO COMPLY WITH SECTION J	10
3.1 Part J1.1 - Building Fabric.....	10
3.2 Part J1.2 – Glazing.....	10
3.3 Part J3 - Building Sealing.....	11
3.4 Part J7 - Hot Water Supply	11
3.5 Part J8 - Facilities for Energy Monitoring	11
4 DETAILED ASSESSMENT	12
4.1 Part J1 - Building Fabric.....	12
4.2 Part J2 – This Part has deliberately been left blank	19
4.3 Part J3 - Building Sealing.....	20
4.4 Part J4 - Air Movement - This Part has deliberately been left blank.....	21
4.5 Part J5 - A/C & Ventilation Systems	22
4.6 Part J6 - Artificial Lighting and Power	23
4.7 Part J7 - Heated Water Supply, Swimming Pool & Spa Pool	24
4.8 Part J8 - Facilities for Energy Monitoring	25
5 STATEMENT OF COMPLIANCE	26
ANNEXURE A – DESIGN DOCUMENTATION	27
APPENDIX 1 – BUILDING ENVELOPE.....	28
APPENDIX 2 – WALL CONSTRUCTION DETAILS.....	29
APPENDIX 3 – EVIDENCE OF COMPLIANCE CHECK LIST	31

EXECUTIVE SUMMARY

BCA Energy has been engaged by Mulpha Hotel to provide an assessment under Section J Energy Efficiency Deemed-to-Satisfy (DTS) provisions, Volume1, National Construction Code (NCC) 2019 for the proposed Stage-2 refurbishment works at the Intercontinental Hotel Sydney.

Highlighted within section-3 of this report, the summary tables identify the relevant NCC section J provisions and nominates the minimum prescriptive requirements for the proposed project to achieve compliance. Should the DTS requirements be deemed impractical, JV3 performance based design solutions can be adopted as an alternative section J compliance pathway.

Based on the project nominated design specification, whilst most of the development may achieve or is capable of compliance under the specified Section J DTS provisions, the proposed oversized skylight design exceeded maximum DTS allowance and hence must refer to *JV3 alternative solution* pathway for a full NCC Section J compliance assessment.

1 BASIS OF ASSESSMENT

1.1 Location and Description

The site comprises two allotments containing the Intercontinental Hotel (incorporating the former NSW Treasury Building) at 115-119 Macquarie Street. The legal description of the site is:

- Lot 40 DP 41315; and
- Lot 4 DP 785393,

The site (115-119 Macquarie Street) contains two interconnected buildings that comprise:

- The 32-storey Intercontinental Hotel tower, which is located on the corner of Phillip and Bridge Streets set above a podium.
- The State Heritage listed former NSW Treasury Building, which is located on the corner of Macquarie and Bridge Streets.

Immediately to the north of the site (99-113 Macquarie Street) is a seven-storey commercial building known as Transport House, which is locally heritage listed. This site was part of the SSD 7693 Concept approval. Works relating to this portion of the Concept SSDA site will be progressed via a separate planning approval/application. The building is separated from the Treasury Buildings by a narrow laneway, known as Macquarie Lane.



1.2 Project Proposals

The proposal is a Stage 2 (Detailed) SSDA that seeks approval for:

- Various refurbishments to the Intercontinental Hotel tower.
- Alterations to the roof of the Intercontinental Hotel, including expansion of the club lounge and terrace – in compliance with the approved envelope under SSD 7693 (the Concept approval).

The proposed land use is 'tourist and visitor accommodation' (including ancillary uses), consistent with the existing use and what was considered/approved under the Concept approval.

From a staging perspective, no works will be undertaken to Transport House due to its sensitivity and requirement for more consideration, including a competitive design process. It is also noted that internal fit outs to hotel rooms has been progressed via a Complying Development Certificate (CDC) process.

The proposal would increase the GFA of the Intercontinental Hotel tower by 250sqm. The proposal also provides a maximum height of building of RL 114.55 (consistent with the envelope approved under the Concept approval).

1.3 Purpose

The purpose of this report is to assess the design proposal against the Deemed-to-Satisfy provisions of Section J of the NCC 2019, and to clearly outline those areas where compliance is not achieved.

The Report addresses ONLY matters relevant to Section 'J' of Volume 1 of the NCC pertaining to the Class 3 & 6 portion of the building. It is assumed relevant discipline specialised consultants are engaged to ensure compliance of service design requirements within section J5 & J6 provisions, hence this assessment does not include the following sub-sections.

- a) Part J5 Airconditioning and ventilation systems*
- b) Part J6 Artificial lighting and power*

1.4 Building Code of Australia

This report is based on the Deemed-to-Satisfy Provisions of Section J of the National Construction Code Series Volume 1 - Building Code of Australia, 2019 Edition incorporating the State variations where applicable. Please note that the version of the NCC applicable is the version applicable at the time of the Construction Certificate Application is dated as received by the certifying authority.

1.5 Limitations

This report does not include nor imply any detailed assessment for design, compliance or upgrading for -

Sections B, C, D, E, F, G, H and I of the NCC;

The structural adequacy or design of the building;

The inherent derived fire-resistance ratings of any proposed structural elements of the building (unless specifically referred to); and

The design basis and/or operating capabilities of any proposed electrical, mechanical or hydraulic fire protection services.

This report does not include, or imply compliance with:

- c) The National Construction Code - Plumbing Code of Australia Volume 3
- d) The Disability Discrimination Act;
- e) The Premises Standard;
- f) Demolition Standards not referred to by the NCC;
- g) Occupational Health and Safety Act;
- h) Requirements of other Regulatory Authorities including, but not limited to, Telstra, Sydney Water, Electricity Supply Authority, WorkCover, RTA, Council and the like;
and
- i) Conditions of Development Consent
- j) Any insulation or sarking is required to be non-combustible material in accordance with BCA Specification C1.1.

1.6 Design Documentation

This report has been based on the Design plans and Specifications listed in Annexure A of this Report.

2 BUILDING DESCRIPTION

For the purpose of the NCC the development may be described as follows.

2.1 Classification (Clause A3.2)

The Building has been classified as follows:

Class	Level	Description
3	5 to 7	Existing hotel façade refurbishment
6	32	Rooftop extension – Dining/Bar

This Report addresses ONLY matters relevant to Section 'J' of Volume 1 of the NCC pertaining to the Class 3 & 6 portion/s of the building.

- Level 5 – Entry glazed doors replacement (Phillip St)
- Level 6 – Existing window replacement (Phillip St & Bridge St)
- Level 7 – Existing window replacement (Phillip St & Bridge St)
- Level 32 – New window to all façades, new western and eastern area extension

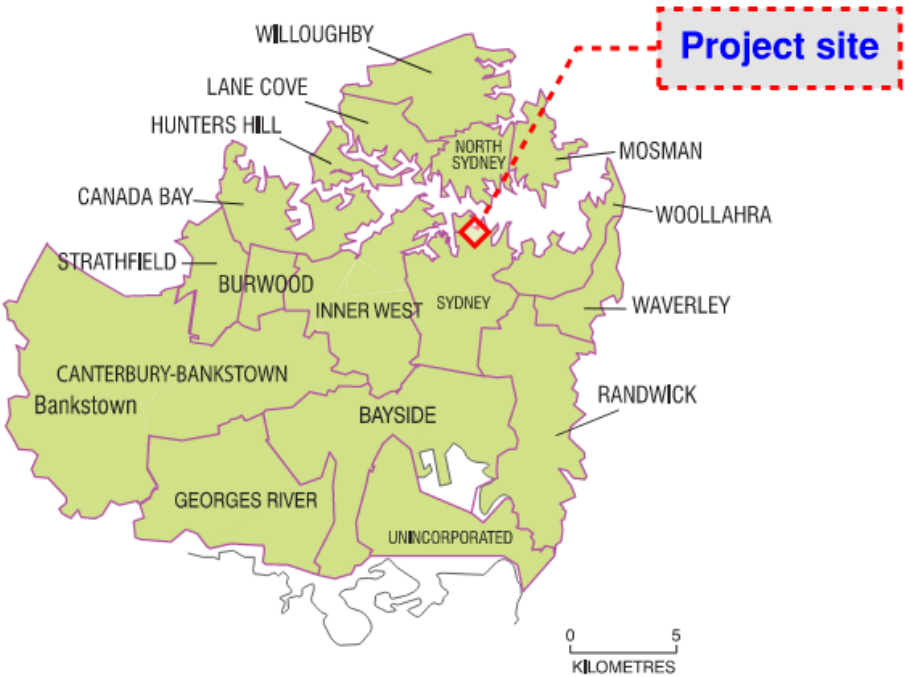
2.2 Climate Zone (Clause A1.1)

The building is located within Climate Zone No.5 . Any reference to ‘this climate zone’ throughout the report is referring to Climate Zone No.5

Climate Zones



Sydney Urban



3 SUMMARY OF PROVISIONS TO COMPLY WITH SECTION J

The following is a summary of the requirements for compliance for Section J to be achievable, for full details of the assessment see Part 4 of this report:

3.1 Part J1.1 - Building Fabric

Building Element	DTS Provision	Off-set	Min. to Comply	Comply	Proposed Compliance
L32 Extension - Metal insulated <u>Roof</u> (<0.45 Solar Absorption)	Rt3.70	NA	Rt3.70	Yes	Add R3.5 insulation
L32 Skylight / Roof light	<=5% U-3.9 SHGC-0.29	NA	NA	No*	Area exceeds 5%, refer to JV3 alternative assessment
Existing upgrade - External FC cladded <u>wall</u>	Rt1.0	NA	Rt1.40	Yes	Add R2.20 insulation
Existing upgrade - Internal FC cladded <u>wall</u>	Rt1.4	NA	Rt1.40	Yes	Add R1.90 insulation
New Suspended <u>floor</u>	Rt2.0	NA	Rt2.03	Yes	Add R3.50 insulation + 16mm thermal break

NB Any insulation or sarking is required to be non-combustible material in accordance with BCA Specification C1.1.

* A JV3 Alternative Solution is required to assess skylight light area over 5% of total area serving.

Ceiling Assumption	The loss of insulation area because of exhaust fans, flues or down-lights is less than 0.5% of the ceiling area.
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3.2 Part J1.2 – Glazing

Level 32 (Part J1 provision):

Floor	Methodology	System U-Value*	System SHGC	System Type
All External glazing	WERS	3.20	0.29	Double, low-e, grey, Al frame
All Internal glazing	WERS	5.80	0.75	Single, clear, Al frame

Level 5 to Level 7 (Replacements to existing, non-Part J1 provision):

Floor	Methodology	System U-Value*	System SHGC	System Type
L5 Entry doors Reception & Concierge	WERS	4.6	0.64	Single, low-e, clear, Al frame
L6 & L7 Phillip & Bridge glazing replacement	WERS	4.6	0.64	Single, low-e, clear, Al frame

3.3 Part J3 - Building Sealing

Building Element	Comment
New Entry Doors	Must be self-closing provided with weather seals.
New Exhaust Fans	Must have self-closing dampers.
Bi-Fold Doors	Any bi-fold doors must be interlocked to ensure the air-conditioning system is inactive when these doors are open.
Open Shop Front	Ensuring the last air conditioning outlet is at least 3 meters front the front entrance and all other door are self-closing.
Roof Lights	A roof light must be sealed when serving a conditioned space and must be constructed with an impermeate ceiling diffuser or a weatherproof seal if it is a roof window, or a readily operable shutter system.
Roof, Walls & Floor	Minimise air leakage by enclosed or internal lining systems that are close fitting at ceiling, wall and floor junctions or sealed by caulking, skirting, architraves, cornices or the like.

