

Please contact: Marlon Kobacker



Г

_

Author:	Marlon Kobacker								
Checked by:	Alistair Coulstock								
Approved by:	Alistair Coulstock								
Revision	Description	tion							
-	Issue for PA	8/06/10							
This report ha Cundall Johns any responsibil	s been prepared in accordance with th ton & Partners Pty Ltd trading as Cunda lity for any use of or reliance on the conte	e terms and conditions o II (ABN 16 104 924 370) nts of this report by any th	of appointment. cannot accept ird party.						
The success a of the design to implementation may not be ach	nd realisation of the proposed initiatives eam, the development of the initiatives the inition the operation of the building. Witho nieved	will be dependant upon the design of the design the life of the design this undertaking the pr	ne commitment gn and also the oposed targets						

CUNDALL

Level 7, 657 Pacific Highway St Leonards, NSW 2065 Ph (02) 8424 7000 Fax (02) 8424 7099



Contents

1	Introduction	4
2	Green Star Office v3 Initiatives	5
2.1	Facade	5
2.2	Architectural	6
2.3	Electrical	. 10
2.4	Mechanical	. 11
2.5	Hydraulics	. 12
2.6	Structural/Civil	. 13
2.7	Construction & Operational Management	. 14
2.8	Innovation: Future-Proofing & Design for Climate Change Adaptation	. 15
2.9	Credit Summary	. 17
Appen	dix A: Climatic Analysis for Natural Ventilation	.19
Appen	dix B: BCA Section J 2010 Glazing Calculations	.21
Appen	dix C: IEQ-13 Compliant Product List	.27
Appen	dix D: IEQ-14 Compliant Product List	.34
Appen	dix E: MAT-8 Compliant Product List	.35
Appen	dix F: Integrated Fitout Guidelines	.36

1 Introduction

This document provides a summary of the proposed ESD strategies for the Australian Hearing Hub at Macquarie University to achieve:

- A 5 Star Green Star Office v3 rating (Design & As-Built) for the base building;
- A (minimum) 4.5 Star NABERS Energy rating for the base building; and
- Future proofing against rising utility costs.

Whilst this return brief presents a possible approach to achieving the above targets, the responsibility lies with the head contractor to ensure that the base building achieves each of the nominated Green Star and NABERS Energy targets.

Strategies focus on the following key issues:

- Providing premium indoor environment quality by optimising air quality, natural daylight, thermal comfort and glare control
- Reducing energy consumption and thus greenhouse gas emissions
- Reducing the use of mains potable water
- Reducing embodied energy within the development
- Reducing the environmental impact of harmful emissions to the air, land and water
- Allowing for adaptation to regulations and costs associated with climate change
- Ensuring building occupants understand the ESD strategies within the building so that it can function as designed

2 Green Star Office v3 Initiatives

2.1 Facade

The facade design balances a number of performance trade-offs: cost, aesthetic, natural light penetration to improve indoor environment quality and reduce electric lighting energy use, external shading and solar performance of glazing to reduce perimeter heat loads and mechanical plant size as well as cooling energy use, thermal performance to balance thermal gains and losses through the fabric, glare control to provide visual comfort for occupants, design for disassembly and BCA Section J minimum requirements for fabric and glazing (see Appendix B for Section J glazing compliance calculations).

The facade design will contribute towards achieving the following Green Star credits:

- IEQ-4 Daylight
- IEQ-5 Daylight Glare Control
- IEQ-9 Thermal Comfort
- ENE-1 Greenhouse Gas Emissions Reduction
- MAT-9 Design for Disassembly

As such, the facade performance requirements are as follows:

- Non-glazed external walls: Minimum R2.8 insulation
- Roof fabric: Minimum R3.2 insulation
- 2 x 450mm horizontal shades on the NW and N facades indicated in yellow below (single shade only for SE facade) this is the minimum shading treatment required.



- Maximum U Value (including framing): 2.7W/m²K
- Maximum Solar Heat Gain Coefficient: 0.35
- Minimum Visual Light Transmission: 60%
- Demountable facade panels for ease of disassembly and reuse as well as ease of replacement by openable windows for natural ventilation or other panel typologies to significantly reduce the future cost of improving energy efficiency (see Appendix A for climatic analysis for natural ventilation)

2.2 Architectural

The architectural design has been provided by Perumal Pedavoli Architects and satisfies Green Star credit criteria for the following credits:

- IEQ-4 Daylight (see section 2.1)
- IEQ-5 Daylight Glare Control (see section 2.1)
- **IEQ-9 Thermal Comfort** (see section 2.1)
- **IEQ-13 Volatile Organic Compounds** Paints and Coatings must comply with the following table (see Appendix C for a list of compliant products)

Paints & Coatings must comply with ASTMD3960								
Product Type	Maximum VOC Content (g/litre)							
Interior Semi Gloss	16							
Interior Low Sheen	16							
Interior Flat Washable	16							
Ceilings Interior	14							
Exterior Gloss	75							
Trim - gloss, semi gloss, satin, varnishes & wood stains	75							
Timber and binding primers	30							
Latex primer for galvanised iron and zincalume	60							
Interior Latex undercoat	65							
Interior Sealer	65							
Interior Sealer	65							
One and two pack performance coatings for floors	140							
Other solvent based coatings	200							

• **IEQ-13 Volatile Organic Compounds** – Sealants and Adhesives must comply with the following table (see Appendix C for a list of compliant products)

Adhesives & Sealants must comply with South Coast Air Quality Management District Rule 1168									
Product Type	Maximum VOC Content (g/litre)								
Indoor carpet adhesive	50								
Carpet pad adhesive	50								
Wood flooring and laminate adhesive	100								
Rubber flooring adhesive	60								
Sub-floor adhesive	50								
Ceramic tile adhesive	65								
Cove base adhesive	50								
Dry wall & panel adhesive	50								
Multipurpose construction adhesive	70								
Structural glazing adhesive	100								
Architectural sealants	250								



• **IEQ-13 Volatile Organic Compounds** – Carpets must comply with the following table (see Appendix C for a list of compliant products)

Carpets must comply with Carpet & Rug Institute Green Label or ASTM D5116										
Product Type	Maximum VOC Emission (mg/m²/hr)	Maximum 4-PC Emission (mg/m²/hr)								
All carpet products	0.5	0.05								

• **IEQ-14 Formaldehyde Minimisation** – Engineered wood products must comply with the following table (see Appendix D for a list of compliant products)

	Engi	neered Wood Pro	ducts	
Product Type	Formaldehyde Emission Limit (E1)	Formaldehyde Emission Limit (E0)	Formaldehyde Emission Limit (Super E0)	Applicable Testing Method
Plywood	1.0 mg/L	0.5 mg/L	0.3 mg/L	AS 2098.11
Particle Board	1.0 mg/L	0.5 mg/L	0.3 mg/L	AS 4266.16
MDF	1.5 mg/L	0.5 mg/L	0.3 mg/L	AS 4266.16
Plywood	6 mg / 100 g	4 mg / 100 g	2.4 mg / 100 g	EN 120
Particle Board	9 mg / 100 g	6 mg / 100 g	2.8 mg / 100 g	EN 120
MDF	9 mg / 100 g	6 mg / 100 g	2.8 mg / 100 g	EN 120
Plywood	0.12 mg/m3h	0.08 mg/m3h	0.04 mg/m3h	DIN EN 717-1
Particle Board	0.12 mg/m3h	0.08 mg/m3h	0.04 mg/m3h	DIN EN 717-1
MDF	0.12 mg/m3h	0.08 mg/m3h	NA	DIN EN 717-1

• TRA-2 Fuel Efficient Transport

- A minimum of 80% of all spaces designated for use by car-pool participants, small cars, hybrid or other alternative fuel vehicles must be preferred parking spaces- these are defined as closest to the facility entrance or lift core. These spots must be clearly signposted and marked with a separate colour from other spots and must not be double or tandem spaces.
- The size of a car space specified for a 'small vehicle' must be physically reduced and suitably labelled according to the AS/NZS2890.1:2004 minimum (i.e. <u>2.3m by 5m</u> for most cases. Refer to Australian Standard for more information).

• TRA-3 Cyclist Facilities

- One staff cycle rack per 150m² NLA will be provided, including a locker for clothes per rack and a shower and changing room per ten racks
- One visitor cycle rack will be provided per 750m² NLA in a covered location

• WAT-1 Occupant Amenity Potable Water Efficiency

- Efficient tapware has been specified as follows, resulting in a 35% reduction in potable water consumption compared to the current commercial benchmark
 - Minimum 6 Star WELS rated urinals (max. 0.8L/flush)
 - Minimum 5 Star WELS rated taps (max. 5L/min)
 - Minimum 4 Star WELS rated toilets (max. 3.5L/flush)
 - Minimum 3 Star WELS rated showerheads (max. 9L/min)

• MAT-1 Recycling Waste Storage

- A dedicated storage area of over 40m² for the separation and collection of office recyclables will be provided that is located in the same level as the delivery area with clearly marked, sign-posted and within 20m of the lift core serving all floors;
- The area is adequately sized to accommodate the storage equipment for the following as a minimum: cardboard, glass, used cooking oil, organic (compost) materials, plastics (mixed containers, soft plastics and polystyrene) and metals;
- The area meets the access requirements of 'Policy for Waste Minimisation in New Developments' (NSW, 2004): Section A, points A-12 through A-17, and Section C, points C6 and C7:
 - A12 The room/s for storing waste and recycling must be located in a position that is convenient for both users and waste collection staff.
 - A13 Collection vehicles must be able to service the development efficiently and effectively, with limited need to reverse. If a vehicle turntable is used it must have a 30 tonne capacity.
 - A14 If clearance proposed is less than 3.8 metres, then vehicle specification will be required from the waste provider that conforms with the proposed development.
 - A15 A suitable refuse collection point must be nominated where waste loading operations can occur on a level surface away from gradients and vehicle ramps.
 - A16 The path for wheeling bins between a central waste storage point and the collection vehicle must be level and free of steps or kerbs. The maximum travel distance between the storage point and the collection point for bins is:
 - 10 metres for bins including 240 litre, 660 litre & 1000 litre Mobile Garbage Bins (MGB's)
 - 3 metres for both 1500L and 2000 litre bulk bins (also known as skips)
 - Any proposed variations require further assessment and discussion with relevant Council Officers.



A17 Where collection vehicles are required to drive into a building to collect waste or recycling, adequate vehicle clearance is required. See Appendix C for typical dimensions of collection vehicles. Access to an approved collection point within a building must enable all collection vehicles to both enter and exit the premises in a forward direction.