3.4 Part J7 - Hot Water Supply

Building Element	Comment
Food preparation and sanitary purposes	Must be designed and installed in accordance with Part B2 of NCC Volume Three – Plumbing Code of Australia.

3.5 Part J8 - Facilities for Energy Monitoring

Monitoring	Comment
Energy Monitoring	At minimum, L32 requires energy meters configured to record the time-of-use consumption of gas and electricity.
	For overall hotel upgrade, it is recommended the building/buildings to provide separate facilities for recording the electricity used in each building.
	A facility to record individually the energy consumption of – a) Air-conditioning plant, b) Artificial lighting, c) Appliance power, d) Central hot water supply, e) Internal transport devices, and other ancillary plant.

4 DETAILED ASSESSMENT

4.1 Part J1 - Building Fabric

J1.1 Application - All new parts of the new building envelope need to comply.

The deemed-to-satisfy provisions of this part apply to building elements forming the envelope of a Class 2 to 9 building.

Building Envelope – The building envelope for the purpose of this Section J is described as the external walls, glazing, floors, ceiling and roof of any conditioned space within the proposed Class 3 & 6 premises, as well as any internal walls or floors of the premises exposed to an unconditioned space. Please see APPENDIX 1 for building envelope and insulation mark-up.

For existing building components, NCC section-J provision compliance generally does not apply in accordance with ABCB's *Upgrading Existing Buildings* protocol. However, where minor upgrade to be made on existing building elements, the replacement parts must achieve equal or better performance, which include:

- Level 5 – Single glazed entry doors replacement
- Level 6 – Single glazed, fixed window replacement
- Level 7 – Single glazed, fixed window replacement

Level 32 refurbishment work involves significant alterations to the existing floor's building fabric, a full compliance with NCC Section-J is required.

J1.2 Thermal Construction General - Builder is to ensure compliance, during construction.

- Insulation must comply with AS/NZS 4859.1.
- Abuts or overlaps adjoining insulation other than at supporting members such as studs, noggin, joists, furring channels where the insulation must be against the member.
- Forms a continuous barrier with ceilings, walls, bulkheads, floors or the like that contribute to the thermal barrier.
- Does not affect the safe or effective operation of a service or fitting.
- Reflective insulation must be installed with the necessary airspace between the reflective insulation and a lining or cladding.
- Reflective insulation must be installed closely against any penetration, door or window opening.
- Reflective insulation must be adequately supported by framing members
- Each adjoining sheet of roll membrane being overlapped not less than 50mm or taped together.
- Bulk insulation must be installed so that it maintains its position and thickness.
- When selecting insulation, caution should be taken to clearly identify the total R-value of the installed roofing, ceiling, floor and wall systems.
- Total R-Value and Total System U-Value, must include allowance for thermal bridging, which in accordance with:
 - AS/NZS 4859.2 for a roof or floor, or
 - Specification J1.5a for wall-glazing construction, or
 - Specification J1.6 or Section 3.5 of CIBSE Guide A for soil or sub-floor spaces

J1.3 Roof & Ceiling Construction

- In this Climate Zone (5), a minimum total R-value of R3.7 (downwards), for the conditioned spaces.
- In Climate Zone 1 to 7, the solar absorption of the upper surface of a roof must be no more than 0.45.

TYPE-1 L32 Extension Metal Roof: R-Value R3.7 Climate-6 (Solar Absorption <0.45)

The new extension roof & ceiling system that is a light-coloured, metal roof with plasterboard ceiling has an R-value of R0.44 (<5°) (downwards). Additional insulation is required to comply a minimum total R-value of R3.70.

Roof & Ceiling Element	R-Value Unventilated-Down
Outside air film	0.04
Light colour metal Roof (Solar Absorption <0.45)	0.00
<i>Additional Insulation</i>	3.26
Airspace (Non-Reflective)	0.18
Plasterboard	0.06
Internal air film	0.16
Total R-value	3.70

Compliance can be met by:

- For new metal roof, installing 140mm batt or equivalent insulation which provide an additional R3.50 (or minimum R3.30), achieving **total R-value of R3.94**, which exceeds the required minimum of R3.70.
- Any insulation or sarking is required to be non-combustible material in accordance with BCA Specification C1.1.

Colour	Solar Absorptance	BCA Classification	BASIX Classification
Classic Cream™	0.32	L	L
Surfmist®	0.32	L	L
Paperbark®	0.42	M	L
Evening Haze®	0.43	M	L
Shale Grey™	0.43	M	L
Sandbank®	0.46	M	L
Dune®	0.47	M	L
Windspray®	0.58	M	M
Pale Eucalypt®	0.60	M	M
Bushland®	0.62	D	M
Headland®	0.63	D	M
Wilderness®	0.65	D	M
Jasper®	0.68	D	M
Manor Red®	0.69	D	M
Woodland Grey®	0.71	D	D
Loft®	0.71	D	D
Monument®	0.73	D	D
Ironstone®	0.74	D	D
Cottage Green®	0.75	D	D
Deep Ocean®	0.75	D	D

DTS

Alternative Solution

J1.4 Roof lights

- a) A total area of roof lights must not exceed 5% of the floor area of the room or space served; and
- b) Transparent and translucent elements, including imperforated ceiling diffuser, must comply with, -
 - i. Table J1.4 for Total system SHGC, and
 - ii. Not more than U3.9 for Total system U-value

Notes to Table J1.4:

Table J1.4 Roof lights - Total system SHGC

<i>Roof light</i> shaft index ^{Note 1}	Total area of <i>roof lights</i> up to 3.5% of the <i>floor area</i> of the room or space	Total area of <i>roof lights</i> more than 3.5% and up to 5% of the <i>floor area</i> of the room or space
< 1.0	≤ 0.45	≤ 0.29
≥ 1.0 to < 2.5	≤ 0.51	≤ 0.33
≥ 2.5	≤ 0.76	≤ 0.49

- The *roof light* shaft index is determined by measuring the distance from the centre of the shaft at the roof to the centre of the shaft at the ceiling level and dividing it by the average internal dimension of the shaft opening at the ceiling level (or the diameter for a circular shaft) in the same units of measurement.
- The area of a *roof light* is the area of the roof opening that allows light to enter the building. The total area of *roof lights* is the combined area for all *roof lights* serving the room or space.

In this project skylights are added within the Level-32 western extension area.

Compliance can be met by:

- To achieve DTS compliance, the roof light area must not exceed 5% of the floor area served, with a maximum **U-value of 3.90**, AND maximum **SHGC values** refer to the table below.

	New Western Extension
No. skylight	11
Total skylight area (m2)	152
Floor area serving (m2)	231.30
Skylight to floor area (%)	65.7%
Max 5% DTS compliance	No* (~11.5m ²)
Shaft index	0.09
Skylight U-value	3.9
Skylight SHGC	0.29

*The proposed area of the skylights is too large to comply, area reduction is proposed OR alternatively, refer to JV3 alternative solution methodology.

J1.5 Wall and Glazing

The Total System U-Value and the Solar Admittance of wall-glazing construction must be calculated in accordance with Specification J1.5a and J1.5b of NCC 2019 provision:

- a) The Total System U-Value of wall-glazing construction must not be greater than -
 - i. for a Class 2 common area, a Class 5, 6, 7, 8 or 9b building or a Class 9a building other than a ward area, **U2.0**; and
 - ii. for a Class 3 or 9c building or a Class 9a ward area –
 - (a) in climate zones 2 or 5, **U2.0**; or
- b) The Total System U-Value of display glazing must not be greater than **U5.8** (for shop or showroom adjacent to walkway or footpath, not including café or restaurants).
- c) Wall components of a wall-glazing construction must achieve a minimum Total R-Value of -
 - i. where the wall is less than 80% of the area of the wall-glazing construction, **R1.0**; or
 - ii. where the wall is 80% or more of the area of the wall-glazing construction, the value specified in Table J1.5a

Table J1.5a Minimum wall Total R-Value - Wall area 80% or more of wall-glazing construction area

<i>Climate zone</i>	Class 2 common area, Class 5, 6, 7, 8 or 9b building or a Class 9a building other than a <i>ward area</i>	Class 3 or 9c building or Class 9a <i>ward area</i>
1	2.4	3.3
2	1.4	1.4
3	1.4	3.3
4	1.4	2.8
5	1.4	1.4
6	1.4	2.8

- d) The solar admittance of externally facing wall-glazing construction must not be greater than -
 - i. for a Class 6 space, the values specified in Table J1.5b; and

Table J1.5b Maximum wall-glazing construction solar admittance - Class 2 common area, Class 5, 6, 7, 8 or 9b building or Class 9a building other than a ward area

<i>Climate zone</i>	Eastern aspect <i>solar admittance</i>	Northern aspect <i>solar admittance</i>	Southern aspect <i>solar admittance</i>	Western aspect <i>solar admittance</i>
1	0.12	0.12	0.12	0.12
2	0.13	0.13	0.13	0.13
3	0.16	0.16	0.16	0.16
4	0.13	0.13	0.13	0.13
5	0.13	0.13	0.13	0.13
6	0.13	0.13	0.13	0.13
7	0.13	0.13	0.13	0.13
8	0.2	0.2	0.42	0.36

Table J1.5c Maximum wall-glazing construction solar admittance - Class 3 or 9b building or Class 9a ward area

<i>Climate zone</i>	Eastern aspect <i>solar admittance</i>	Northern aspect <i>solar admittance</i>	Southern aspect <i>solar admittance</i>	Western aspect <i>solar admittance</i>
1	0.07	0.07	0.10	0.07
2	0.10	0.10	0.10	0.10
3	0.07	0.07	0.07	0.07
4	0.07	0.07	0.07	0.07
5	0.10	0.10	0.10	0.10
6	0.07	0.07	0.07	0.07
7	0.07	0.07	0.08	0.07
8	0.08	0.08	0.08	0.08

Refer to Table J1.5a above for minimum wall and façade performance requirement.

- Level 32 Refurbishment and Extension

Orientation	Class	Min. Wall R-value (m ² .K/W)	Max. DTS U-value (W/m ² .K)
N	6	1.0	2.0
E	6	1.0	2.0
S	6	1.0	2.0
W	6	1.0	2.0
Internal Envelope wall	6	1.4	2.0

- Level 5 – 7 Hotel Floor

Not Applicable to existing façade with minor refurbishment works.

J1.5.1 Façade Systems

Total Façade System Value:

- Level 32 Refurbishment and Extension

Compliance	Facade	U-value	Solar Admittance	Compliance
Method 1 – Façade	<u>North</u>	1.92	0.14	No
	<u>East</u>	2.06	0.08	No
	<u>South</u>	1.36	0.10	Yes
	<u>West</u>	2.08	0.17	No
Method 2 – Combined facades	U-value		<1.97 of 2.0	Yes
	AC Energy		<107 of 107	Yes

Nominated compliance pathway: Method-2

J1.5.2 Glazing Elements

Nominated Glazing system types – Level 32 (Part J1 provision):

Floor	Methodology	System U-Value*	System SHGC	System Type
All External glazing	WERS	3.20	0.29	Double, low-e, grey, Al frame
All Internal glazing	WERS	5.80	0.75	Single, clear, Al frame

Nominated Glazing system types – Level 5 to Level 7 (Replacements to existing, non-Part J1 provision):

Floor	Methodology	System U-Value*	System SHGC	System Type
L5 Entry doors Reception & Concierge*	WERS	4.6	0.64	Single, low-e, clear, Al frame
L6 & L7 Phillip & Bridge glazing replacement*	WERS	4.6	0.64	Single, low-e, clear, Al frame

*The existing element is a standard clear, single glazed system, with U-value no less than 5.8; the proposed replacement to be single low-E equivalent or better system.

J1.5.3 Wall Elements

Nominated wall construction types for the projects; refer to Appendix-2 for Wall construction detail (incl. thermal bridging losses)

- Level 32

Wall system types	DTS Provision	Min. to Comply Insulation R-value (m ² .K/W)	Min. to Comply Total system R-value (m ² .K/W)
<u>Existing External FC clad</u> <u>stud wall</u> 9mm FC, 87mm insulation, 90mm steel stud (6mm thermal break), 11mm PB and 11mm fire rated PB	Rt1.0	R2.20	Rt1.40
<u>Existing Internal FC clad</u> <u>stud wall</u> 9mm FC, 76mm insulation, 90mm steel stud (6mm thermal break), 11mm PB and 11mm fire rated PB	Rt1.4	R1.90	Rt1.40

- Level 5 – 7

No Applicable refurbishment works.

J1.6 Floors

- A floor must achieve the Total R-Value specified in Table J1.6.
- A floor must be insulated around the vertical edge of its perimeter with insulation having an R-Value greater than or equal to 1.0 when the floor—
 - is a concrete slab-on-ground in *climate zone 8*; or
 - has an in-slab or in-screed heating or cooling system, except where used solely in a bathroom, amenity area or the like.
- Insulation required by (b) for a concrete slab-on-ground must—
 - be water resistant; and
 - be continuous from the adjacent finished ground level—
 - to a depth not less than 300 mm; or
 - for the full depth of the vertical edge of the concrete slab-on-ground.

The sub-floor and soil R-Value must be calculated in accordance with Specification J1.6 or Section 3.5 of CIBSE Guide A.

Location	<i>Climate zone 1</i> — up- wards heat flow	<i>Climate zones 2 and 3</i> — upwards and downwards heat flow	<i>Climate zones 4, 5, 6 and 7</i> — downwards heat flow	<i>Climate zone 8</i> — downwards heat flow
A floor without an in-slab heating or cooling system	2.0	2.0	2.0	3.5
A floor with an in-slab heating or cooling system	3.25	3.25	3.25	4.75

The proposed suspended floor for L32 western extension has un-insulated R-value of R0.51 overall compliance without additional insulation requirement.

Suspended floor

Floor Element	R-Value
Outdoor air film	0.03
Steel frame <ul style="list-style-type: none"> ○ 20% framing area with 8mm thermal break on both side of the frame (total 16mm) ○ additional insulation 	Thermal bridging is included to determine insulation layer below
<i>Additional insulation</i>	<i>1.49 minimum</i>
Air space	0.17
Timber floor layer	0.15
Indoor air film	0.16
Total R-value	2.00 minimum

Compliance can therefore be met by the following:

Adding 140mm bulk insulation with total of 16mm thermal break to steel frame or better which provides an added **R-value of 1.53**. This will achieve a **total 'value' of R2.03 which exceeds the required R-value of R2.0**

4.2 Part J2 – This Part has deliberately been left blank

4.3 Part J3 - Building Sealing

J3.1 Application

Applies to elements forming the envelope of a Class 2 to 9 building other than -

- i. A building in climate zones 5 where the only means of air-conditioning is by using an evaporative cooler; OR
- ii. A permanent building opening, in a space where a gas appliance is located, that is necessary for the safe operation of a gas appliance; OR
- iii. A building or space where the mechanical ventilation required by Part F4 (Health and amenity – ventilation) provides sufficient pressurisation to prevent infiltration.

J3.2 Chimneys and Flues

The chimney or flue of an open solid-fuel burning appliance must be provided with a damper or flap that can be closed to seal the chimney or flue.

J3.3 Roof Lights

A roof light must be sealed when serving a conditioned space and must be constructed with an imperforate ceiling diffuser or a weatherproof seal if it is a roof window, or a readily operable shutter system (manual, mechanical or electronic).

J3.4 Windows and doors

All external envelope doors and windows must either have seals to restrict air infiltration or the windows must comply with AS 2047.

An entrance to a building must have an airlock, self-closing door, rapid roller door, revolving door or the like...where the conditioned space has a floor area greater than 50m².

Compliance can be met by the following:

- All new entry doors must be self-closing.
- All bi-fold doors must be interlocked to ensure the air-conditioning system is inactive when these doors are open.

An open shop front must have a 3m deep unconditioned zone between the open front and the conditioned space, and all other entrances must have self-closing doors.

Compliance can be met by the following:

- Ensuring the last air conditioning outlet is at least **3 metres** from the front entrance and all other doors are self-closing.

J3.5 Exhaust Fans

All exhaust fans fitted in a conditioned space must have a sealing device such as a self-closing damper or the like.

Compliance can be met by:

- Any new exhaust fans to have self-closing dampers, including “miscellaneous exhaust fans”.

J3.6 Constructions of roofs, walls and floors

Roofs, ceilings, walls and floors and any opening such as a window or door must be constructed to minimise air leakage by -

- Enclosed by internal lining systems that are close fitting at ceiling, wall and floor junctions or
- Sealed by architraves, skirting, cornices or expanding foam, rubber compressible strip, caulking or the like.

J3.7 Evaporative coolers

An evaporative cooler must be fitted with a self-closing damper when serving -

- i. A heated space; or
- ii. A habitable room or a public area of a building in Climate Zones 5.

4.4 Part J4 - Air Movement - This Part has deliberately been left blank

4.5 Part J5 - A/C & Ventilation Systems

Detailed air-conditioning and ventilation system sizing and compliance requirements must refer to Mechanical design documentation.

4.6 Part J6 - Artificial Lighting and Power

Detailed lighting, power control, water storage units, lifts, escalators and moving walkways compliance requirements must refer to Electrical design documentation.

4.7 Part J7 - Heated Water Supply, Swimming Pool & Spa Pool

J7.2 Heated Water Supply

Builder to generally ensure system for food preparation and sanitary purposes must be designed and installed in accordance with Part B2 of NCC Volume Three – Plumbing Code of Australia

Compliance can be met by:

- Specifying system as per required under Part B2 of NCC Volume Three – Plumbing Code of Australia

J7.3 Swimming Pool Heating and Pumping - Not Applicable

J7.4 Spa Pool Heating and Pumping - Not Applicable

4.8 Part J8 - Facilities for Energy Monitoring

J8.1 Application

The provisions of this part do not apply to a sole-occupancy unit of a Class 2 building, a Class 4 part of a building or to a Class 8 electricity network substation.

J8.2 *****

J8.3 Facilities for Energy Monitoring

- a) A building or sole-occupancy unit with a floor area of more than 500 m² must have an energy meter configured to record the time-of-use consumption of gas and electricity.
- b) A building with a floor area of more than 2500 m² must have energy meters configured to enable individual time-of-use energy consumption data recording, in accordance with (c), of the energy consumption of, air-conditioning plant, artificial lighting, appliance power, central hot water supply, internal transport devices, and other ancillary plant.
- c) Energy meters required by (b) must be interlinked by a communication system that collates the time-of-use energy consumption data to a single interface monitoring system where it can be stored, analysed and reviewed.
- d) The provisions of (b) do not apply to a Class 2 building with a floor area of more than 2500 m² where the total area of the common areas is less than 500 m².

Compliance can be met by:

- **For Level 32 upgrade** works with a floor area over 500 m² (<2500 m²), minimum requirement is to provide energy meters configured to record the time-of-use consumption of gas and electricity, i.e. smart meters. However, as an overall hotel upgrade works, the following energy monitoring facility provision is recommended.
- **For the entire building upgrade**, where floor area greater than 2500m², it must have the facility to record individual time-of- use energy consumption data for the air-conditioning plant, artificial lighting, appliance power, central hot water supply, internal transport devices, and other ancillary plant, i.e. smart meters with building management system for data collection and management.

5 STATEMENT OF COMPLIANCE

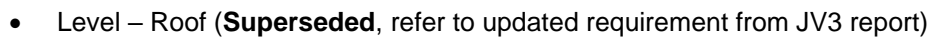
The design documentation as referred to in Appendix-1 of this report has been assessed against the applicable provisions of Section J of the National Construction Code (NCC) and it is considered that such documentation achieves or is capable of full compliance under the specified Section J provisions, with the exception of oversized skylight requirement to be assessed under JV3 alternative solution pathway.

ANNEXURE A – DESIGN DOCUMENTATION

This report has been based on the following design documentation prepared by *Woods Bagot*, Issue for SSDA (100% issue), dated as 24/07/2020,