• MAT-8 Sustainable Timber

- All timber used in the design will be sourced from sustainable sources such as plantations (FSC certified) or reused from post-consumer recyclers.
- EMI-4 Insulant ODP
 - 100% of insulants will have an Ozone Depletion Potential (ODP) of zero
- IEQ-12 Internal Noise Levels
 - 95% of the NLA will not exceed the 'Satisfactory' ambient internal noise levels in accordance with AS/NZS 2107:2000, as follows:
 - Within the entire base building general office space, noise from the building services will not exceed 40dBAeq.
 - Within the base building office space, the sound level will not exceed 40dBAeq (measured in open plan offices).

Additionally as part of the O&M manual, consideration will be given to best practice environmentally responsible materials for replacement/repair.

2.3 Electrical

A high efficiency electrical design has been developed by JHA consulting. The design satisfies Green Star credit criteria for the following credits:

- MAN-2 Commissioning Clauses (see Section 2.7)
- MAN-3 Building Tuning (see Section 2.7)
- IEQ-6 High Frequency Ballasts
 - High frequency ballasts will be installed in fluorescent luminaries for 95% NLA as measured at the working plane (720mm AFFL)
- IEQ-7 Electric Lighting Levels
 - Office lighting design will maintain an illuminance level of no more than 400 Lux for 95% NLA as measured at the working plane (720mm AFFL)
- ENE-2 Energy Sub-metering
 - Sub-metering and monitoring of the following will be provided:
 - Lighting for each tenancy
 - Power for each tenancy
 - Power uses over 100kVA

• ENE-3 Lighting Power Density

 Maximum lighting power density of 1.5W/m² per 100 lux in general office areas, 2.0W/m2 in meeting rooms and cellular offices (720mm AFFL)

• ENE-4 Lighting Zoning

- Lighting zones to remain less than 100m² with switches accessible to occupants and individually addressable switching circuits
- Daylight sensors for dimming will be provided
- ENE-5 Peak Demand Reduction
 - A connection will be made to the Library Thermal Energy Storage (TES) system such that the Hearing Hub electric chillers will assist in charging the TES during off-peak times and draw chilled water during peak times to achieve a 15% peak demand reduction.

• EMI-7 Light Pollution

- External lighting will be designed to avoid light being directed upwards such that no light beam, generated from within the building or outside of the building boundary, is directed at any point in the sky hemisphere without falling directly onto a non-transparent surface.
- The design will comply with AS4282 "Control of the Obtrusive Effects of Outdoor Lighting" and 95% of outdoor spaces will not exceed the minimum requirements of AS1158 for illuminance levels.

Additionally, infrastructure capacity for future connection to a roof-mounted PV system will be provided to allow the building to increase its onsite energy generation potential when funding allows. Electrical infrastructure will also be provided for future electric car charging bays.

2.4 Mechanical

A high efficiency VAV system suitable for a multi-tenanted layout has been designed by Erbas consulting. The design satisfies Green Star credit criteria for the following credits:

- MAN-2 Commissioning Clauses (see Section 2.7)
- MAN-3 Building Tuning (see Section 2.7)
- IEQ-1 Ventilation Rates
 - 50% improvement on AS1668.2-2002 for ventilation rates

• IEQ-2 Air Change Effectiveness

The ventilation systems must be designed to achieve an Air Change Effectiveness (ACE) of >0.95 for at least 95% of the NLA when measured in accordance with ASHRAE 129-1997: 'Measuring Air Change Effectiveness'; measured in the breathing zone (nominally 1m from finished floor level).

• IEQ-3 Carbon Dioxide Monitoring and Control

 A CO₂ monitoring and control system must be provided with a minimum of one CO₂ sensor at all return points on each floor, to facilitate continuous monitoring and adjustment of outside air ventilation rates to each level and independent control of ventilation rates to achieve outside air requirements.

• IEQ-16 Tenant Exhaust Riser

- Dedicated tenant exhaust risers m be provided with the following characteristics:
 - > Compliant with section 5.7 of AS1668.2-2002;
 - Providing no less than 0.2 L/s/m² for 100% of the NLA;
 - > Capacity of 0.35 L/s/ m² for 100% of NLA on any individual floor; and
 - > Exhaust will not be recycled to other enclosures of different use.
- In contribution to ENE-1 (Greenhouse Gas Emission Reduction), consideration will be given to maximising the energy efficiency of ancillary components of the mechanical system such as fans, pumps and all chillers.

• EMI-1 Refrigerant ODP

100% of refrigerants will have an Ozone Depletion Potential (ODP) of zero

• EMI-3 Refrigerant Leaks

- HVAC Systems containing refrigerants are to be contained in a moderately air tight enclosure and a refrigerant leak detection system is to be installed to cover highrisk parts of the plant; and
- A refrigerant recovery system will be equipped with an automated pump-down system sized to effectively and safely capture, isolate, and store 95% (by weight) of the maximum refrigerant charge.



• WAT-4 Heat Rejection Water

 The Potable water consumption of water-based heat rejection systems will be reduced by 50% through the use of evaporative condensers for the base building HVAC system heat rejection.

Additionally, the system will allow for:

- An economy cycle operation where outside air will be brought to the space without any active conditioning;
- A future mixed mode operation to allow the air conditioning system to switch off when the facade is replaced with openable windows and the outside temperature permits natural ventilation; and
- Consideration for a future high efficiency replacement system.

2.5 Hydraulics

A water efficient hydraulic design has been prepared by Steve Paul and Partners consulting. The design satisfies Green Star credit criteria for the following credits:

- MAN-2 Commissioning Clauses (see Section 2.7)
- MAN-3 Building Tuning (see Section 2.7)
- WAT-1 Occupant Amenity Potable Water Efficiency
 - Rainwater will be captured from the roof and stored in a 200kL tank to supply irrigation and toilet flushing, resulting in a 65% reduction in potable water consumption compared to the current commercial benchmark

• WAT-2 Water Meters

- Sub-metering and monitoring of water will be provided for each tenancy
- Sub-metering and monitoring of water will be provided for major water uses within the base building, including:
 - Bathrooms;
 - ➢ Showers;
 - Irrigation;
 - Wash-down systems;
 - Rainwater supply; and
 - Future recycled water supply (to be provided in future)

• WAT-3 Landscape Irrigation

 Rainwater will be captured from the roof and stored in a 200kL tank to supply over 90% of water demand for irrigation



• WAT-5 Fire System Water Consumption

• Sufficient temporary storage will be provided for a minimum of 80% of the routine fire protection system test water and maintenance drain-downs, for reuse on-site

• EMI-6 Discharge to Sewer

 The reduction in potable water consumption due to water efficiency measures will result in a 50% reduction in discharge to sewer compared to the current commercial benchmark

Additionally, infrastructure provision will be made to allow the cooling towers to be fed from a future district recycled water main and as part of the O&M manual, consideration will be given to best practice water efficient replacement fittings in future.

2.6 Structural/Civil

The structural and civil engineering design has been prepared by Woolacotts consulting. The design satisfies Green Star credit criteria for the following credits:

• MAT-5 Concrete

- A proportion of cement will be replaced with an industrial waste product (at least 30% for in-situ concrete, 20% for precast concrete and 15% for stressed concrete), reducing the embodied energy impacts of Portland cement production
- 20% of all aggregate used for structural purposes will be recycled (Class 1 RCA in accordance with HB155-2002) or slag aggregate; and no natural aggregates will be used in non-structural uses (e.g. building base course, sub-grade to any car parks and footpaths, backfilling to service trenches, kerb and gutter)

• EMI-5 Watercourse Pollution

- Stormwater will be detained such that the development does not increase peak stormwater flows compared to the pre-development site for rainfall events of up to a 1-in 2 year storm;
- All stormwater leaving the site, at any time up to a 1-in-20 year storm event, will be treated or filtered in accordance with either:
 - CSIRO Urban Stormwater: Best Practice Environmental Management Guidelines; or
 - Australian and New Zealand Environment Conservation Council (ANZECC)'s Guidelines for Urban Stormwater Management.



2.7 Construction & Operational Management

The head contractor, commissioning agent and facilities management will be required to ensure that the construction and operational management will achieve high levels of performance for environmental management. The current management approach satisfies Green Star credit criteria for the following credits:

- MAN-2 Commissioning Clauses
 - Comprehensive pre-commissioning, commissioning, and quality monitoring are to be contractually required to be performed for all building services (BMS, mechanical, electrical and hydraulic); and the works completed in exact accordance with CIBSE Commissioning Codes or ASHRAE Commissioning Guideline 1-1996 (for mechanical services only); and
 - The design team and contractor are required to transfer project knowledge to the building owner/manager through all of the following:
 - Documented design intent
 - As-built drawings
 - > Operations and Maintenance Manual
 - Commissioning Report; and
 - > Training of building management staff

• MAN-3 Building Tuning

- After handover, the building owner must implement tuning of all building systems; and a relevant member of the design team is involved in the tuning process.
- Monthly monitoring must be undertaken and the outcomes are reported to the building owner quarterly
- Full re-commissioning is to be undertaken 12 months after practical completion
- A Building Tuning Report on the outcomes of the tuning process is to be provided to the building owner and made available to the design team.
- MAN-4 Independent Commissioning Agent
 - An independent commissioning agent, Graeme Thwaite, will provide commissioning advice to the building owner and the design team as well as monitor and verify the commissioning of all building systems.

• MAN-5 Building User's Guide

- A simple and easy-to-use Building Users' Guide, which includes information relevant for the building users, occupants and tenants' representatives, will be developed and made available to the building owner.
- MAN-6 Environmental Management
 - The head contractor is to implement a comprehensive, project-specific Environmental Management Plan (EMP) for the works in accordance with Section 4 of the NSW Environmental Management System guidelines 1998 or 2007; and
 - The head contractor must have valid ISO 140001 Environmental Management System (EMS) accreditation prior to and throughout the project.



• MAN-7 Waste Management

• More than 80% of demolition and construction waste will be recycled.

• ECO-1 Waste Management

- Should no topsoil be deemed contaminated, then:
 - All topsoil impacted by the construction works shall be separated and protected from degradation, erosion or mixing with fill or waste;
 - There must be no net change in the volume of topsoil on the site; and
 - 95% of all topsoil (by volume) must retain its productivity

2.8 Innovation: Future-Proofing & Design for Climate Change Adaptation

The design team has developed a long-term greenhouse gas emissions reduction strategy for the building to allow it to respond to adaptation to regulations and costs associated with climate change.

Current cost barriers to low carbon buildings preclude the majority of new buildings from targeting energy reductions of 70-100% compared to the current average. This range is becoming globally accepted as the 'restorative' range to prevent catastrophic climate change due to atmospheric greenhouse gas emissions. As a result, buildings constructed today will face regulations relating to greenhouse gas emissions reductions that will require making significant upgrades during their lifetime.

The project team believes that designing in the ability to make these upgrades without major demolition and refurbishment can potentially avoid major future cost penalties with little capital cost to the current building construction.

Currently the Australian Hearing Hub is targeting a reduction of 50% which will be achieved though strong passive design, efficient building services and a shared energy system connection with the library thermal energy storage tank.

Cost-benefit analysis has shown that other on-site energy generation systems such as solar cooling or photovoltaic electricity generation are not cost effective and have thus been omitted from the design. It is expected that technologies such as these will become cost-effective during the lifetime of this building and as such the building has been designed to accommodate a future photovoltaic electricity generation system.

Additionally, the facade has been designed as demountable and the mechanical system controls have been designed to allow future mixed-mode operation when conditions permit.

Furthermore, the operations and maintenance manual will include requirements to source energy efficient equipment as replacements become necessary.



In addition to the greenhouse gas reduction approach, a number of other future-proofing strategies have been developed. The table below summarises all future-proofing strategies associated with the Australian Hearing Hub.

Future Proofing Initiative	Description & Benefits
Shared Thermal Energy Storage for Peak Demand Reduction	A connection will be made to the Library Thermal Energy Storage (TES) system such that the Hearing Hub electric chillers will assist in charging the TES during off-peak times and draw chilled water during peak times to achieve a 15% peak demand reduction.
Photovoltaic electricity generation	Provision has been made within the electrical distribution board to allow future connection of photovoltaic panels.
Natural ventilation mode	A demountable facade has been designed such that a replacement facade with openable windows can be provided quickly and cost-effectively so that the building can operate in natural ventilation mode when conditions permit. Mechanical system controls have been designed to allow for this mode of operation.
Electric Car Charging	Provision of electrical infrastructure has been made to allow for future car charging bays in the basement.
Sustainable Equipment Replacement Policy	Requirements for an improvement in the environmental performance of replacement equipment compared to components being replaced have been included in the operation and maintenance manual.
Recycled Water for Non- potable demands	Provision has been made to allow cooling towers and sanitary flushing to connect to a future district recycled water main.



2.9 Credit Summary

The table below summarises the credits being targeted to achieve a 5 Star Green Star Office Design & As-Built certification.

Category	Title	Credit No.	Points Available	Points Achieved	Points to be Confirmed
Manageme	nt				
	Green Star Accredited Professional	Man-1	2	2	0
	Commissioning Clauses	Man-2	2	2	0
	Building Tuning	Man-3	2	2	0
	Independent Commissioning Agent	Man-4	1	1	0
	Building Users' Guide	Man-5	1	1	0
	Environmental Management	Man-6	2	2	0
	Waste Management	Man-7	2	2	0
		TOTAL	12	12	0
Indoor Envi	ronment Quality				
	Ventilation Rates	IEQ - 1	3	1	0
	Air Change Effectiveness	IEQ - 2	2	2	0
	Carbon Dioxide Monitoring and				
	Control	IEQ - 3	1	1	0
	Daylight	IEQ - 4	3	1	0
	Daylight Glare Control	IEQ - 5	1	1	0
	High Frequency Ballasts	IEQ - 6	1	1	0
	Electric Lighting Levels	IEQ - 7	1	1	0
	External Views	IEQ - 8	2	0	0
	Thermal Comfort	IEQ - 9	2	2	0
	Individual Comfort Control	IEQ - 10	2	0	0
	Hazardous Materials	IEQ - 11	1	1	0
	Internal Noise Levels	IEQ - 12	2	2	0
	Volatile Organic Compounds	IEQ - 13	3	3	0
	Formaldehyde Minimisation	IEQ - 14	1	1	0
	Mould Prevention	IEQ - 15	1	0	0
	Tenant Exhaust Riser	IEQ - 16	1	1	0
		TOTAL	27	18	0
Energy					
	Conditional Requirement	Ene -	-	-	0
	Greenhouse Gas Emissions	Ene - 1	20	5	0
	Energy Sub-metering	Ene - 2	2	2	0
	Lighting Power Density	Ene - 3	3	2	0
	Lighting Zoning	Ene - 4	2	2	0
	Peak Energy Demand Reduction	Ene - 5	2	1	0
		TOTAL	29	12	0
Transport					
	Provision of Car Parking	Tra - 1	2	2	0
	Fuel-Efficient Transport	Tra - 2	1	1	0
	Cyclist Facilities	Tra - 3	3	3	0
	Commuting Mass Transport	Tra - 4	5	5	0
		TOTAL	11	11	0

Australian Hearing Hub



Water					
	Occupant Amenity Water	Wat - 1	5	4	0
	Water Meters	Wat - 2	1	1	0
	Landscape Irrigation	Wat - 3	1	1	0
	Heat Rejection Water	Wat - 4	4	2	0
	Fire System Water Consumption	Wat - 5	1	1	0
		TOTAL	12	9	0
Materials					
	Recycling Waste Storage	Mat - 1	2	2	0
	Building Reuse	Mat - 2	0	na	0
	Reused Materials	Mat - 3	1	0	0
	Shell and Core or Integrated Fit-out	Mat - 4	2	2	0
	Concrete	Mat - 5	3	2	0
	Steel	Mat - 6	2	0	0
	PVC Minimisation	Mat - 7	2	0	0
	Sustainable Timber	Mat - 8	2	2	0
	Design for Disassembly	Mat - 9	1	1	0
	Dematerialisation	Mat - 10	1	0	0
		TOTAL	16	9	0
Land Use 8	Ecology				
	Conditional Requirement	Eco -	0	-	0
	Topsoil	Eco - 1	1	0	 1
	Reuse of Land	Eco - 2	1	1	0
	Reclaimed Contaminated Land	Eco - 3	2	2	0
	Change of Ecological Value	Eco - 4	4	1	0
		TOTAL	8	4	1
Emissions	1				
	Refrigerant ODP	Emi - 1	1	1	0
	Refrigerant GWP	Emi - 2	2	0	 0
	Refrigerant Leaks	Emi - 3	2	2	 0
	Watercourse Pollution	Emi - 5	2	2	 0
	Discharge to Sewer	Emi - 6	4	2	 0
	Light Pollution	Emi - 7	1	1	 0
	Legionella	Emi - 8	1	1	0
	Insulant ODP	Emi - 4	1	1	0
		TOTAL	14	10	0
	Total mainted mainter			-	
	Total weighted points:	65			1
	Once certified this would equate to a	Five Star rati	ng.		

Appendix A: Climatic Analysis for Natural Ventilation

The building has been designed such that the facade will be able to demount to allow the installation of openable windows at a later date.

The diagram below is a psychometric chart that represents annual Sydney weather data. Each individual dot on the chart represents an hour of weather data for a typical year. The pie chart in the left corner groups all the points into comfort categories i.e. comfortable (yellow) too hot (blue), too humid (purple), too cold (red).

The red and blue orthogonal outlines represent the comfort envelopes for summer and winter. All the yellow dotes that are contained within this envelope are the comfortable hours. If just air temperatures were used to represent comfort between 19 to 26 deg C then comfort conditions could represent 60% of the year.

The high humid levels that are experienced in Sydney (represented by the purple dots) have a considerable impact on comfort reducing the acceptable comfort period to 35% of the year.

The assessment has been made for the working hours between 8am and 6pm and the data has been adjusted to represent internal conditions allowing for internal office loads.



The diagram below is a wind rose that has been generated for the comfort hours represented in the psychometric chart (the yellow dots).

A typical wind rose for Sydney for all hours has three main characteristics for strong and frequent wind conditions - predominant strong southerlies, cool north easterlies after hot summer days and occasional but strong hot westerlies in summer. The typical wind rose looks very different from the wind rose that just represents the conditions when temperatures are comfortable. The predominant breezes during the comfort hours is from the west

and north-west. These breezes should be targeted for areas appropriate for mixed-mode ventilation.



Appendix B: BCA Section J 2010 Glazing Calculations

The tables below illustrate the compliant glazing taken from the BCA Section J2 glazing calculator for each floor.

BC	A VOLUME O	NE GLAZ	ZING C	ALCU	ILATO	R (fir	st issu	ed wi	th BC	A 201	10)					HELP
Building	Anice		ABCB		A1	ice		ABCB		A	ece.	Applica	tion	ABCB		Climate zone
Grou	nd floor											other				5
V		VOLUME ONE		VULUME U	1E 🔨	/ 1010	MEVNE	\sim	UEUME UN	-	9 v		UNE	∇		
Storey	ABCB	Facade ar	eas asico		AB	ice.		ABCB		A	ece 1					
	1	N	NE	E	SE	S	S¥	v	NV	internal						
	VOLUME ONE OPti	on A 107m ²	92.5m²	152m ²	136m*	264m*	69.8m²	104m [*]	295m²		9) ve					
	Opti									n/a	in a					
	Glazing are	≈(A) 58m²	16m²	71m²	55m²	124m²	9.4m²	35m²	136m²							
Numbe	r of rows preferred in table be	low	21	las curren	hı displayed.	,										
Tuantes				-	.,,,,,,			- Aler	-		0.			1 Alexandre		No.
GL	AZING ELEMENTS, ORI	ENTATION SE	CTOR, SI	ZE and PE	RFORMA	NCE CH/	ARACTER	ISTICS	SHAI	DING	CA	LCULA	TED OU	TCOMES	OK (if in	puts are valid)
	Glazing element	Facin	g sector		Size		Perfor	mance	P&H or	device	Sha	ading	Mult	ipliers	Size	Outcomes
		Option					Total						Heatin		Area	Element share
		A	Option B	Height	Vidth	Area	U-¥alue	SHGC	Р	н	P/H	G	g	Coolin	used	of % of
🖃 ID	Description (optiona	al) facades	facades	(m)	(m)	(m³)	(AFRC)	(AFRC)	(m)	(m)		(m)	(S _H)	g (S _c)	(m³)	allowance used
1	NW-1-1	NW		0.90	73.80		2.7	0.35	0.450	0.900	0.50	0.00	0.78	0.60	66.42	48% of 61%
2	NW-1-2	NW		0.90	73.80		2.7	0.35	0.450	0.900	0.50	0.00	0.78	0.60	66.42	48% of 61%
3	NW-2	NW		1.20	1.00		2.7	0.35				0.00	1.00	1.00	1.20	2% of 61%
4	NW-3	NW		1.20	2.00		2.7	0.35				0.00	1.00	1.00	2.40	3% of 61%
5	SW-1-1	SW		0.90	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.79	0.70	0.99	9% of 17%
6	SW-1-2	SW		0.90	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.79	0.70	0.99	9% of 17%
7	SW-2	SW		1.80	4.10		2.7	0.35				0.00	1.00	1.00	7.38	82% of 17%
8	W-1	W		3.60	7.06		2.7	0.35				0.00	1.00	1.00	25.42	73% of 68%
9	W-2	W		1.80	5.15		2.7	0.35				0.00	1.00	1.00	9.27	27% of 68%
10	S-1	S		1.80	68.85		2.7	0.35				0.00	1.00	1.00	#####	100% of 46%
11	E-1	E		1.80	3.00		2.7	0.35				0.00	1.00	1.00	5.40	13% of 62%
12	E-2	E		2.70	5.40		2.7	0.35	6.900	3.600	1.92	0.90	0.46	0.47	14.58	17% of 62%
13	E-3	E		2.70	18.80		2.7	0.35	5.500	3.600	1.53	0.90	0.64	0.57	50.76	70% of 62%
14	N-1	N		2.70	21.30		2.7	0.35	2.500	3.600	0.69	0.90	0.97	0.76	57.51	100% of 96%
15	SE-1	SE		1.80	30.65		2.7	0.35	0.450	1.800	0.25	0.00	0.87	0.83	55.17	100% of 53%
16	NE-1-1	NE		0.90	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.74	0.61	0.99	4% of 43%
17	NE-1-2	NE		0.90	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.74	0.61	0.99	4% of 43%
18	NE-2	NE		1.80	4.68		2.7	0.35				0.00	1.00	1.00	8.42	60% of 43%
19	NE-3	NE		1.80	1.90		2.7	0.35				0.00	1.00	1.00	3.42	24% of 43%
20	NE-4-1	NE		0.90	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.74	0.61	0.99	4% of 43%
21	NE-4-2	NE		0.90	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.74	0.61	0.99	4% of 43%

IMPORTANT NOTICE AND DISCLAIMER IN RESPECT OF THE GLAZING CALCULATOR

The Glazing Calculator has been developed by the ABCB to assist in developing a better understanding of glazing energy efficiency parameters.