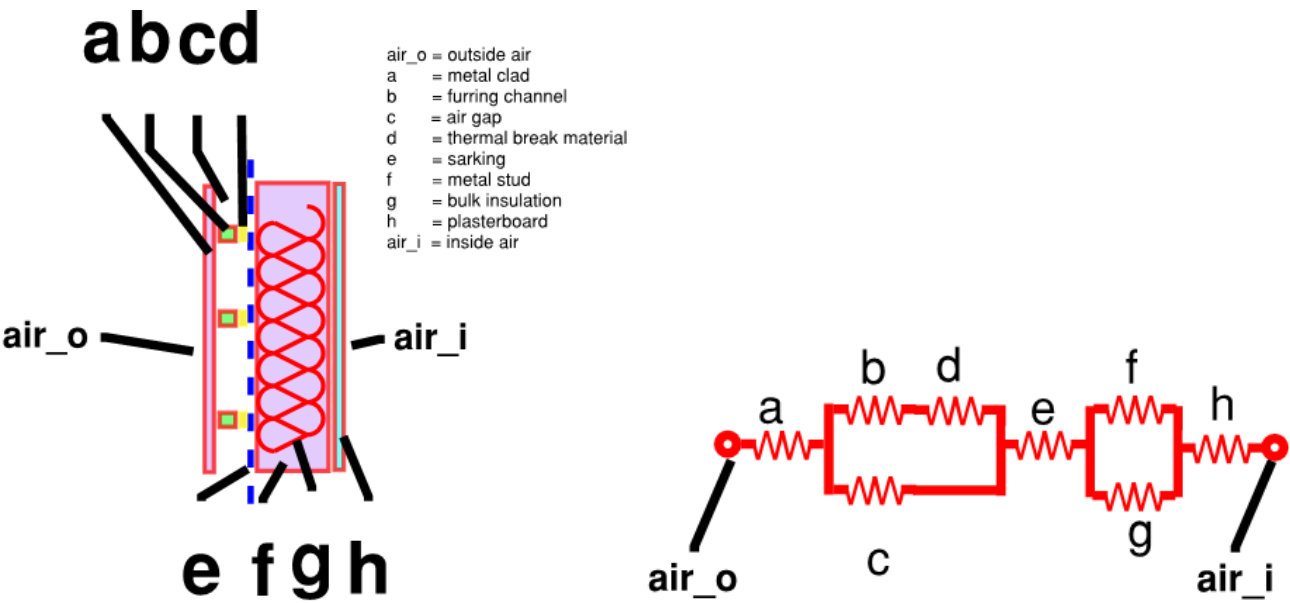
NUMBER	NAME	REVISION	SCALE
ST2-DA- 00000	COVER SHEET	A	
ST2-DA- 00001	DRAWING LIST	B	
ST2-DA- 10000	SITE CONTEXT PLAN	A	1:1000
ST2-DA- 10001	SITE PLAN	B	1:500
ST2-DA- 11000	STAGING PLANS	B	N.T.S.
ST2-DA- 12000	SHADOW DIAGRAMS	A	1:5000
ST2-DA- 13000	GFA PLANS	A	1:500
ST2-DA- 14000	3D HEIGHT PLANE DIAGRAM	A	N.T.S.
ST2-DA- 15000	PUBLIC DOMAIN PLANS	A	1:250
ST2-DA- 19050	EXISTING FLOOR PLAN - LEVEL 05	A	1:200
ST2-DA- 19060	EXISTING FLOOR PLAN - LEVEL 06	A	1:200
ST2-DA- 19070	EXISTING FLOOR PLAN - LEVEL 07	A	1:200
ST2-DA- 19320	EXISTING FLOOR PLAN - LEVEL 32	A	1:200
ST2-DA- 19330	EXISTING FLOOR PLAN - LEVEL 33 (ROOF)	A	1:200
ST2-DA- 20050	DEMOLITION PLAN - LEVEL 05	A	1:200
ST2-DA- 20060	DEMOLITION PLAN - LEVEL 06	A	1:200
ST2-DA- 20070	DEMOLITION PLAN - LEVEL 07	A	1:200
ST2-DA- 20320	DEMOLITION PLAN - LEVEL 32	A	1:200
ST2-DA- 20330	DEMOLITION PLAN - LEVEL 33 (ROOF)	A	1:200
ST2-DA- 22050	FLOOR PLAN - LEVEL 05	C	1:200
ST2-DA- 22060	FLOOR PLAN - LEVEL 06	C	1:200
ST2-DA- 22070	FLOOR PLAN - LEVEL 07	C	1:200
ST2-DA- 22320	FLOOR PLAN - LEVEL 32	D	1:200
ST2-DA- 22330	FLOOR PLAN - LEVEL 33 (ROOF)	C	1:200
ST2-DA- 24050	RCP - LEVEL 05	A	1:200
ST2-DA- 30001	EXISTING ELEVATION - SOUTH & EAST	A	1:400
ST2-DA- 30002	EXISTING ELEVATION - NORTH & WEST	A	1:400
ST2-DA- 30011	DEMOLITION ELEVATION - SOUTH & EAST	A	1:400
ST2-DA- 30012	DEMOLITION ELEVATION - NORTH & WEST	A	1:400
ST2-DA- 30021	ELEVATION - SOUTH & EAST	A	1:400
ST2-DA- 30022	ELEVATION - NORTH & WEST	A	1:400
ST2-DA- 30201	EXISTING SECTION - OVERALL	A	1:400
ST2-DA- 30211	DEMOLITION SECTION - OVERALL	A	1:400
ST2-DA- 30221	SECTION - OVERALL	A	1:400
ST2-DA- 45001	CITY CORNER ENTRY ELEVATIONS/SECTION	C	1:100
ST2-DA- 45002	CITY CORNER ENTRY DETAILS	A	1:50
ST2-DA- 45101	LEVEL 32 FACADE ELEVATIONS	A	1:100
ST2-DA- 45102	LEVEL 32 FACADE ELEVATIONS	A	1:100
ST2-DA- 45103	LEVEL 32 FACADE DETAILS	A	1:50
ST2-DA- 46001	CORTILE FLOOR PLAN	A	1:100
ST2-DA- 46002	CORTILE INTERNAL SECTIONS	A	1:100
ST2-DA- 46003	CORTILE INTERNAL SECTIONS	A	1:100
ST2-DA- 46004	CORTILE BALUSTRADE DETAIL	A	1:100
ST2-DA- 90000	MATERIAL SCHEDULE	A	N.T.S.
ST2-DA- 90101	PERSPECTIVE MONTAGE - 01	A	N.T.S.
ST2-DA- 90102	PERSPECTIVE MONTAGE - 02	A	N.T.S.
ST2-DA- 90103	PERSPECTIVE MONTAGE - 03	A	N.T.S.
ST2-DA- 90104	PERSPECTIVE MONTAGE - 04	A	N.T.S.

- Level – 32 (**Superseded**, refer to updated requirement from JV3 report)



APPENDIX 2 – WALL CONSTRUCTION DETAILS

Wall thermal resistance schematic (thermal break inclusion)



External FC cladded wall

Wall Element	Element Spec	R-Value
Outside air film		0.04
FC cladding	<ul style="list-style-type: none"> 9mm 	0.04
Insulation	<ul style="list-style-type: none"> 87mm, R2.20 insulation 90mm steel stud (13.5% frame to wall) 6mm thermal break 	1.09
Plasterboard	<ul style="list-style-type: none"> 11mm sheet 	0.06
Plasterboard	<ul style="list-style-type: none"> 11mm sheet (Fire rated) 	0.06
Internal air film		0.12
Total R-value		1.40 minimum

Internal FC cladded wall

Wall Element	Element Spec	R-Value
Outside air film		0.14
FC cladding	<ul style="list-style-type: none"> 9mm 	0.04
Insulation	<ul style="list-style-type: none"> 76mm, R1.90 insulation 90mm steel stud (13.5% frame to wall) 6mm thermal break 	0.99
Plasterboard	<ul style="list-style-type: none"> 11mm sheet 	0.06
Plasterboard	<ul style="list-style-type: none"> 11mm sheet (Fire rated) 	0.06
Internal air film		0.12
Total R-value		1.41

APPENDIX 3 – EVIDENCE OF COMPLIANCE CHECK LIST

The purpose of this checklist is to itemise the evidence that should be collected during the construction phase of the project that will demonstrate how the final building complies with the Energy Efficiency requirements of Section J of the NCC that were identified during the design phase.

Generally evidence should take the form of delivery receipts, photographs, or signed and dated statements from installers.

This following check list is a generic list and some elements may not be applicable to a particular project.

Part J1 - Building Fabric

Element	Applicable (Y or N)	Evidence
Roof & ceiling insulation		Delivery receipts for roof/ceiling insulation type and rating and/or pictures of insulation installation and the R rating of the insulation.
Roof Colour		Delivery receipts for roof material and colour or pictures of the roof colour naming the roof colour.
Roof Lights		Delivery receipts for any roof lights nominating the number, size and solar characteristics (U-value and SHGC-value).
Wall insulation		Delivery receipts for wall insulation type and rating and/or pictures of insulation installation and the R rating of the insulation.
Floor		Delivery receipts for floor insulation type and rating and/or pictures of insulation installation and the R rating of the insulation.

Or a signed and dated statement from the builder/contractor that the Building Fabric insulation was installed as per the authorised plans and the Energy Efficiency Report.

Part J2 – Glazing

Element	Applicable (Y or N)	Evidence
Glazing		Delivery receipts for the glazing installed on site including the thermal characteristics of the glazing (U-value and SHGC-value)

Or a signed and dated statement from the builder/contractor that the Glazing was installed with the thermal characteristics as per the authorised plans and the Energy Efficiency Report.

Part J3 – Building Sealing

Element	Applicable (Y or N)	Evidence
Infiltration prevention		Delivery receipts for the number of self-closing doors installed.
Open shop front		Pictures of the A/C outlet being at least 3 metres from the open shop front.
Exhaust fans		Delivery receipts for the self-closing dampers on exhaust fans or pictures showing their installation.

Or a signed and dated statement from the builder/contractor that the self-closing doors and/or A/C outlet next to the open shop front was installed as per the authorised plans, specifications and the Energy Efficiency Report.

Part J7 – Hot Water Supply, Swimming Pool, Spa Pool

Element	Applicable (Y or N)	Evidence
Hot water taps		Delivery receipts for the number and star rating of the hot water taps installed.
Hot Water Systems		Delivery receipts for the number and type of hot water systems installed.
Time clocks		Delivery receipts for the number and type of time clock installed to control the hot water systems.

Or a signed and dated statement from the hot water installer that the hot water system fitting and time clocks were installed as per the authorised plans, specifications and the Energy Efficiency Report.

Part J8 – Facilities for Energy Monitoring

Element	Applicable (Y or N)	Evidence
Energy Meters		Delivery receipts for the number and type of all the energy meter installed
Energy interface monitoring system		Delivery receipts for the interface monitoring system that capable to store, analyse and review energy data for the six specified consumption streams.




Or a signed and dated statement from the monitoring system installer indicating that the energy meters and monitoring systems were installed as per the authorised plans, specifications and the Energy Efficiency Report will comply.

NCC SECTION-J JV3 ASSESSMENT REPORT

Intercontinental Hotel Refurbishment - Stage 2

To: Mulpha Hotel
Project: Intercontinental Hotel – Stage 2
Date: 04/08/2020
Client Contact: Simon Constantone
Email: SimonConstantone@built.com.au
From: Greg Zheng
Direct: 8484 4063
Email: gzheng@bcaenergy.com.au

DOCUMENT CONTROL

Revision	Issue Date	Report Details		
2549-JV3-r2/gz	04/08/2020	NCC Section J Assessment Report		
Note: Revised section-1.2		Prepared by	Checked by	Approved by
		Greg Zheng	Rob Romanous	Greg Zheng
		Sustainable Design Consultant	ESD Manager	Sustainable Design Consultant
				

Previous Revisions	Issue Date	Revision Notes
2549-JV3-r1/gz	07/07/2020	Issue for SSDA (100% issue)

Table of Contents

EXECUTIVE SUMMARY	4
1 BASIS OF ASSESSMENT	5
1.1 Location and Description.....	5
1.2 Project Proposals	6
1.3 Purpose	6
1.4 Building Code of Australia	6
1.5 Limitations	6
1.6 JV3 Assessment Procedure	7
1.7 Design Documentation	7
2 BUILDING DESCRIPTIONS	8
2.1 Classification (Clause A3.2)	8
2.2 Climate Zone (Clause A1.1)	9
3 PROVISIONS TO COMPLY WITH JV3 – ENERGY CONSUMPTION & GHG EMISSION.....	10
3.1 Part JV3 - Verification Method Using the Proposed Building.....	10
3.2 Building Fabric - Comparison between DTS & JV3 Provisions	10
3.3 Glazing - Comparison between DTS & JV3 Provisions	11
3.4 Onsite Energy Consumption - Proposed JV3 Provisions	11
3.5 Greenhouse Gas Emission - Comparison between DTS & JV3 Provisions	11
4 PROVISIONS TO COMPLY WITH JV3 – THERMAL COMFORT LEVEL	12
4.1 Standard Variables.....	12
4.2 HVAC Zoning	12
4.3 PMV Result	13
5 CONCLUSION	14
6 REFERENCE BUILDING REQUIREMENTS - DTS	15
7 STATEMENT OF COMPLIANCE	16
ANNEXURE A - DESIGN DOCUMENTATION	17
APPENDIX 1 – BUILDING ENVELOPE.....	18
APPENDIX 2 – DTS AND PROPOSED ENERGY CONSUMPTION RESULTS.....	19
APPENDIX 3 – BUILDING MODEL	20

EXECUTIVE SUMMARY

BCA Energy has been engaged by Mulpha Hotel to provide a performance solution assessment under Section J Energy Efficiency Verification method JV3 provision, Volume1, National Construction Code (NCC) 2019 for the proposed Stage-2 refurbishment works at the Intercontinental Hotel Sydney.

The intention of JV3 verification method is to enable design flexibility exceeds the Deemed-to-satisfy (DTS) provisions, which primarily beneficial to the following components of the proposed project:

- Oversized skylight requirement
- Standardise glazing types and appearance
- Performance trade-off between building fabric elements

To satisfy the JV3 verification methodology, the annual energy consumption & greenhouse gas (GHG) emission of the proposed building design must not more than reference building design which comprised of all the DTS requirements; AND the proposed building must also comply to the minimum thermal comfort provision. The following simulations have been conducted to demonstrate JV3 compliance:

- Model 1 – **Reference building + Reference services** (Building fabrics and building services requirement as per DTS provision)
- Model 2 – **Proposed Building + Reference services** (Building fabrics as per design intent, and building services as per DTS provision)

Based on the modelling outcome in section-3 of this report, the proposed building achieves GHG emission reduction of 0.096% against the reference building, whilst maintaining comfort level above the minimum floor areas and occupancy requirements. This is deemed compliant under the NCC2019, Section J Energy Efficiency JV3 Verification Method.