While the ABCB believes that the Glazing Calculator, if used correctly, will produce accurate results, it is provided "as is" and without any representation or warranty of

any kind, including that it is fit for any purpose or of merchantable quality, or functions as intended or at all.

Your use of the Glazing Calculator is entirely at your own risk and the ABCB accepts no liability of any kind.

Copyright @ 2010 – Australian Government, State and Territory Governments of Australia. All Rights Reserved



ESD Report

Buildin	g name/description											Applie	ation			Climate zone
F	· · · · · · · · · · · · · · · · · · ·										.	other	•			5
Storey	VOLUME ONE	Facade a	reas	🔍 vo	LUME ON	ie 🤇	🔍 VOLI	UME ONE	U.	Volu	ME ON					
	2 4000	N	NE	E	SE	S	S₩	V	NV	internal						
	Option A	89m²	93m²	152m ²	118m ²	264m ²	61m ²	104m ²	295m²							
	VOLUME ONE Option B									nla	ME ON					
	Glazing area (A)	41 <i>m</i> ²	16m²	15m²	55m²	124m²	9.4m²	35m²	135m²							
Jumbe	er of rows preferred in table belo	WOLUME (^{ME} 23	(as curre	ntly display	ed)										
ZING	ELEMENTS, ORIENTAT	ION SEC	TOR, SIZ	ZE and P	ERFORM	MANCE	CHARAC	TERISTI	SHAI	DING	CALC	ULAT	ED OUT	COMES	: OK (if i	inputs are val
	Glazing element	Facing	sector		Size		Perfor	mance	P&H or	device	Sha	ding	Multi	ipliers	Size	Outcomes
		A					U-						Heati	-	Area	of % of
	Decemination (actional)	facade	Option B	Height	Width (m)	Area	Value (AERC)	SHGC	(m)	H (m)	Р/Н	G (m)	ng (S.)	Cooli	used (m ²)	allowance
- ID	Description (optional)	MIM	racaues	0.00	72.90	(m)	(AFRC)	(AFRC)	0.450	0.000	0.50	0.00	(34)	ng (3c)	(III) 66 43	499/ of 609/
2	NVV-1-1 NW/ 4-2	NIM		0.90	73.00		2.1	0.35	0.450	0.900	0.50	0.00	0.70	0.60	66.42	40% 0100%
2	NW 2	NIM		4 20	1.00		2.1	0.35	0.400	0.300	0.50	0.00	1.00	1.00	1 20	2% of 60%
	NW 3	NIM		1.20	1.00		2.1	0.35				0.00	1.00	1.00	1.20	2% of 60%
5	SW_1_1	SW		0.90	1.00		2.7	0.35	0.450	0.900	0.50	0.00	0.79	0.70	0.00	9% of 19%
6	SW-1-2	SW		0.50	1 10		2.1	0.35	0.450	0.900	0.50	0.00	0.79	0.70	0.55	9% of 19%
7	SW-1-2 SW-2	SW		1.80	4 10		27	0.35	0.450	0.500	0.50	0.00	1.00	1.00	7 38	82% of 19%
\$	W_1	W		3.60	7.06		27	0.35				0.00	1.00	1.00	25.42	73% of 68%
ğ	W-2	w		1.80	5.15		2.7	0.35				0.00	1.00	1.00	9.27	27% of 68%
##	S-1	s		1.80	68.85		2.7	0.35				0.00	1.00	1.00	######	100% of 46%
##	E-1	Ē		1.80	3.00		2.7	0.35				0.00	1.00	1 00	5 40	38% of 22%
##	F-2	E		1.80	4.10		2.7	0.35				0.00	1.00	1.00	7.38	52% of 22%
##	E-3-1	E		0.90	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.71	0.66	0.99	5% of 22%
##	E-3-2	E		0.90	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.71	0.66	0.99	5% of 22%
##	N-1-1	N		0.90	22.95		2.7	0.35	0.450	0.900	0.50	0.00	0.76	0.54	20.66	50% of 54%
##	N-1-2	N		0.90	22.95		2.7	0.35	0.450	0.900	0.50	0.00	0.76	0.54	20.66	50% of 54%
	SE-1	SE		1.80	30.65		2.7	0.35	0.450	1.800	0.25	0.00	0.87	0.83	55.17	100% of 61%
##		NE		0.90	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.74	0.61	0.99	4% of 43%
##	NE-1-1			0.00	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.74	0.61	0.99	4% of 43%
## ## ##	NE-1-1 NE-1-2	NE		0.90												
## ## ##	NE-1-1 NE-1-2 NE-2	NE		1.80	4.68		2.7	0.35				0.00	1.00	1.00	8.42	60% of 43%
## ## ##	NE-1-1 NE-1-2 NE-2 NE-3	NE NE NE		0.90 1.80 1.80	4.68		2.7	0.35				0.00	1.00	1.00	8.42	60% of 43% 24% of 43%
## ## ## ##	NE-1-1 NE-1-2 NE-2 NE-3 NE-4-1	NE NE NE		0.90 1.80 1.80 0.90	4.68		2.7 2.7 2.7	0.35 0.35 0.35	0.450	0.900	0.50	0.00	1.00 1.00 0.74	1.00 1.00 0.61	8.42 3.42 0.99	60% of 43% 24% of 43% 4% of 43%

IMPORTANT NOTICE AND DISCLAIMER IN RESPECT OF THE GLAZING CALCULATOR

The Glazing Calculator has been developed by the ABCB to assist in developing a better understanding of glazing energy efficiency parameters. While the ABCB believes that the Glazing Calculator, if used correctly, will produce accurate results, it is provided "as is" and without any representation or warranty of any kind, including that it is fit for any purpose or of merchantable quality, or functions as intended or at all.

Your use of the Glazing Calculator is entirely at your own risk and the ABCB accepts no liability of any kind.



ESD Report

	g name/description											Applica	ation			Climate zone
F											. [other				5
toreu	VOLUME ONE	Facade a	reas	🔍 vo	LUME ON	ie 🤇	🕑 VOL	UME ONE	Ŭ	VOLU	ME ON	Е		VOLUME		VOLU
,	3 48 68	N	NE	E	SE	S	S₩	V	NV	internal	1					
	Option A	89m²	93m ²	152m ²	118m ²	264m ²	61m ²	104m ²	295m ²							
	Option B									nia	ME ON					
	Glazing area (A)	41m ²	16m²	15m²	55m²	124m²	9.4m²	35m²	136m²	-	ME UN					
ımbe	r of rows preferred in table belo	WOLUME	23	las curres	nthi disolai	ed)										
	AB10			ABCB			ice .		ABC				ARCO			ABCB
ZING	ELEMENTS, ORIENTAT	ION SEC	TOR, SI	ZE and P	ERFOR	MANCE	CHARAC	TERISTI	SHAI	DING	CALC	ULAT	ED OUT	ICOMES	GK (if i	inputs are v
•	Glazing element	Facing	sector		Size		Perfor	mance	P&H or	device	Sha	ding	Mult	ipliers	Size	Outcome
		A					U-						Heati		Area	of % of
1		facade	Option B	Height	Vidth	Area	Yalue	SHGC	P	н	P/H	G	ng	Cooli	used	allowand
ID	Description (optional)	S	Facades	(m)	(m)	(m²)	(AFRC)	(AFRC)	(m)	(m)		(m)	(S _H)	ng (Sc)	(m*)	used
1	NW-1-1	NW		0.90	73.80		2.7	0.35	0.450	0.900	0.50	0.00	0.78	0.60	66.42	48% of 619
2	NW-1-2	NW		0.90	73.80		2.7	0.35	0.450	0.900	0.50	0.00	0.78	0.60	66.42	48% of 61
3	NW-2	NW		1.20	1.00		2.7	0.35				0.00	1.00	1.00	1.20	2% of 61%
4	NW-3	NW		1.20	2.00		2.7	0.35				0.00	1.00	1.00	2.40	3% of 61%
5	SW-1-1	SW		0.90	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.79	0.70	0.99	9% of 19%
6	SW-1-2	SW		0.90	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.79	0.70	0.99	9% of 19%
7	SW-2	SW		1.80	4.10		2.7	0.35				0.00	1.00	1.00	7.38	82% of 19
8	W-1	W		3.60	7.06		2.7	0.35				0.00	1.00	1.00	25.42	73% of 68
9	W-2	W		1.80	5.15		2.7	0.35				0.00	1.00	1.00	9.27	27% of 68
##	S-1	S		1.80	68.85		2.7	0.35				0.00	1.00	1.00	#####	100% of 4
##	E-1	E		1.80	3.00		2.7	0.35				0.00	1.00	1.00	5.40	38% of 22
##	E-2	E		1.80	4.10		2.7	0.35				0.00	1.00	1.00	7.38	52% of 22
##	E-3-1	E		0.90	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.71	0.66	0.99	5% of 22%
##	E-3-2	E		0.90	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.71	0.66	0.99	5% of 22%
##	N-1-1	N		0.90	22.95		2.7	0.35	0.450	0.900	0.50	0.00	0.76	0.54	20.66	50% of 54
	N-1-2	N		0.90	22.95		2.7	0.35	0.450	0.900	0.50	0.00	0.76	0.54	20.66	50% of 54
##		SE		1.80	30.65		2.7	0.35	0.450	1.800	0.25	0.00	0.87	0.83	55.17	100% of 6
## ##	SE-1						2.7	0.35	0.450	0.900	0.50	0.00	0.74	0.61	0.99	4% of 43%
## ##	SE-1 NE-1-1	NE		0.90	1.10				-							
## ## ##	SE-1 NE-1-1 NE-1-2	NE		0.90	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.74	0.61	0.99	4% of 43%
## ## ## ##	SE-1 NE-1-1 NE-1-2 NE-2	NE NE NE		0.90 0.90 1.80	1.10 1.10 4.68		2.7 2.7	0.35 0.35	0.450	0.900	0.50	0.00	0.74	0.61	0.99 8.42	4% of 43% 60% of 43
## ## ## ## ## ##	SE-1 NE-1-1 NE-1-2 NE-2 NE-3	NE NE NE NE		0.90 0.90 1.80 1.80	1.10 1.10 4.68 1.90		2.7 2.7 2.7	0.35 0.35 0.35	0.450	0.900	0.50	0.00 0.00 0.00	0.74 1.00 1.00	0.61 1.00 1.00	0.99 8.42 3.42	4% of 43% 60% of 43 24% of 43

if inputs are valid

~/

The Glazing Calculator has been developed by the ABCB to assist in developing a better understanding of glazing energy efficiency parameters. While the ABCB believes that the Glazing Calculator, if used correctly, will produce accurate results, it is provided "as is" and without any representation or warranty of any kind, including that it is fit for any purpose or of merchantable quality, or functions as intended or at all. Your use of the Glazing Calculator is entirely at your own risk and the ABCB accepts no liability of any kind.