1 BASIS OF ASSESSMENT

1.1 Location and Description

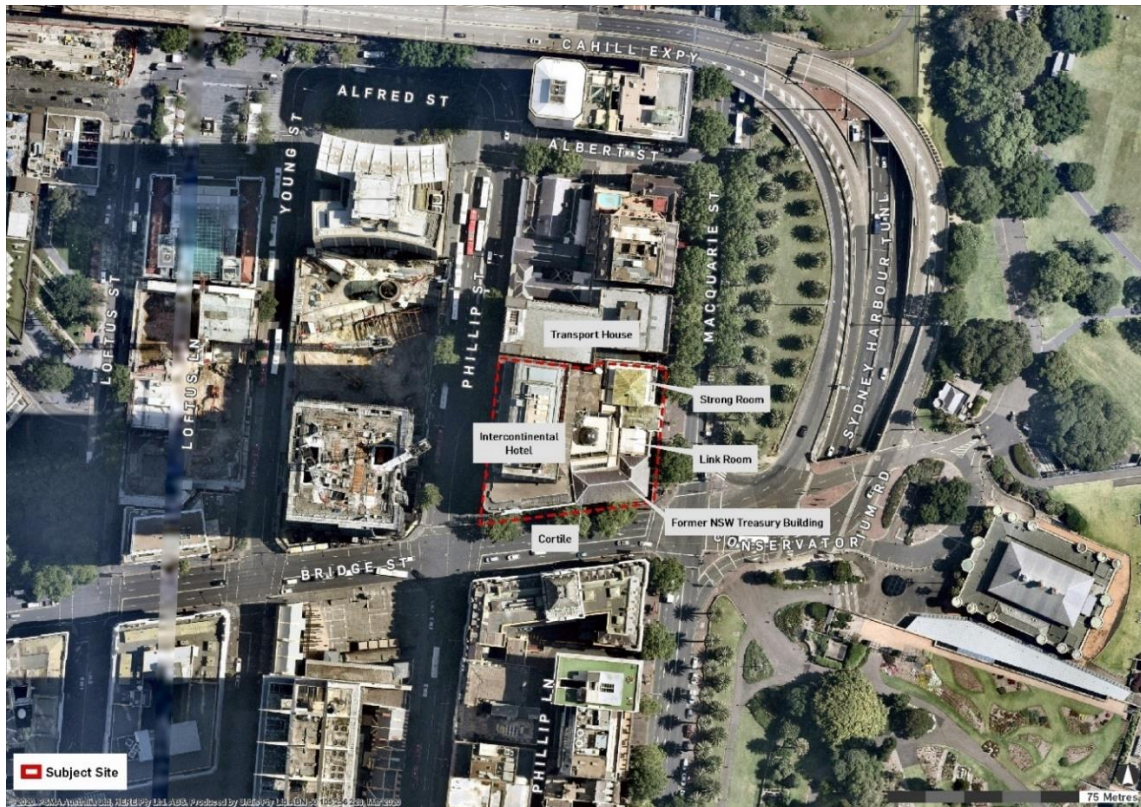
The site comprises two allotments containing the Intercontinental Hotel (incorporating the former NSW Treasury Building) at 115-119 Macquarie Street. The legal description of the site is:

- Lot 40 DP 41315; and
- Lot 4 DP 785393,

The site (115-119 Macquarie Street) contains two interconnected buildings that comprise:

- The 32-storey Intercontinental Hotel tower, which is located on the corner of Phillip and Bridge Streets set above a podium.
- The State Heritage listed former NSW Treasury Building, which is located on the corner of Macquarie and Bridge Streets.

Immediately to the north of the site (99-113 Macquarie Street) is a seven-storey commercial building known as Transport House, which is locally heritage listed. This site was part of the SSD 7693 Concept approval. Works relating to this portion of the Concept SSDA site will be progressed via a separate planning approval/application. The building is separated from the Treasury Buildings by a narrow laneway, known as Macquarie Lane.



1.2 Project Proposals

The proposal is a Stage 2 (Detailed) SSDA that seeks approval for:

- Various refurbishments to the Intercontinental Hotel tower.
- Alterations to the roof of the Intercontinental Hotel, including expansion of the club lounge and terrace – in compliance with the approved envelope under SSD 7693 (the Concept approval).

The proposed land use is 'tourist and visitor accommodation' (including ancillary uses), consistent with the existing use and what was considered/approved under the Concept approval.

From a staging perspective, no works will be undertaken to Transport House due to its sensitivity and requirement for more consideration, including a competitive design process. It is also noted that internal fit outs to hotel rooms has been progressed via a Complying Development Certificate (CDC) process.

The proposal would increase the GFA of the Intercontinental Hotel tower by 250sqm. The proposal also provides a maximum height of building of RL 114.55 (consistent with the envelope approved under the Concept approval).

1.3 Purpose

The purpose of this report is to assess the design proposal against the Section JV3, verification method of the NCC 2019, using approved ANSI/ASHRAE Standard 140 simulation software, *IESVE v2019.1.0.0*. This Report addresses ONLY matters relevant to Section 'J' of Volume 1 of the NCC pertaining to the **Class 3 & 6 building**, refer to Appendix-4 for Section-J requirements.

The proposed specifications from the JV3 assessment are applicable to part-J1 of Section-J provisions only. The remaining Section-J provisions (J3, J5, J6, J7 & J8) must refer to the latest DTS (Deemed-to-Satisfy) report for compliance requirements.

1.4 Building Code of Australia

This report is based on the Deemed-to-Satisfy Provisions of Section J of the National Construction Code Series Volume 1 - Building Code of Australia, 2019 Edition incorporating the State variations where applicable. Please note that the version of the NCC applicable is the version applicable at the time of the Construction Certificate Application is dated as received by the certifying authority.

1.5 Limitations

This report does not include nor imply any detailed assessment for design, compliance or upgrading for -

Sections B, C, D, E, F, G, H and I of the NCC;

The structural adequacy or design of the building;

The inherent derived fire-resistance ratings of any proposed structural elements of the building (unless specifically referred to); and

The design basis and/or operating capabilities of any proposed electrical, mechanical or hydraulic fire protection services.

This report does not include, or imply compliance with:

- a) The National Construction Code - Plumbing Code of Australia Volume 3
- b) The Disability Discrimination Act;
- c) The Premises Standard;
- d) Demolition Standards not referred to by the NCC;
- e) Occupational Health and Safety Act;
- f) Requirements of other Regulatory Authorities including, but not limited to, Telstra, Sydney Water, Electricity Supply Authority, WorkCover, RMS, Council and the like; and
- g) Conditions of Development Consent

-
- h) Any insulation or sarking is required to be non-combustible material in accordance with BCA Specification C1.1.

The building has been modelled to the current JV3 Specifications set out in the NCC 2019. This includes JV3 reference building design criteria JV3 (a) to (c) along with Specification JV a to JV c for greenhouse gas (GHG) emission factor, occupancy, A/C, appliances and lighting profiles.

This JV3 does not give the actual annual energy consumption/GHG emission for the building; rather it gives an estimate of the expected annual energy consumption/greenhouse gas emission of the building with the chosen fabric and services provided in co-ordination with Specification JV a to JV c.

1.6 JV3 Assessment Procedure

- Building Energy Modelling
 1. Reference building – DTS Reference building fabrics + DTS reference building services
 2. Proposed building 1 – Proposed building fabrics + DTS reference building services
 3. Proposed building 2 – Proposed building fabrics + Proposed building services
- Include renewable energy offset where applicable
- Convert *annual energy consumption* to *annual greenhouse gas emission*
- Assess *thermal comfort level* as per *Predicted Mean Vote* (PMV) criteria
- Compare *annual greenhouse gas emission* vs. *thermal comfort level* outcomes AND verify compliance status

Note: The project is committed to achieve proposed building services equal or better than DTS provision, hence the proposed building 2 is deemed to comply when the proposed building 1 achieve compliance requirement.

1.7 Design Documentation

This report has been based on the Design plans and Specifications listed in Annexure A of this Report.

2 BUILDING DESCRIPTIONS

For the purpose of the NCC the development may be described as follows.

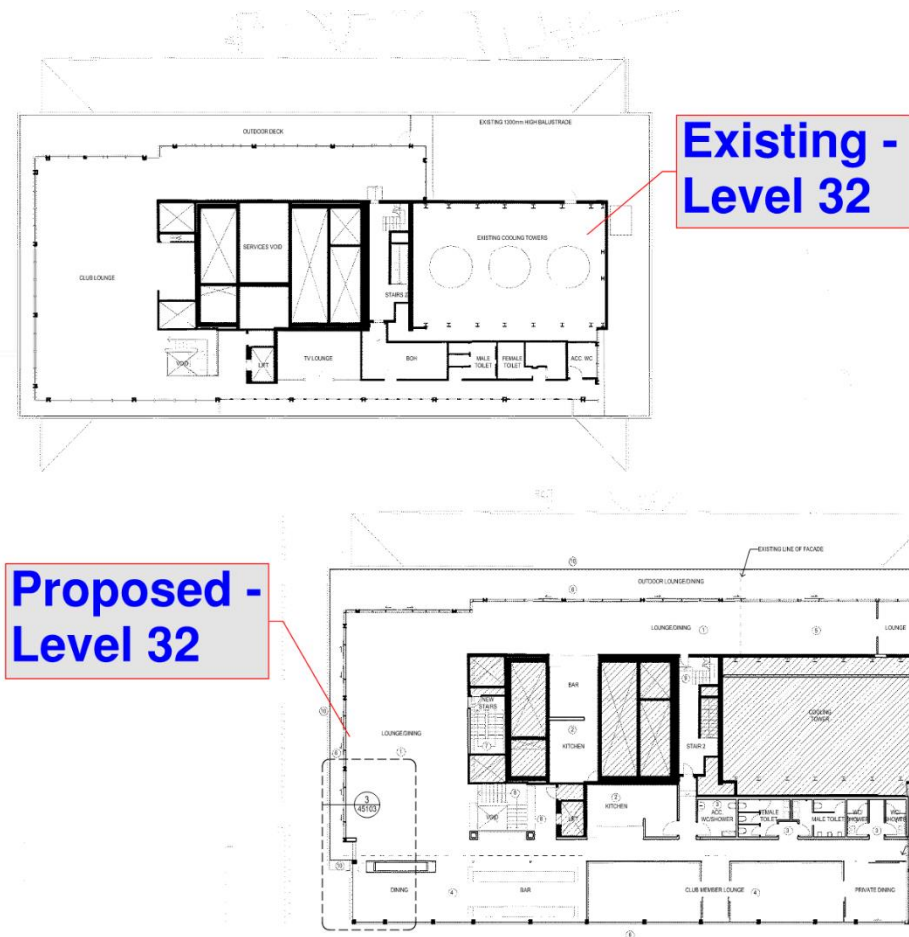
2.1 Classification (Clause A3.2)

The Building has been classified as follows:

Class	Level	Description
3	5 to 7	Existing hotel façade refurbishment
6	32	Rooftop extension – Dining/Bar

This Report addresses ONLY matters relevant to Section 'J' of Volume 1 of the NCC pertaining to the Class 3 & 6 portion/s of the building.

- Level 5, 6 & 7– Replacement to existing glazing systems, this work scope is irrelevant to this JV3 assessment and has been excluded.
- Level 32 – New windows to existing façades, plus new western and eastern area extensions



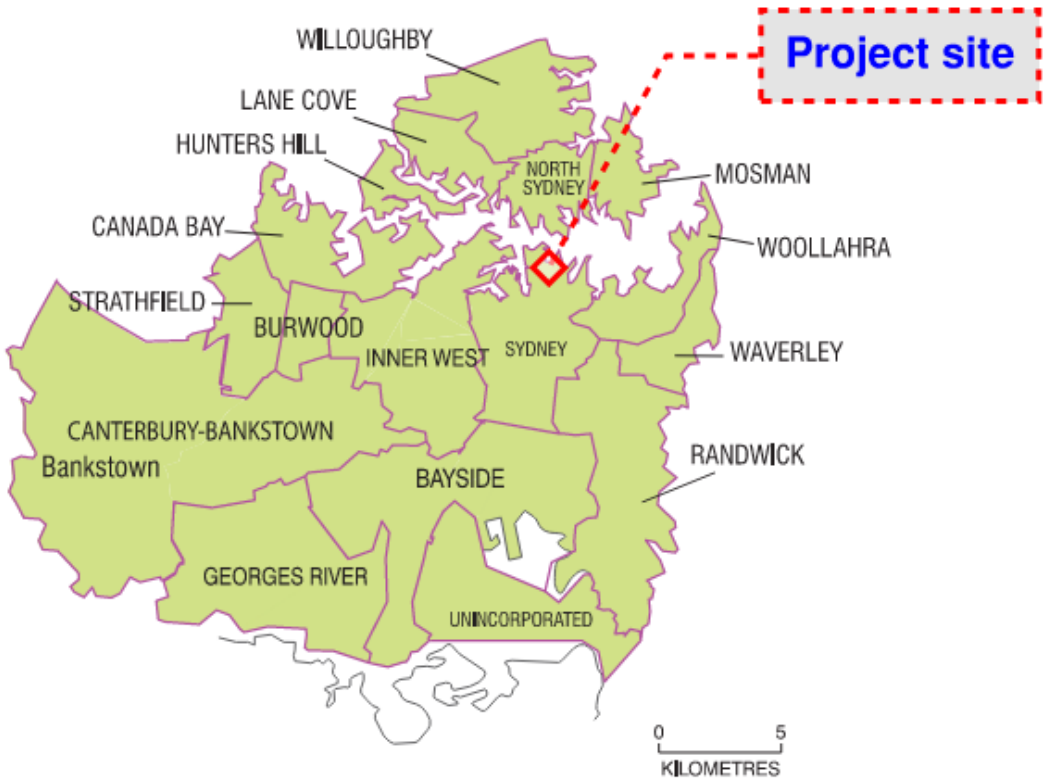
2.2 Climate Zone (Clause A1.1)

The building is located within Climate Zone No. 5 . Any reference to ‘this climate zone’ throughout the report is referring to Climate Zone No. 5

Climate Zones



Sydney Urban



3 PROVISIONS TO COMPLY WITH JV3 – ENERGY CONSUMPTION & GHG EMISSION

This part specifies how the proposed building is modelled differently to the reference (DTS) building and supersedes any specifications noted within DTS Provisions of the Section-J report.

3.1 Part JV3 - Verification Method Using the Proposed Building

The annual energy consumption of the proposed Building (annual GHG emission is direct proportional to annual energy consumption from the same energy source, thereby GHG emission is calculated within section-3.5 of the report), using the proposed building fabric and proposed services is 99.69 **MWh**; the annual energy consumption for the reference building, using DTS building fabric and DTS services is 99.78 **MWh** (please see Appendix 2. Therefore, the building as proposed has achieved compliance with parts of the Section JV3 provisions as the estimated annual energy consumption of the proposed building is less than the reference building. It is assumed that in the proposed building the services will be provided with services to be equal or better than the minimum DTS requirements.

The proposed building uses the same services as the reference building. The proposed building fabric is different to the reference building in the following way:

- Increased all envelope wall minimum requirement from R1.00 to R1.40
- Improved external glazing system from [U-3.2, SHGC-0.29] to [U-2.4, SHGC-0.27]
- Improved max skylight area to 152m². Additional roof shading is required, options include minimum 50% fixed shading and 30% fritting, OR sun tracked automatic louvre, OR minimum 30% fixed shading and 30% fritting with reduced SHGC-0.12.
- Increased skylight glazing system from [U-3.9, SHGC-0.29] to [U-2.4, SHGC-0.27]
- Removed internal wall minimum Rt1.40 insulation wall requirement.

3.2 Building Fabric - Comparison between DTS & JV3 Provisions

Under NCC2019 Section J DTS provision for thermal bridging allowance, standard insulation R-value must be de-rated where high thermal conductivity elements are used. For example, a 90mm (R2.25) glass wool insulation, steel frame light-weight wall without thermal break element may only represent total system R-value of 1.0, which means additional bulk insulation OR thermal break layer is required to meet minimum total system R-value of 1.4. For an equivalent of timber frame construction, R1.86 is readily achieved with same insulation.

Building Element	DTS Assumptions	Proposed JV3 Provisions
New Extension - Metal Insulated Roof	Total of R3.70 Solar Absorptance <0.45	As per DTS provision
Skylight (Western Façade Extension)	41.56m ² (<=5%) U-3.9 SHGC-0.29	152m ² U-2.40 SHGC-0.27, with 50% fixed shading & 30% fritting OR sun tracked automatic louvre OR SHGC-0.12, with 30% fixed shading & 30% fritting
Existing upgrade - External FC cladded <u>wall</u>	Rt1.00	Rt1.40 (90mm bulk insulation + 6mm thermal break)
Existing upgrade - Internal FC cladded <u>wall</u>	Rt1.40	Removed insulation requirement
New Suspended <u>floor</u>	Rt2.03	As per DTS provision

3.3 Glazing - Comparison between DTS & JV3 Provisions

DTS Glazing Requirements

Floor	Methodology	System U-Value*	System SHGC	System Type
All External glazing	WERS	3.20	0.29	Double, low-e, grey, Al frame
All Internal glazing	WERS	5.80	0.75	Single, clear, Al frame

JV3 Alternative Solution Glazing Requirements

Floor	Methodology	System U-Value*	System SHGC	System Type
All External glazing	WERS	2.40	0.27	Double, low-e, grey, Al frame
All Internal glazing	WERS	5.80	0.75	Single, clear, Al frame

3.4 Onsite Energy Consumption - Proposed JV3 Provisions

Energy Type	DTS	JV3	Annual Energy Offset (MWh)
Solar PV panels	NA	No Provision	0

3.5 Greenhouse Gas Emission - Comparison between DTS & JV3 Provisions

Annual Total	DTS	JV3	JV3 Reduction (%)
Energy (MWh)	99.78	99.69	-
Energy (GJ) x3.6	359.23	358.89	-
GHG factor (kg CO ₂ -e/GJ)	256 (NSW)		-
GHG Emission w/o PV (tonCO₂)	91.96	91.87	-0.096%

Table 3a Greenhouse gas emissions factors (kgCO₂-e/GJ)

Energy Source	ACT	NSW	NT	Qld	SA	Tas	Vic	WA
Electricity	-	256	201	256	170	61	323	207
Natural gas	-	51.53	51.53	51.53	51.53	51.53	51.53	51.53

Figure 1 NCC2019 Specification JVb

As illustrated in GHG emission results above, the Proposed building has achieved CO₂ reduction of 0.096% with changes within building fabrics only. As a result, the Proposed building complies to the energy consumption/GHG emission criteria set under JV3 provision.

4 PROVISIONS TO COMPLY WITH JV3 – THERMAL COMFORT LEVEL

Based on the assessment undertaken as summarised in the following section-4 of the report, it is demonstrated that the thermal comfort requirements of JV3 are met and the proposed building achieves the minimum PMV levels between -1.0 and 1.0 for areas not less than 95% of the occupied zones for 98% of the year.

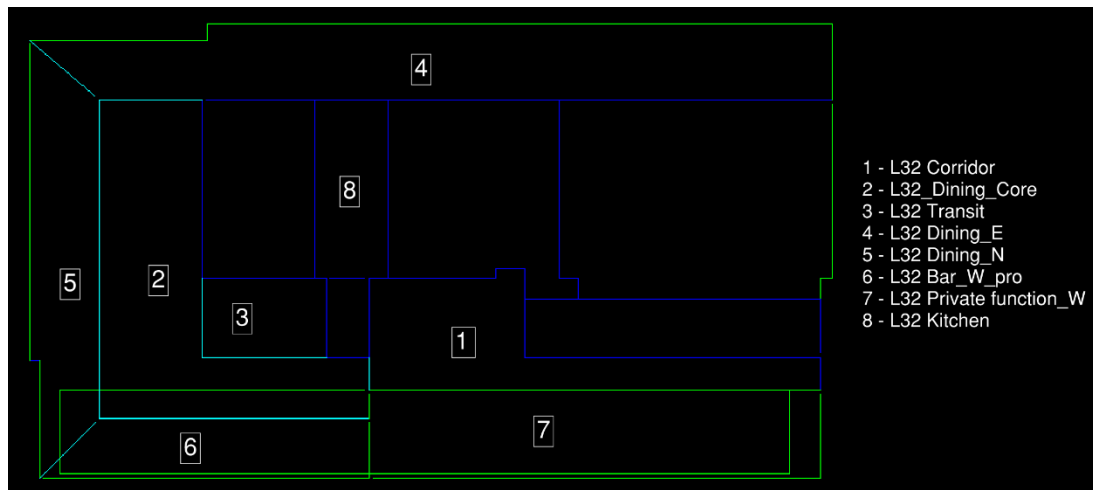
4.1 Standard Variables

The following parameters have been incorporated to determine the total compliance hours during standard hours of occupancy where the PMV level fall between -1.0 to 1.0:

- Standard hours of occupancy:
 - 7AM to 9PM, Monday to Friday (Reduced operation demand for weekend and public holidays)
- Occupant clothing value, metabolic rate, and indoor air speed for assembly building:
 - **For PMV <-1.0:**
CLO = 1.0 (thin long sleeve garment - winter)
MET = 1.2 (seated and relaxed standing)
Air Speed = 0.15m/s (min. natural ventilation)
 - **For PMV >1.0:**
CLO = 0.60 (thin short sleeve garment - summer)
MET = 1.2 (seated and relaxed standing)
Air Speed = 0.25m/s (with natural ventilation)
- Internal loads – all heat gains from the occupants, lighting and equipment directly impact the needs for space heating and cooling. For purpose DA design, the proposed building is assumed the same as DTS reference model for all internal loads.
- Airconditioning system design conditions: 24°C in summer AND 21°C in winter for the following areas:
 - Building A – Offices space, Kitchen & Breakout
 - Building B – Control and Broadcast rooms

4.2 HVAC Zoning

To simplify the thermal model without impacting simulation accuracy, floor space with large internal areas have been separated into perimeter and core zones, serviced by comparable HVAC systems for zones with similar thermal demands. Occupied and conditioned zones are marked and labelled below, and the perimeter zone depth is assumed at the full height of floor to ceiling.



4.3 PMV Result

Based on the methodology described above, the proposed building occupied zones are assessed accordingly and yielded the following output.