Australian Hearing Hub

ESD Report

Suildina	namofdorcription A	148			848			A868		_	A84	Applica	tion			Climate zone
3F												othe	r			5
Storey		Facado aro	ar								12					
	4	н	ME	E	SE	s	S¥	¥	HW	internal						
	Option A	147m ²	93m ^a	126m ³	178m ³	349m ^a	60m ^a	60m ³	389m ³		ABC					
	Option B									n da						
	option b	30 km²	15.9m²	21 km²	85.2m²	124m2	9 20m²	9.23m²	MEm?		1.2					
	Greating erro(H)				0.0200				772077							
umbor	of row proforrod in table bolow	<u> </u>	- 33	(ar cwrin	tly disployed	<i>17</i>										
61	AZING FI EMENTS ORIENT	ATION SE	CTOR SU	F and PF	REARMA	HOF CHAI	ACTERIS	TICS	SHA	ING	CAL	CIII AT		COMES	0K (16 in	ante ara nali.
•	flasia a altertati	E			<:	IVE ONA	Profes		PAU		51.		Madei		Si	0-1
•	disting sizes (A					U-						Heati		Area	f Z f
		facada	Option B	Haight	Widek	Ares	Talas	SHEC	P	н	P/H	6		Caalia	wed	ellauence
7) ID	Description (optional)		Facador	(m)	(m)	(m')	(AFRC)	(AFRC)	(m)	(m)		(m)	(S _H)	• (Sc)	(m')	wood
1	NV-1-1	NV		0.90	73.80		2.7	0.35	0.450	***	0.50	0.00	0.78	0.60	66.42	43% of 52%
2	NV-1-2	NV		0.90	73.80		2.7	0.35	0.450	***	0.50	0.00	0.78	0.60	66.42	43% of 52%
3	NV-2	NV		1.20	1.00		2.7	0.35				0.00	1.00	1.00	1.20	1% of 52%
4	NV-3	NV		1.20	1.00		2.7	0.35				0.00	1.00	1.00	1.20	1% of 52%
5	NV-4	NV		1.20	2.00		2.7	0.35				0.00	1.00	1.00	2.40	3% of 52%
6	NV-5	NV		1.80	4.05		2.7	0.35				0.00	1.00	1.00	7.29	9% of 52%
7	SV-1-1	SV		0.90	1.10		2.7	0.35	0.450	***	0.50	0.00	0.79	0.70	0.99	9% of 19%
8	SV-1-2	SV		0.90	1.10		2.7	0.35	0.450	***	0.50	0.00	0.79	0.70	0.99	9% of 19%
9	S¥-2	SV		1.80	4.10		2.7	0.35				0.00	1.00	1.00	7.38	82% of 19%
	¥-1	V		1.80	5.15		2.7	0.35				0.00	1.00	1.00	9.27	100% of 31%
- 11	S-1	S		1.20	2.00		2.7	0.35				0.00	1.00	1.00	2.40	2% of 37%
•	S-2	S		1.20	1.00		2.7	0.35				0.00	1.00	1.00	1.20	1% of 37%
•	S-3	S		1.20	2.00		2.7	0.35				0.00	1.00	1.00	2.40	2% of 37%
•	S-4	S		1.20	1.00		2.7	0.35				0.00	1.00	1.00	1.20	1% of 37%
•	S-5	S		1.20	2.00		2.7	0.35				0.00	1.00	1.00	2.40	2% of 37%
•	S-6	S		1.80	68.85		2.7	0.35				0.00	1.00	1.00	123.93	93% of 37%
. +	E-1	E		1.80	3.00		2.7	0.35				0.00	1.00	1.00	5.40	29% of 35%
	E-2	E		1.80	4.10		2.7	0.35				0.00	1.00	1.00	7.38	39% of 35%
. +	E-3-1	E		0.90	1.10		2.7	0.35	0.450	***	0.50	0.00	0.71	0.66	0.99	3% of 35%
	E-3-2	E		0.90	1.10		2.7	0.35	0.450	***	0.50	0.00	0.71	0.66	0.99	3% of 35%
	E-4	E		1.80	9.10		2.7	0.35	DEVIC	E	**	0.00	0.00	0.25	16.38	25% of 35%
	N-1-1	N		0.90	22.95		2.7	0.35	0.450	***	0.50	0.00	0.76	0.54	20.66	27% of 61%
	N-1-2	N		0.90	22.95		2.7	0.35	0.450	***	0.50	0.00	0.76	0.54	20.66	27% of 61%
	N-2	N		1.80	8.26		2.7	0.35				0.00	1.00	1.00	14.87	42% of 61%
	N-3	N		1.80	7.74		2.7	0.35	DEAIC	E	**	0.00	0.00	0.19	13.93	4% of 61%
	SE-1	SE		1.80	16.70		2.7	0.35				0.00	1.00	1.00	30.06	38% of 65%
-	SE-2	SE		1.80	30.65		2.7	0.35	0.450	***	0.25	0.00	0.87	0.83	55.17	62% of 65%
	NE-1-1	NE		0.90	1.10		2.7	0.35	0.450		0.50	0.00	0.74	0.61	0.99	4% OF 43%
-	NE-1-2	NE		0.90	1.10		2.7	0.35	0.450	***	0.50	0.00	0.74	0.61	0.99	4% of 43%
-	NE-Z	NE		1.80	4.68		2.7	0.35				0.00	1.00	1.00	8.42	60% oF 43%
-	NE-3	NE		1.80	1.90		2.1	0.35	0.450		0.50	0.00	1.00	1.00	3.42	24% OF 43%
	NE-4-1	NE		0.90	1.10		2.1	0.35	0.450		0.50	0.00	0.74	0.61	0.99	4% OF 43%
				0.30	1.10				1 401		1110111	ULUE	0.74	December 10 (1971)	11 2 2 3	1 9 24 DIT 9 3 24

The Glazing Calculatur har been developed by the ABCB to arrivit in developing a better understanding of glazing energy officiency parameters. While the ABCB believer that the Glazing Calculator, if used correctly, uill produce accurate results, it is provided "as is" and uithout any representation or warranty of any kind, including that it is fit for any purpose or of merchantable quality, or functions as intended or at all. are valid

Australian Hearing Hub

ESD Report

Buildin	g name/description			ABCB		A	868		ABG	6		Applic	ation			Climate zone
4F												othe	r 📃			5
Storey		Facade a	reas								ME ON					
	5 4000	N	NE	E	SE	S	SV	V	NV	internal	1					
	Option Å	147m ²	93m ²	126m ²	178m ²	349m ²	60m ²	60m ²	389m²							
	Option E									nia						
	Glazing area (A)	73m²	16m²	31 <i>m</i> ²	84m²	130m²	9.4m²	9.3m²	145m²	-	INC VI					
Numbe	er of rows preferred in table belo	W LUME (30	(as curres	ntly display	ed)										
	A000			ABCB		A	BCB		ABC	8						ABCB
LAZING	ELEMENTS, ORIENTAT	TON SEC	CTOR, SI	ZE and P	ERFOR	MANCE	CHARAC	TERIST	SHA	DING	CALC	ULAT	ED OUT	COMES	S OK (if	inputs are valio
	Glazing element	Facing	sector		Size		Perfo	rmance	P&H or	device	Sha	iding	Mult	ipliers	Size	Outcomes
	•	A	Option P	Hojaht	Videk	Ares.	U-	euec	Б		циа	G	Heati	Caoli	Area	10 % 10
a in	Description (optional)	s	facades	(m)	(m)	(m ³)	(AFBC)	(AFBC)	(m)	(m)	1.111	(m)	(S _u)	na (Sz)	(m ²)	used
1	NW-1-1	NW		0.90	73.80	()	2.7	0.35	0.450	0.900	0.50	0.00	0.78	0.60	66.42	43% of 52%
2	NW-1-2	NW		0.90	73.80		2.7	0.35	0.450	0.900	0.50	0.00	0.78	0.60	66.42	43% of 52%
3	NW-2	NW		1.20	1.00		2.7	0.35	01100	0.000	0.00	0.00	1 00	1.00	1 20	1% of 52%
4	NW-3	NW		1.20	1.00		2.7	0.35				0.00	1 00	1.00	1.20	1% of 52%
5	NW-4	NW		1.20	1.00		2.7	0.35				0.00	1 00	1.00	1.20	1% of 52%
6	NW-5	NW		1.20	1.00		2.7	0.35				0.00	1.00	1.00	1.20	1% of 52%
7	NW-6	NW		1.80	4.05		2.7	0.35				0.00	1.00	1.00	7.29	9% of 52%
8	SW-1-1	SW		0.90	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.79	0.70	0.99	9% of 19%
9	SW-1-2	SW		0.90	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.79	0.70	0.99	9% of 19%
##	SW-2	SW		1.80	4.10		2.7	0.35				0.00	1.00	1.00	7.38	82% of 19%
##	W-1	W		1.80	5.15		2.7	0.35				0.00	1.00	1.00	9.27	100% of 31%
##	S-1	S		1.20	1.00		2.7	0.35				0.00	1.00	1.00	1.20	1% of 36%
##	S-2	S		1.20	1.00		2.7	0.35				0.00	1.00	1.00	1.20	1% of 36%
##	S-3	S		1.20	1.00		2.7	0.35				0.00	1.00	1.00	1.20	1% of 36%
##	S-4	S		1.20	2.00		2.7	0.35				0.00	1.00	1.00	2.40	2% of 36%
##	S-5	S		1.80	68.85		2.7	0.35				0.00	1.00	1.00	######	95% of 36%
##	E-1	E		1.80	3.00		2.7	0.35				0.00	1.00	1.00	5.40	18% of 56%
##	E-2	E		1.80	4.10		2.7	0.35				0.00	1.00	1.00	7.38	24% of 56%
##	E-3-1	E		0.90	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.71	0.66	0.99	2% of 56%
##	E-3-2	E		0.90	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.71	0.66	0.99	2% of 56%
##	E-4	E		1.80	9.10		2.7	0.35				0.00	1.00	1.00	16.38	54% of 56%
##	N-1-1	N		0.90	40.50		2.7	0.35	0.450	0.900	0.50	0.00	0.76	0.54	36.45	50% of 58%
##	N-1-2	N		0.90	40.50		2.7	0.35	0.450	0.900	0.50	0.00	0.76	0.54	36.45	50% of 58%
##	SE-1	SE		1.80	46.80		2.7	0.35	0.450	1.800	0.25	0.00	0.87	0.83	84.24	100% of 62%
##	NE-1-1	NE		0.90	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.74	0.61	0.99	4% of 43%
##	NE-1-2	NE		0.90	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.74	0.61	0.99	4% of 43%
##	NE-2	NE		1.80	4.68		2.7	0.35				0.00	1.00	1.00	8.42	60% of 43%
##	NE-3	NE		1.80	1.90		2.7	0.35				0.00	1.00	1.00	3.42	24% of 43%
##	NE-4-1	NE		0.90	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.74	0.61	0.99	4% of 43%
##	NE-4-2	NE		0.90	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.74	0.61	0.99	4% of 43%

IMPORTANT NOTICE AND DISCLAIMER IN RESPECT OF THE GLAZING CALCULATOR

The Glazing Calculator has been developed by the ABCB to assist in developing a better understanding of glazing energy efficiency parameters. While the ABCB believes that the Glazing Calculator, if used correctly, will produce accurate results, it is provided "as is" and without any representation or warranty of any kind, including that it is fit for any purpose or of merchantable quality, or functions as intended or at all.



ESD Report

Buildin	g name/description			ABCB		A	0.68		ABC			Applies	ation			Climate zone
5F												other				5
Storey	VOLUME ONE	Facade a	reas	🔍 <u>vo</u>	LUME ON	ie 🔍	VOL	UME ONE		VOLU	ME ON					
	6 4848	N	NE	E	SE	S	S₩	V	NV	internal	1					
	Option Å	147m ²	93m ²	126m ²	178m ²	349m ²	60m ²	60m ²	389m²		1					
	Option E									nta						
	Glazing area (A)	73m²	16m²	31m²	84m²	130m²	9.4m²	9.3m²	145m²	-	ME ON					
	- 1040 F															
Numbe	er of rows preferred in table belo	WLUME	27	(as curre	ntly display	ed)										
MINNE	0.000			ABCB		A	RCR		ABC				ABCB			ABCB
AZING	ELEMENTS, ORIENTAT	ION SEC	TOR, SI	ZE and P	ERFOR	MANCE	CHARAC	TERIST	SHA	DING	CALC	ULAT	ED OUT	COMES	S OK (if	inputs are valio
<u> </u>	Glazing element	Facing	sector		Size		Perfo	mance	P&H or	device	Sha	ding	Multi	ipliers	Size	Outcomes
		A	Ontine D	Uninht	Videk	A	U-	euce			БШ	c	Heati	Casli	Area	of % of
a in	Description (optional)	racade	Excades	(m)	width (m)	(m²)	(AFBC)	(AFBC)	(m)	(m)	PIH	(m)	ng (S)	DG (Sa)	(m ²)	allowance
1	NW_1_1	NW	Tabades	0.90	73.80	(iii)	27	0.35	0.450	0.000	0.50	0.00	0.78	0.60	66.42	43% of 52%
<u></u>	NW_1_2	NW		0.50	73.80		2.1	0.35	0.450	0.000	0.50	0.00	0.78	0.60	66.42	43% of 52%
2	NW-1-2	NW		1 20	2.00		2.7	0.35	0.450	0.300	0.50	0.00	1.00	1.00	2 40	3% of 52%
	NW-3	NW		1.20	2.00		2.7	0.35				0.00	1.00	1.00	2.40	3% of 52%
5	NW-4	NW		1.80	4.05		2.7	0.35				0.00	1.00	1.00	7.29	9% of 52%
6	SW-1-1	SW		0.90	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.79	0.70	0.99	9% of 19%
7	SW-1-2	SW		0.90	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.79	0.70	0.99	9% of 19%
8	SW-2	SW		1.80	4.10		2.7	0.35				0.00	1.00	1.00	7.38	82% of 19%
9	W-1	W		1.80	5.15		2.7	0.35				0.00	1.00	1.00	9.27	100% of 31%
##	S-1	S		1.20	2.00		2.7	0.35				0.00	1.00	1.00	2.40	2% of 36%
##	S-2	S		1.20	1.00		2.7	0.35				0.00	1.00	1.00	1.20	1% of 36%
##	S-3	S		1.20	2.00		2.7	0.35				0.00	1.00	1.00	2.40	2% of 36%
##	S-4	S		1.80	68.85		2.7	0.35				0.00	1.00	1.00	######	95% of 36%
##	E-1	E		1.80	3.00		2.7	0.35				0.00	1.00	1.00	5.40	18% of 56%
##	E-2	E		1.80	4.10		2.7	0.35				0.00	1.00	1.00	7.38	24% of 56%
##	E-3-1	E		0.90	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.71	0.66	0.99	2% of 56%
##	E-3-2	E		0.90	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.71	0.66	0.99	2% of 56%
##	E-4	E		1.80	9.10		2.7	0.35				0.00	1.00	1.00	16.38	54% of 56%
##	N-1-1	N		0.90	40.50		2.7	0.35	0.450	0.900	0.50	0.00	0.76	0.54	36.45	50% of 58%
##	N-1-2	N		0.90	40.50		2.7	0.35	0.450	0.900	0.50	0.00	0.76	0.54	36.45	50% of 58%
##	SE-1	SE		1.80	46.80		2.7	0.35	0.450	1.800	0.25	0.00	0.87	0.83	84.24	100% of 62%
##	NE-1-1	NE		0.90	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.74	0.61	0.99	4% of 43%
##	NE-1-2	NE		0.90	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.74	0.61	0.99	4% of 43%
##	NE-2	NE		1.80	4.68		2.7	0.35				0.00	1.00	1.00	8.42	60% of 43%
##	NE-3	NE		1.80	1.90		2.7	0.35				0.00	1.00	1.00	3.42	24% of 43%
##	NE-4-1	NE		0.90	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.74	0.61	0.99	4% of 43%
##	NE-4-2	NE		0.90	1.10		2.7	0.35	0.450	0.900	0.50	0.00	0.74	0.61	0.99	4% of 43%

IMPORTANT NOTICE AND DISCLAIMER IN RESPECT OF THE GLAZING CALCULATOR

The Glazing Calculator has been developed by the ABCB to assist in developing a better understanding of glazing energy efficiency parameters. While the ABCB believes that the Glazing Calculator, if used correctly, will produce accurate results, it is provided "as is" and without any representation or warranty of any kind, including that it is fit for any purpose or of merchantable quality, or functions as intended or at all. Your use of the Glazing Calculator is entirely at your disk and the QBCP accents on liability of any kind.



Appendix C: IEQ-13 Compliant Product List

The following list has been prepared to provide guidance on compliant products for Green Star credit IEQ-13. Whilst the list has been prepared with best endeavours, the responsibility lies with the contractors to source compliant products and provide the required documentation for Green Star Office As-Built v3.

Adhesives & Sealants - must comply with South Coast Air Quality Management District Rule 1168											
Product Type	Brand	Name	Compliant VOC Content (g/litre)	Actual VOC Content (g/litre)							
Indoor carpet adhesive			50								
	Mapei	ECO 800		<0.01							
	Mapei	Ultrabond ECO 90		TBC							
	Mapei	Ultrabond ECO 185		TBC							
	Mapei	Ultrabond ECO 200		TBC							
	Mapei	Ultrabond ECO 220		TBC							
	Mapei	Ultrabond ECO 840		TBC							
	Mapei	Ultrabond ECO 8200		TBC							
	Interface	Intertac		<1							
Carpet pad adhesive			50								
	RLA Polymers	GS100		11							
	RLA Polymers	GS300		<1							
	RLA Polymers	GS400		10							
Wood flooring and laminate adhesive			100								
	Ultrabond	P990		<5							
Rubber flooring adhesive			60								
¥	Mapei	ECO 300		<0.01							

ESD Report

	Mapei	ECO 540		TBC
Sub-floor adhesive			50	
	Ardex	LQ 92		5
Ceramic tile adhesive			65	
	MCB	A80		14
	Ardex	FG 8		2
	Ardex	Abacolor		2
	Spirit Marble & Tile	Water based premium sealer		61
Cove base adhesive		500.050	50	0.01
	Ultrabond	ECO 350		<0.01
Dry wall & panel adhesive			50	
	CSR	Gyprock™ Back Blocking Cement		<10
	CSR	Gyprock™ Base Coat 20		<10
	CSR	Gyprock™ Base Coat 60		<10
	CSR	Gyprock™ Base Coat 45		<10
	CSR	Gyprock™ Base Coat 90		<10
	CSR	Gyprock™ Casting Plaster		<10
	CSR	Gyprock™ Cornice Cement 60		<10
	CSR	Gyprock™ Dental Plaster		<10
	CSR	Gyprock™ Hardwall Plaster		<10
	CSR	Gyprock™ Pottery Plaster		<10
	CSR	Gyprock™ Masonry Adhesive		<10
	CSR	Gyprock™ Spray Plaster		<10
	CSR	Gyprock™ Stopping Plaster		<10
	CSR	Gyprock™ Superfine Plaster		<10
	CSR	Gyprock™ Total Cote Lite		<10
	CSR	Gyprock™ Easy Finish Topping Compound		<10

ESD Report

	CSR	Gyprock™ External Joint Compound		35
	CSR	Gyprock [™] Pro-Lite Topping Compound		<10
	CSR	Gyprock™ Jointmaster Topping Compound		<10
	CSR	Gyprock [™] Stud Adhesive		<10
	CSR	Gyprock™ Easy Flow		<10
	CSR	Gyprock™ Final Finish Topping Compound		<10
	CSR	Gyprock [™] Multipurpose Joint Compound		<10
	CSR	Gyprock™ Wet Area Joint Compound		33
	CSR	Gyprock™ Wet Area Base Coat		35
	CSR	Gyprock™ Rapid Patch		<10
	CSR	Cemintel External Jointing Compound		<10
	CSR	Cemintel Texture Coat		<10
	CSR	MiTex Skim Coat Medium		<10
	CSR	MiTex Skim Coat Coarse		20
	CSR	MiTex MiBond		<10
	CSR	MiTex MiRender		<10
	CSR	MiTex Kalahari Medium		<10
	CSR	MiTex Kalahari Fine		<10
	CSR	MiTex Mojave 2mm Scratch		<10
Multipurpose construction adhesive			70	
	Hilti	HIT HY150		60
	RLA Polymers Pty Ltd	RL1018		20
	RLA Polymers Pty Ltd	RLA Polymers Pty Ltd		10
	DuPont	Corian		<0.25mg/m3