		Combined PMV Frequency					Hours Per Year	6570
		CLO=1.0 Met=1.2 Velocity=0.15m/s		CLO=0.60 Met=1.2 Velocity=0.25m/s				
		Predicted mean vote () - hours in range		Predicted mean vote () - hours in range				
Zone Name	Area (m²)	< -1.50	-1.50 to -1.00	-1.00 to 1.00	1.00 to 1.50	> 1.50	Annual PMV Outside of -1.00 to 1.00	Area Weighted Hours (Core)
L32 Corridor	68.533	0	0	0	0	0	0	0.0
L32_Dining_Core	107.14	0	0	6570	0	0	0	0.0
L32 Transit	24.743	0	16	6554	0	0	16	0.7
L32 Dining_E	141.421	0	0	6570	0	0	0	0.0
L32 Dining_N	64.185	0	0	6568	2	0	2	0.2
L32 Bar_W_pro	45.022	0	62	6508	0	0	62	4.8
L32 Private function_W	99.232	0	0	6570	0	0	0	0.0
L32 Kitchen	32.168	0	52	6518	0	0	52	2.9
	0							
	0							
	0							

Total Area	582.4
-------------------	-------

Area Weighted Total Hours Outside of Range (-1.0 to 1.0)	8.56
Area Weighted Total Hours Inside Range	6561.44
Total Occupied Hours per Year	6570.00
Percentage of time Inside Range	99.9%
Percentage of area of occupied zone	100.0%

As illustrated in the thermal comfort results above, the Proposed building has achieved PMV levels of between -1.0 and 1.0 during standard hours of occupancy for 99.9% of the year for all its occupied/conditioned areas. As a result, the proposed building complies to the thermal comfort level criteria set under JV3 provision.

5 CONCLUSION

Based on the energy consumption/GHG emission modelling outcome and the thermal comfort level assessment undertaken in section 3-4 of the report, it is demonstrated that the Proposed building is:

- Lower in energy consumption and Greenhouse gas emission than the DTS reference building, without the need for renewable energy offset, AND
- PMV levels are within -1 and 1 during standard occupancy for 99.9% of the year, for 100% of the floor area of occupied zones

In summary, the project has achieved compliance under JV3 provisions of NCC2019, the proposed building fabrics and glazing specifications from the JV3 assessment superseded J1 requirement of the section-J DTS report.

6 REFERENCE BUILDING REQUIREMENTS - DTS

Part 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 JV_a.
- (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 JV_b.

7 STATEMENT OF COMPLIANCE

The design documentation as referred to in this report has been assessed against the applicable provisions of Section J of the National Construction Code (NCC) and it is considered that such documentation complies or is capable of complying (as outlined above) with that Code.

The proposed building fabric and glazing specifications of the JV3 assessment have superseded the obligations as defined within Part J1 of the original Section-J DTS report (Appendix-4). The remaining part J3 to J8 requirements remain relevant under Section-J DTS provisions unless noted otherwise.

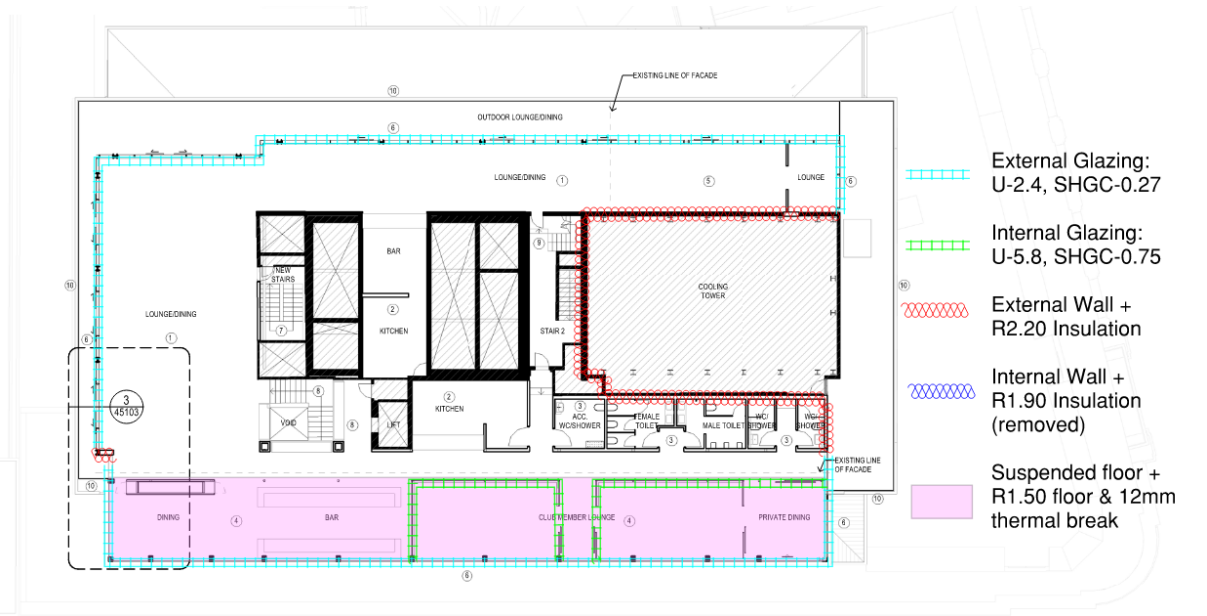
ANNEXURE A - DESIGN DOCUMENTATION

This report has been based on the following design documentation prepared by *Woods Bagot*, Issue for SSDA (100% issue), dated as 24/07/2020,

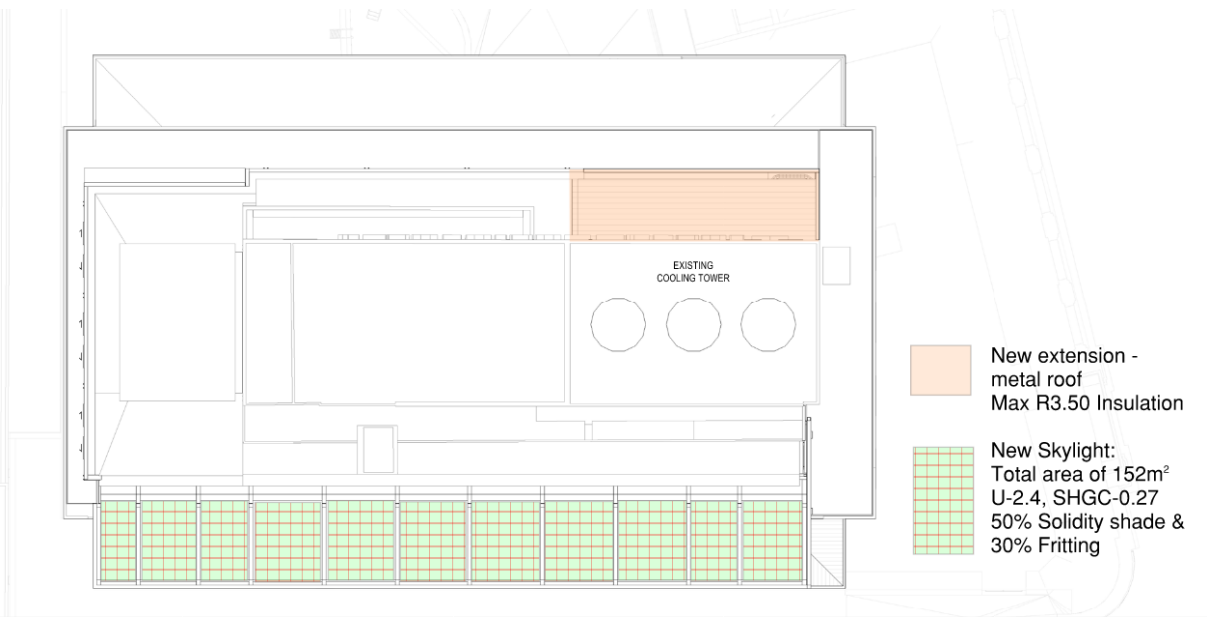
NUMBER	NAME	REVISION	SCALE
ST2-DA- 00000	COVER SHEET	A	
ST2-DA- 00001	DRAWING LIST	B	
ST2-DA- 10000	SITE CONTEXT PLAN	A	1:1000
ST2-DA- 10001	SITE PLAN	B	1:500
ST2-DA- 11000	STAGING PLANS	B	N.T.S.
ST2-DA- 12000	SHADOW DIAGRAMS	A	1:5000
ST2-DA- 13000	GFA PLANS	A	1:500
ST2-DA- 14000	3D HEIGHT PLANE DIAGRAM	A	N.T.S.
ST2-DA- 15000	PUBLIC DOMAIN PLANS	A	1:250
ST2-DA- 19050	EXISTING FLOOR PLAN - LEVEL 05	A	1:200
ST2-DA- 19060	EXISTING FLOOR PLAN - LEVEL 06	A	1:200
ST2-DA- 19070	EXISTING FLOOR PLAN - LEVEL 07	A	1:200
ST2-DA- 19320	EXISTING FLOOR PLAN - LEVEL 32	A	1:200
ST2-DA- 19330	EXISTING FLOOR PLAN - LEVEL 33 (ROOF)	A	1:200
ST2-DA- 20050	DEMOLITION PLAN - LEVEL 05	A	1:200
ST2-DA- 20060	DEMOLITION PLAN - LEVEL 06	A	1:200
ST2-DA- 20070	DEMOLITION PLAN - LEVEL 07	A	1:200
ST2-DA- 20320	DEMOLITION PLAN - LEVEL 32	A	1:200
ST2-DA- 20330	DEMOLITION PLAN - LEVEL 33 (ROOF)	A	1:200
ST2-DA- 22050	FLOOR PLAN - LEVEL 05	C	1:200
ST2-DA- 22060	FLOOR PLAN - LEVEL 06	C	1:200
ST2-DA- 22070	FLOOR PLAN - LEVEL 07	C	1:200
ST2-DA- 22320	FLOOR PLAN - LEVEL 32	D	1:200
ST2-DA- 22330	FLOOR PLAN - LEVEL 33 (ROOF)	C	1:200
ST2-DA- 24050	RCP - LEVEL 05	A	1:200
ST2-DA- 30001	EXISTING ELEVATION - SOUTH & EAST	A	1:400
ST2-DA- 30002	EXISTING ELEVATION - NORTH & WEST	A	1:400
ST2-DA- 30011	DEMOLITION ELEVATION - SOUTH & EAST	A	1:400
ST2-DA- 30012	DEMOLITION ELEVATION - NORTH & WEST	A	1:400
ST2-DA- 30021	ELEVATION - SOUTH & EAST	A	1:400
ST2-DA- 30022	ELEVATION - NORTH & WEST	A	1:400
ST2-DA- 30201	EXISTING SECTION - OVERALL	A	1:400
ST2-DA- 30211	DEMOLITION SECTION - OVERALL	A	1:400
ST2-DA- 30221	SECTION - OVERALL	A	1:400
ST2-DA- 45001	CITY CORNER ENTRY ELEVATIONS/SECTION	C	1:100
ST2-DA- 45002	CITY CORNER ENTRY DETAILS	A	1:50
ST2-DA- 45101	LEVEL 32 FACADE ELEVATIONS	A	1:100
ST2-DA- 45102	LEVEL 32 FACADE ELEVATIONS	A	1:100
ST2-DA- 45103	LEVEL 32 FACADE DETAILS	A	1:50
ST2-DA- 46001	CORTILE FLOOR PLAN	A	1:100
ST2-DA- 46002	CORTILE INTERNAL SECTIONS	A	1:100
ST2-DA- 46003	CORTILE INTERNAL SECTIONS	A	1:100
ST2-DA- 46004	CORTILE BALUSTRADE DETAIL	A	1:100
ST2-DA- 90000	MATERIAL SCHEDULE	A	N.T.S.
ST2-DA- 90101	PERSPECTIVE MONTAGE - 01	A	N.T.S.
ST2-DA- 90102	PERSPECTIVE MONTAGE - 02	A	N.T.S.
ST2-DA- 90103	PERSPECTIVE MONTAGE - 03	A	N.T.S.
ST2-DA- 90104	PERSPECTIVE MONTAGE - 04	A	N.T.S.