Australian Hearing Hub

ESD Report

Structural glazing adhesive			100	
Architectural sealants			250	
	Ardex	Ardex SE		125
	Rockstar	Concrete Sealer		<1
	Rockstar	Water-based Natural Finish Stone Sealer		100
	Lyndon's	Multicure R		49
	Applied Concrete Solutions	Slabclab R		49
	Selleys	Proseries Fireblock		5.5
	Resene	Cemseal		0
	Mapei	AC		TBC
	Mapei	Mapelastic		TBC
	Mapei	Mapelastic Smart		TBC
	Mapei	Mapegum WPS		TBC
	Mapei	Plastimul		TBC
	Mapei	Idrosilex Pronto		TBC
	Mapei	Kerapoxy		TBC
	Mapei	Mapei Keracolor SF		TBC
	Mapei	Mapei Keracolor FF		TBC
	Mapei	Mapei Keracolor GG		TBC
	Mapei	Ultracolor Plus		TBC
	Mapei	Mapei Kerabond Plus		TBC
	Mapei	Mapei Isolastic 50		TBC
	Mapei	Mapei Granirapid		TBC
	Mapei	Mapei Ultramastic Eco		TBC
	Mapei	Mapei Adeflex R		TBC
	Мареі	Mapei Adesilex P4		TBC
	Мареі	Mapei Keraflex		TBC
	Mapei	Mapei Keraquick		TBC

Australian Hearing Hub



Mapei	Mapei Keraset	TBC
Mapei	Mapei Latex Plus	TBC
Mapei	Mapei Tixobond Fine S1	TBC

Paints & Coatings - must comply with ASTMD3960										
Product Type	Brand	Name	Compliant VOC Content (g/litre)	Actual VOC Content (g/litre)						
Interior Semi Gloss			16							
	Resene	Decorator Acrylic Semi-Gloss		7						
Interior Low Sheen			16							
	Dulux	Enviro2 Low Sheen DD1274 (white)		1						
Interior Flat Washable			16							
	Resene	Broadwall Waterborne Wallboard Sealer		0						
	Resene	Decorator Acrylic I/E Flat		7						
Ceilings Interior			14							
	Resene	Ceiling Paint		7						
Exterior Gloss			75							
	Resene	Aquashield		7						
Trim - gloss, semi gloss, satin, varnishes & woodstains			75							
	Dulux	Aquanamel Gloss DD1282 (signal red)		<69						
	Resene	Enamacryl		63						

Timber and binding primers			30	
	Mapei	Mapeprim SP		TBC
	Mapei	Biblock		TBC
	Mapei	Triblock		TBC
	Mapei	Primer G		TBC
	Mapei	ECO Prim T		TBC
Latex primer for galvanised iron and zincalume			60	
	Dulux	Quit Rust Galvanised Iron Primer Plus DD1048		<60
Interior Latex undercoat			65	
	Resene	Quick Dry Acrylic Undercoat		41
Interior Sealer			65	
	Resene	Broadwall 3 in 1		5
	Resene	Broadwall Surface Prep		27
	Resene	Decorator Acrylic Primer Undercoat		41
	Resene	Aquapel Sealer		10
	Resene	Broadwall Waterborne Wallboard Sealer		0
One and two pack performance coatings for floors			140	
(Semi gloss tintable)	ArtEpox	ArtEpox 110		<110
(Clear coating)	ArtEpox	ArtEpox 140		<140
	ArtEpox	ArtEpox 180		<90
(Gloss tintable)	Jaxxon	Jaxxon 1505		<140
	Jaxxon	Jaxxon 1515		<140
	Jaxxon	Jaxxon 1525		<140
	Jaxxon	Jaxxon 1535		<140

Other solvent based coatings			200	
	Jaxxon	Jaxxon 1335		<150
	Jaxxon	Jaxxon 1355		<180
	Jaxxon	Jaxxon 1545		<160
	ArtEpox	ArtEpox 130		<160
	Mapei	Ultraplan		TBC
	Mapei	Ultraplan ECO		TBC
	Mapei	Ultraplan Maxi		TBC
	Mapei	Plano 3		TBC
	Mapei	UC Leveller		TBC
	Mapei	Novoplan 21		TBC
	Mapei	Nivorapid		TBC
	Mapei	Ultra Skimcoat		TBC
	Mapei	Planipatch		TBC

Car	Carpets - must comply with Carpet & Rug Institute Green Label or ASTM D5116											
Product Type	Brand	Name	Compliant VOC Emission (mg/m²/hr)	Actual VOC Emission (mg/m²/hr)	Compliant 4- PC Emission (mg/m²/hr)	Actual 4-PC Emission (mg/m²/hr)						
All carpet products			0.5		0.05							
	Carpets Inter	Nylon modular tile with ECOfelt PETG backing (#25139660)		0.115		0.02						
	Carpets Inter	GlassBacRE		0.01		0.002						
	Carpets Inter	Graphlex		<0.001		<0.006						

Appendix D: IEQ-14 Compliant Product List

The following list has been prepared to provide guidance on compliant products for Green Star credit IEQ-14. Whilst the list has been prepared with best endeavours, the responsibility lies with the contractors to source compliant products and provide the required documentation for Green Star Office As-Built v3.

Engineered Wood Products								
Product Type	Brand	Product	Formaldehyde Emission Limit (E1)	Formaldehyde Emission Limit (E0)	Formaldehyde Emission Limit (Super E0)	Actual Emissions	Applicable Testing Method	
Plywood			1.0 mg/L	0.5 mg/L	0.3 mg/L		AS 2098.11	
	Amerind	E0 Plywood				0.5		
	Ausply (Big River Timbers)	Plywood 'Super E0'				0.3		
Particle Board			1.0 mg/L	0.5 mg/L	0.3 mg/L		AS 4266.16	
	Laminex	E0 Particle Board				<1.0		
	Laminex	E1 Particle Board (9mm and 16mm product non-compliant)				<1.0		
	Carter Holt Harvey	E0 Particle Board				<0.5		
MDF			1.5 mg/L	0.5 mg/L	0.3 mg/L		AS 4266.16	
	Laminex	E0 MDF				<0.5		
	Laminex	E1 MDF				<1.0		
	Supawood	E0 MDF				<0.5		
	Alpine	E0 MDF				<0.5		

Appendix E: MAT-8 Compliant Product List

The following list has been prepared to provide guidance on compliant products for Green Star credit MAT-8. Whilst the list has been prepared with best endeavours, the responsibility lies with the contractors to source compliant products and provide the required documentation for Green Star Office As-Built v3.

FSC Timber Products					
Supplier	Product Class	Product Type	Trade Name		
Amerind	311	3110	Timber (Sawn)		
	312	3121	Timber (Mouldings)		
	314	3142	MDF, hardboard, softboard, whiteboards, colourboards, particle board, plywood		
		3143	MDF, hardboard, softboard, whiteboards, colourboards, particle board, plywood		
Briggs Veneers		FSC-Pure			
		FSC-mixed timber veneer			
		FSC-mixed timber			
		FSC-mixed fibre board			
		FSC-Controlled timber veneer			
		FSC-Controlled timber			
New Age Veneers		FSC-Pure			
		FSC-mixed timber veneer			
		FSC-mixed timber			
Elton Group		FSC-mixed timber			
		FSC-recycled timber			
Boral		Highland Products	Softwood		

Appendix F: Integrated Fitout Guidelines

The following base building Green Star (As-Built) points are at risk of being lost due to tenancy works, particularly the large area of cellular offices and meeting rooms. Any tenancy works commencing before the practical completion of the base building must allow for the base building As-Built requirements to be satisfied. It is the contractor's requirement to ensure that the fitout works are integrated with the base building works according to the following table.

Credit	Title	Base Building As-Built Requirement	Requirement(s) for Fitouts
MAN-2	Commissioning – Clauses	Summary Commissioning Report for all services including commissioning dates, tests carried out and changes made as a result of the commissioning process. This summary report must demonstrate compliance with either the ASHRAE Guideline 1 or the CIBSE Commissioning codes. A copy of the documentation and information transferred to the building owner/manager (including a copy of each transmittal) for each of: mechanical, electrical and hydraulic services.	Commissioning only required for base building systems. Commissioning of tenancy services to dovetail with commissioning of base building services.
MAN-3	Commissioning – Building Tuning	Copies of the building tuning contracts (prices may be deleted) for all building services, demonstrating that there is a client commitment to a firm 12-month commissioning building tuning period after handover. This requires minimum quarterly reviews and a final recommissioning after 12 months of operation. Contracts must show the scope and timeframe of the building tuning process, requiring the above criteria and be signed by both the client and the contractor.	Tuning only required for base building systems. Tuning of tenancy services to dovetail with tuning of base building services.
MAN-4	Commissioning - Agent	An extract from the independent agent's commissioning report that summarises the major findings and recommendations of the commissioning process.	ICA not responsible for commissioning tenant-installed items.
MAN-6	Environmental Management	A copy of the EMP and all reporting created through the use of the EMP clearly demonstrating compliance with the requirements of with section 4 of the NSW Environmental Management System guidelines.	Tenancy EMP to sit under base building EMP and not affect the directives of base building EMP (duplication preferred).
MAN-7	Waste Management	An extract from the contract provisions which demonstrated that the contractor was required to reuse/recycle a minimum fixed proportion of construction waste and report on waste reuse quarterly to the client. Copies of the waste reports issued to the client quarterly showing the percentage waste recycled or reused (by weight) Sub-contractor certification confirming that the waste reuse/recycling target was achieved for this site.	Waste Management plan to duplicate base building's waste management plan to recycle 80% of construction waste. Combine waste from both base build and fitout, ensuring that over 80% of demolition and construction waste is recycled in total.

r			
IEQ-1	Ventilation Rates	Minimum outside air to be provided at rates 50% better than the requirements of AS 1668.2-1991. As-built drawings and commissioning report to be provided showing minimum fresh air rates served by each AHU; plus a summary table showing that for each space served by an AHU, the requirements of the credit for the points claimed are met. Note that improvements must be measured against AS1668.2 (1991).	Dedicated tenant systems do not need to comply with IEQ-1 requirements.
IEQ-2	Air Change Effectiveness	The ventilation systems are designed to achieve an Air Change Effectiveness (ACE) of >0.95 for at least 95% of the NLA when measured in accordance with ASHRAE 129-1997: 'Measuring Air Change Effectiveness'; and ACE is measured in the breathing zone (nominally 1m from finished floor level).	To achieve this point for As-Built certification, modelling will be conducted without tenant partitions.
IEQ-3	CO ₂ Monitoring	One CO ₂ sensor must be provided per return duct that facilitates continuous monitoring and adjustment of outside air ventilation rates. As-built drawings, O&M requirements and a BMS point schedule to be provided in a short report.	A sensor must be supplied as per the credit criteria to general office areas.
IEQ-4	Daylight	30% of the NLA will have a Daylight Factor (DF) of not less than 2.0%, at desk-height level (720mm AFFL) under a uniform design sky.	To achieve this point for As-Built certification, modelling will be conducted without tenant partitions.
IEQ-6	High Frequency Ballasts	High frequency ballasts to be installed in fluorescent luminaires over a minimum of 95% of NLA. Documentation required: as-installed drawings of lighting systems showing proportion of NLA served by fittings with high frequency ballasts; a copy of supplier or sub-contractor certification which confirms the total number of high frequency ballast fittings which have been installed; a summary calculation sheet from the lighting engineer showing the total number of fittings required for each floor and for the entire project.	Any fluorescent lighting provided must comply with the credit criteria.
IEQ-7	Electric Lighting Levels	Office lighting design to maintain illuminance level of no more than 400 Lux for 95% of the NLA at 900mm (shown on illuminance lighting level drawings).	Any lighting provided must comply with the credit criteria. Labs and quiet rooms are excluded from this credit, pending approval of a CIR from the GBCA.
IEQ-9	Thermal Comfort	Thermal comfort levels are to achieve Predicted Mean Vote (PMV) levels between -0.5 and +0.5, calculated in accordance with ISO7730 (or equivalent using Draft ASHRAE Comfort Standard 55 and "Developing an Adaptive Model of Thermal Comfort and Preference - Final Report on ASHRAE RP884") and must be achieved during Standard Hours of Occupancy using standard clothing, metabolic rate and air velocity values for 98% of the year.	To achieve this point for As-Built certification, modelling will be conducted without tenant partitions.



Australian Hearing Hub

IEQ-12	Internal Noise Levels	For 95% of the building's NLA, the building services nois sound levels provided in Table 1 of AS/NZS 2107:2000. Additionally, the sound levels must be between 40 dB La private offices. Extracts from the commissioning report are required to so outline the conditions under which the tests were carried	To achieve this point for As-Built certification, measurement will be conducted in open plan areas. A report will be prepared by an acoustic consultant showing how the credit was achieved.		
IEQ-13	-13 Volatile Organic Compounds Use of VOCs in carpets, sealants, adhesives and paints to be reduced in accordance with the following requirements:				
		Paints & Coatings must comply with	ASTMD3960		Fitouts will comply with the credit criteria.
		Product Type	Compliant VOC Content (g/litre)		
		Interior Semi Gloss	16		
		Interior Low Sheen	16		
		Interior Flat Washable	16		
		Ceilings Interior	14		
		Exterior Gloss	75		
		Trim - gloss, semi gloss, satin, varnishes & wood	75		
		Timber and binding primers	30		
		Latex primer for galvanised iron and zincalume	60		
		Interior Latex undercoat	65		
		Interior Sealer	65		
		Interior Sealer	65		
		One and two pack performance coatings for floors	140		
		Other solvent based coatings	200		

South Coast Air	res & Sealants must c r Quality Management	omply with District Rule 1168	Fitouts will comply with the credit c
Product Type Compliant VOC Content (g/litre)		Compliant VOC Content (g/litre)	
Indoor carpet adhesiv	/e	50	
Carpet pad adhesive		50	
Wood flooring and la	minate adhesive	100	
Rubber flooring adhe	sive	60	
Sub-floor adhesive		50	
Ceramic tile adhesive		65	
ove base adhesive		50	
Dry wall & panel adhe	esive	50	
Multipurpose constru	ction adhesive	70	
Structural glazing adhesive		100	
Architectural sealants	6	250	
Multipurpose constru Structural glazing adl Architectural sealants	action adhesive hesive s	70 100 250	
Corract & Du	Carpets must comply	with	Fitouts will comply with the credit c
Carpet & Rug	Carpets must comply g Institute Green Labe	with I or ASTM D5116	Fitouts will comply with the credit c
Carpet & Rug Product Type	Carpets must comply g Institute Green Labe Compliant VOC Emission (mg/m²/hr)	with el or ASTM D5116 Compliant 4-PC Emission (mg/m²/hr)	Fitouts will comply with the credit c

Australian Hearing Hub

IEQ-14	Formaldehyde Minimisation	All composite wood products must satisfy the requirements of the following table:						
			E	ngineered Woo	d Products			Fitouts will comply with the credit criteria.
		Product Type	Formaldehyde Emission Limit (E1)	Formaldehyde Emission Limit (E0)	Formaldehyde Emission Limit (Super E0)	Applicable Testing Method		
		Plywood	1.0 mg/L	0.5 mg/L	0.3 mg/L	AS 2098.11		
		Particle Board	1.0 mg/L	0.5 mg/L	0.3 mg/L	AS 4266.16		
		MDF	1.5 mg/L	0.5 mg/L	0.3 mg/L	AS 4266.16		
		Plywood	6 mg / 100 g	4 mg / 100 g	2.4 mg / 100 g	EN 120		
		Particle Board	9 mg / 100 g	6 mg / 100 g	2.8 mg / 100 g	EN 120		
		MDF	9 mg / 100 g	6 mg / 100 g	2.8 mg / 100 g	EN 120		
		Plywood	0.12 mg/m3h	0.08 mg/m3h	0.04 mg/m3h	DIN EN 717-1	-	
		Particle Board	0.12 mg/m3h	0.08 mg/m3h	0.04 mg/m3h	DIN EN 717-1		
		MDF	0.12 mg/m3h	0.08 mg/m3h	NA	DIN EN 717-1		
IEQ-16	Tenant Exhaust Riser	Must provide • Provides r • Has a cap • The exhau	e a dedicated tena no less than 0.2L/s pacity of 0.5L/s/m2 st system is not re	ant exhaust riser (c s/m2 for 100% of th for 100% of the N ecycled to other en	omplying with Sect ne NLA; LA on any individu closures of differer	ion 5.7 of AS 1668.2- al floor; and it use.	2002) that:	Tenancy fit out to permit installation of exhaust riser as per the base building requirements.
ENE-1	Greenhouse Gas Emissions	Must provide than 70%) d	e base building en lemonstrating that	ergy use data afte base building syst	r 12 months of ope ems perform at a 4	ration (with occupanc I.5 Star NABERS Ene	y greater rgy level.	To achieve this point for As-Built certification, base building energy
	Reduction	The Base B	uilding rating is ba	ised on:				modelling will be conducted without tenant
		• Cc	ommon Area Light	ing: Lifts: Commo	on Area Ventilation	Car Park Ventilation	Hot Water	partitions.
		Co	ndenser Water He	eat Rejection; Offic	e Air Conditioning			
ENE-3	Sub-Metering Required for Electrical uses over 100kVA	Sub-meters BMS schedu	must be installed ule plus as-installe	for any tenant syst	ems exceeding 10 t be provided with	0kVA. location of all sub met	ers clearly	Tenant to permit installation of sub-meters for any tenant systems exceeding 100kVA.
1		marked, sho	owing maximum lo	ad for each meter.				

Australian Hearing Hub

ENE-4	Sub-Metering required for each tenancy	Sub-meters must be installed for each tenancy. BMS schedule plus as-installed schematics must be provided with location of all sub meters clearly marked, showing inputs for each meter.	Tenant to permit energy sub-metering and monitoring by base building BMS
ENE-5	Office Lighting Power Density	The average lighting power densities for 95% of the NLA must not exceed 1.5 W/m ² per 100 Lux. In order to comply with IEQ-7(Office lighting design to maintained illuminance level of no more than 400 Lux for 95% of the NLA at 900mm (shown on illuminance lighting level drawings), the average lighting power densities for 95% of the NLA must not exceed 6 W/m ² .	To achieve 2 points for this credit, all general office lighting provided must comply with the credit criteria and the marked up cellular office areas and meeting rooms are not to exceed 2 W/m ² per 100 Lux. Labs and quiet rooms are excluded from this credit, pending approval of a CIR from the GBCA.
ENE-6	Increased Office Lighting Zoning Control	 The following is required: All individual or enclosed spaces must have individual switches; the size of individually switched lighting zones must not exceed 100m² for 95% of the NLA; and switching must be clearly labelled and easily accessible by building occupants. 	Fitouts will comply with the credit criteria.
WAT-1	Potable Water Efficiency	 All sanitary fixtures and tapware to achieve: Minimum 6 Star WELS rated urinals (max. 0.8L/flush) Minimum 5 Star WELS rated taps (max. 6L/min) Minimum 4 Star WELS rated toilets (max. 3.4L/flush) Minimum 3 Star WELS rated showerheads (max. 9L/min) The following documentation is required: Supplier certification confirming the quantity of water efficient fittings claimed were provided for this project Sub-contractor certification confirming water efficient fittings supplied were installed for this project 	Fitouts will comply with the credit criteria.
MAT-8	Sustainable Timber	 All timber products to be sourced from FSC timber plantations or post-consumer reused timber. The following documentation is required: Summary document listing all uses of timber on the project, the supplier cost and whether or not the timber qualifies for the credit; Supplier certification confirming quantity and cost of timber supplied for this project and including supplier or manufacturer certification that the timber meets the requirements of this green star credit Sub-contractor certification confirming the quantities and types of timber used for various building elements for this project 	Fitouts will comply with the credit criteria.

EMI-1	Refrigerant ODP	100% of HVAC refrigerants in use have an Ozone Depletion Potential (ODP) of zero. The following documentation is required:	Fitouts will comply with the credit criteria.
		 Supplier certification quantifying all refrigerants supplied to that site (this is to correlate to the calculations summary showing the refrigerants used) 	
		• Sub-contractor certification demonstrating that the refrigerants and chillers supplied to the site are the items that were installed	
		 References proving 100% of refrigerants used have an ODP of zero as determined from either HB 40.1-2001: The Australian Refrigeration and Air-conditioning Code of Good Practice (Appendix 3 & 4) or AIRAH Refrigerant Selection Guide 2003 	
EMI-9	Insulant ODP	All thermal insulation avoids the use of ozone depleting substances in both manufacture or composition.	Fitouts will comply with the credit criteria.
		Items to be covered include: building services such as chilled water pipework, refrigerant pipework, ductwork, hot & cold water pipes and water tanks, building fabric insulation for walls, roof, floor, window frames, doors, cavity closures and lintels.	



The head contractor will develop a plan to ensure that the base building achieves its Green Star Office v3 As-Built rating. An example of a successful management procedure is shown below.