APPENDIX 1 – BUILDING ENVELOPE

Level 32 – Project proposed requirement



Level Roof – Project proposed requirement



APPENDIX 2 – DTS AND PROPOSED ENERGY CONSUMPTION RESULTS**DTS Model**

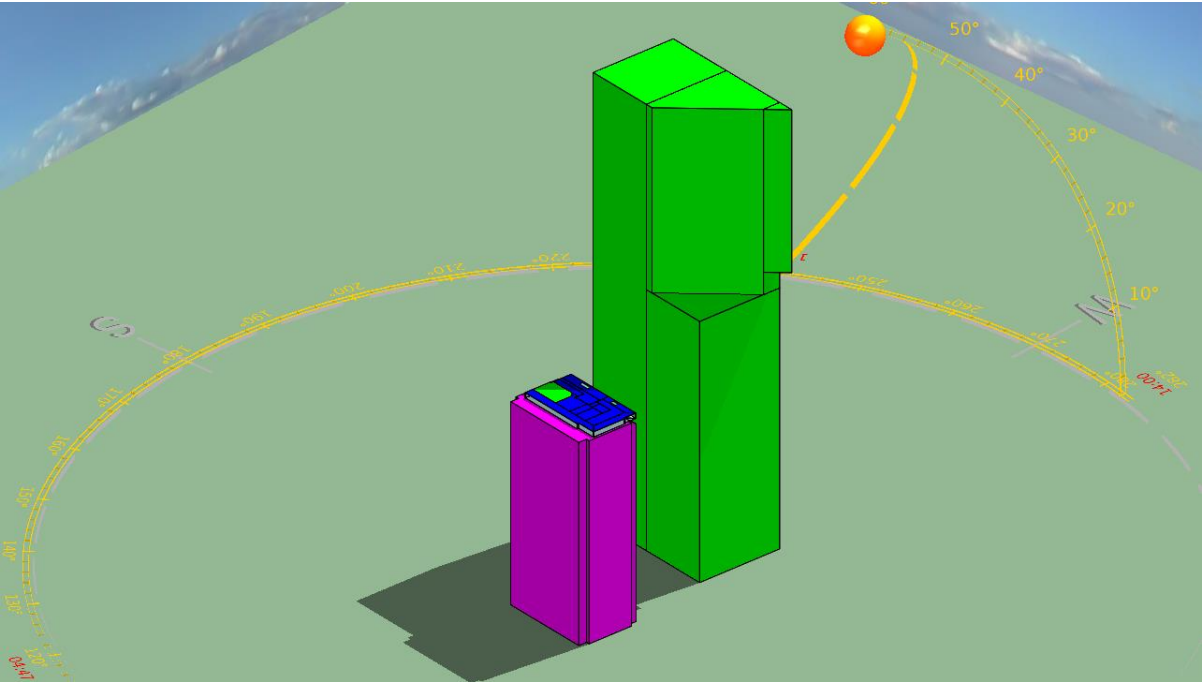
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Jan 01-31	1.9241	4.5487	0.0157	1.2368	3.3883
Feb 01-28	1.6549	3.9124	0.0153	1.1171	3.0604
Mar 01-31	1.3314	3.1475	0.2358	1.2368	3.3883
Apr 01-30	0.6970	1.6478	0.6989	1.1969	3.2790
May 01-31	0.2803	0.6628	1.5846	1.2368	3.3883
Jun 01-30	0.1377	0.3254	1.9475	1.1969	3.2790
Jul 01-31	0.0590	0.1395	4.0142	1.2368	3.3883
Aug 01-31	0.1699	0.4018	2.9835	1.2368	3.3883
Sep 01-30	0.3782	0.8941	1.6693	1.1969	3.2790
Oct 01-31	0.7968	1.8838	0.6350	1.2368	3.3883
Nov 01-30	0.7345	1.7363	0.4367	1.1969	3.2790
Dec 01-31	1.0059	2.3781	0.2458	1.2368	3.3883
Summed total	9.1698	21.6781	14.4822	14.5618	39.8940

JV3 Model

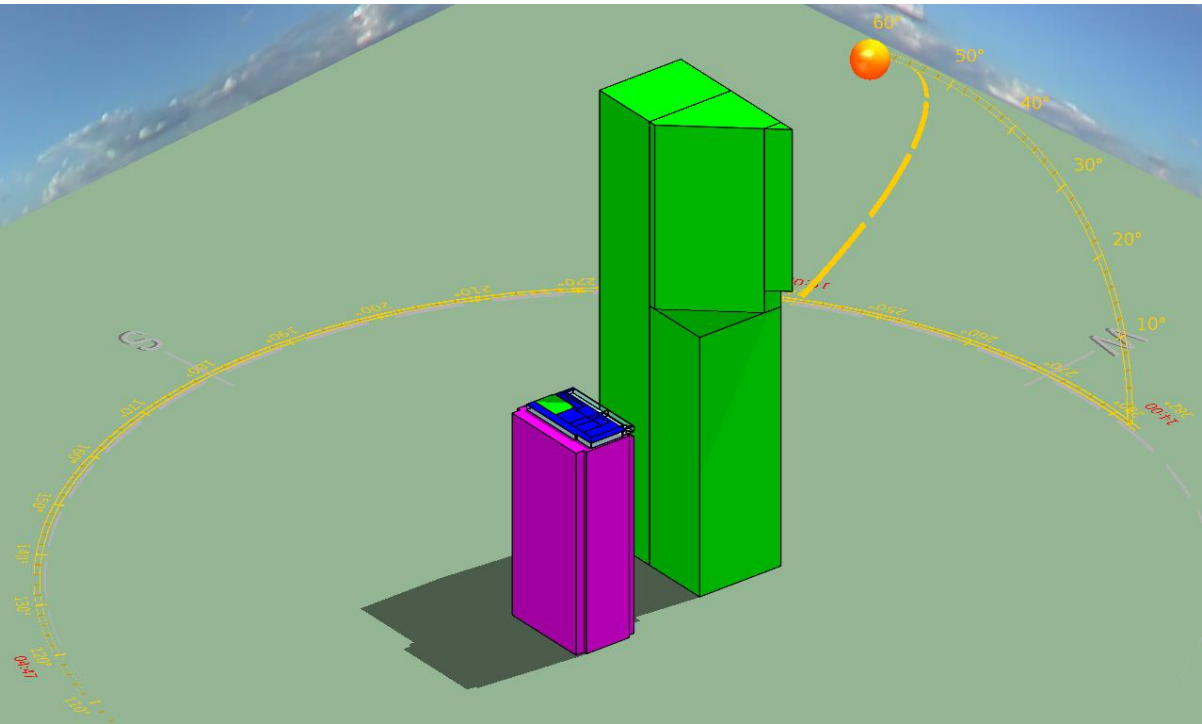
	Ap Sys heat rej fans/pumps energy (MWh)	Chillers energy (MWh)	Boilers energy (MWh)	Total equip energy (MWh)	Total lights energy (MWh)
Date	2549_JV3_pro_2i.aps	2549_JV3_pro_2i.aps	2549_JV3_pro_2i.aps	2549_JV3_pro_2i.aps	2549_JV3_pro_2i.aps
Jan 01-31	1.9121	4.5204	0.0169	1.2368	3.3883
Feb 01-28	1.6394	3.8757	0.0166	1.1171	3.0604
Mar 01-31	1.3084	3.0932	0.2485	1.2368	3.3883
Apr 01-30	0.6681	1.5795	0.7266	1.1969	3.2790
May 01-31	0.2586	0.6114	1.6520	1.2368	3.3883
Jun 01-30	0.1263	0.2986	2.0232	1.1969	3.2790
Jul 01-31	0.0515	0.1217	4.1518	1.2368	3.3883
Aug 01-31	0.1615	0.3817	3.0832	1.2368	3.3883
Sep 01-30	0.3671	0.8679	1.7280	1.1969	3.2790
Oct 01-31	0.7766	1.8359	0.6614	1.2368	3.3883
Nov 01-30	0.7215	1.7056	0.4572	1.1969	3.2790
Dec 01-31	0.9899	2.3403	0.2554	1.2368	3.3883
Summed total	8.9811	21.2320	15.0210	14.5618	39.8940

APPENDIX 3 – BUILDING MODEL

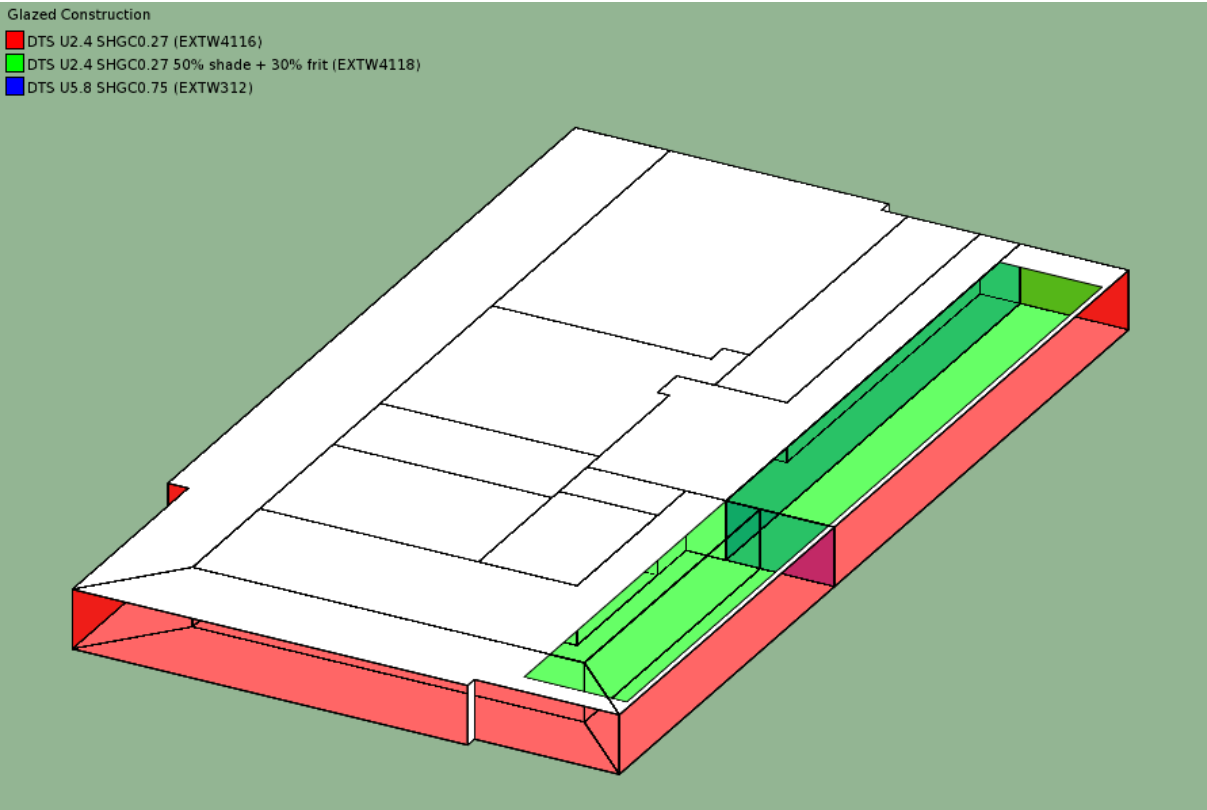
Reference building



Proposed building



Glazing Type – Iso view from NW



Glazing Type – Iso view from SE

