



Global Change Institute

TEMC Conference

Anne Kovachevich, Qld ESD leader, Arup
3 September 2014



The team

Architect / landscape: **Hassell**

Mechanical and electrical services: **Medland
Metropolis**

ESD, acoustics, fire engineering: **Arup**

Civil / structural: **Bligh Tanner**

Quantity surveyor: **Rider Levett Bucknall**

Hydraulics / fire: **Steve Paul and Partners**

Main contractor: **McNab**

ICA: **Umow Lai**

Owner / applicant / project manager: **UQ**

Presentation overview

- Drivers
- Initiatives
- Lessons learnt
- Questions



- Demonstrate principles of the Global Change Institute
- GCI Australia Addressing the challenges of a changing world

<http://www.gci.uq.edu.au>



- Valuing heritage: Rejuvenating a significant building
- Flexibility and adaptability: An armature for change
- Sustainable materials and construction processes
- Optimise air quality + well being



GCI | Drivers

- Lead campus wide ecological transformation: *'A living building'*
- Beautiful + inspiring spaces
- Net zero carbon footprint in operation
- Renewable energy provider
- Net zero energy
- Net zero water



Sustainability framework



Green Star

Green Star
+ Living Building Challenge

Green Star
+ Living Building Challenge
+ Focal Areas of GCI

Successful
initiatives



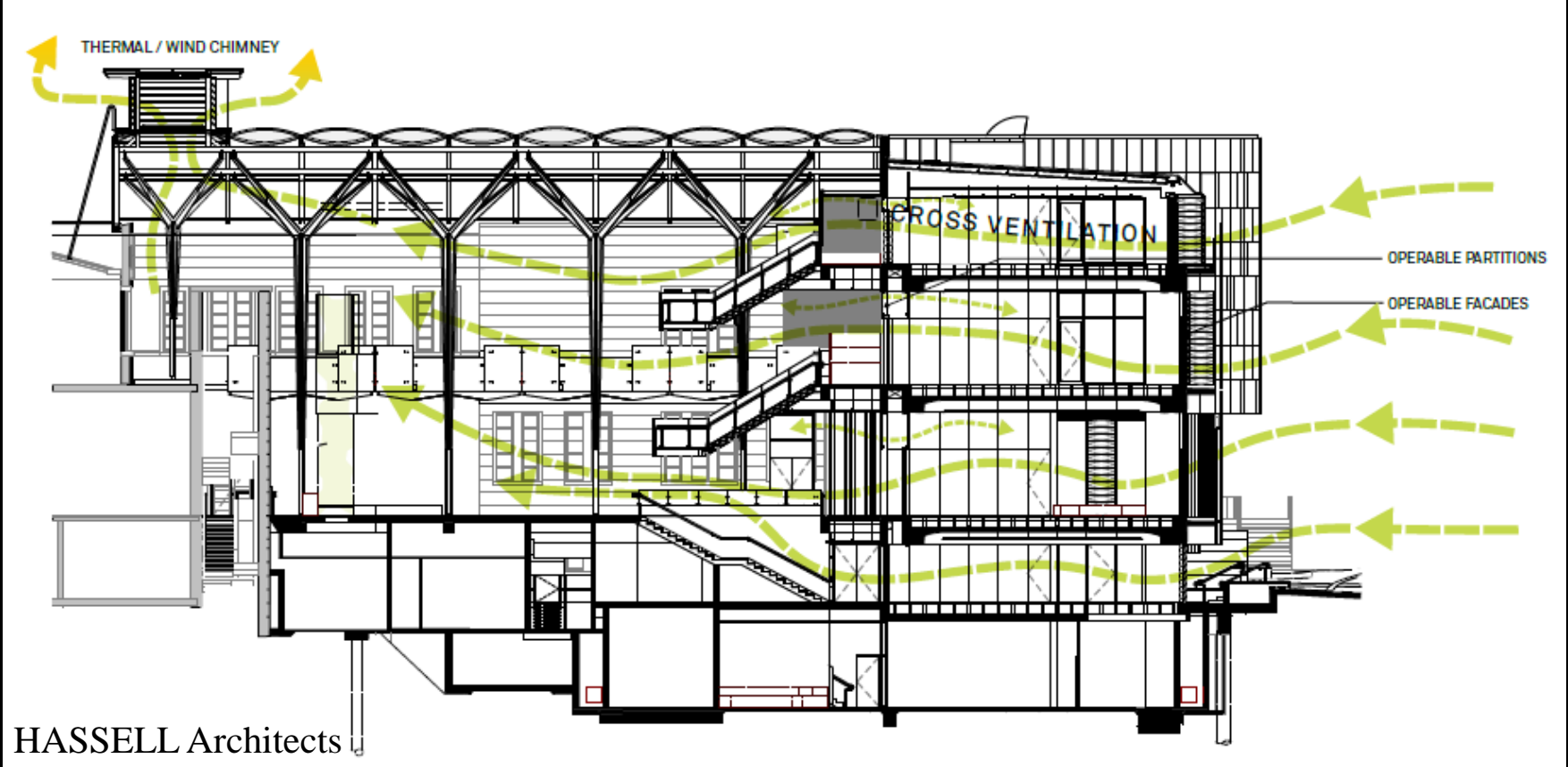


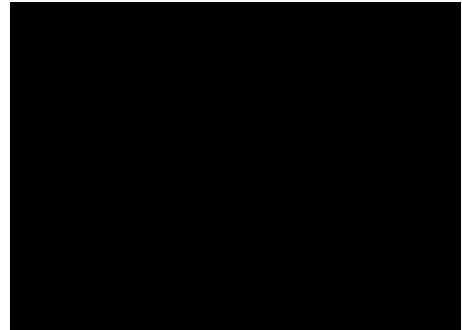
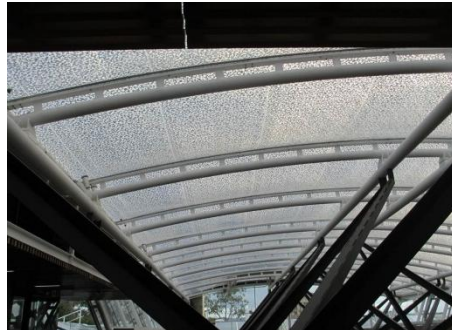
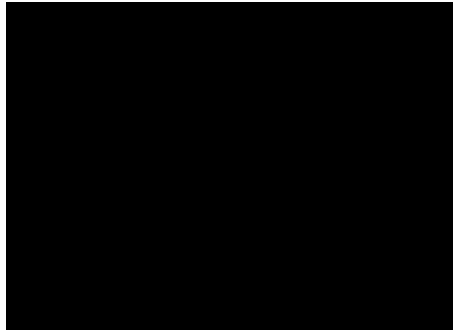
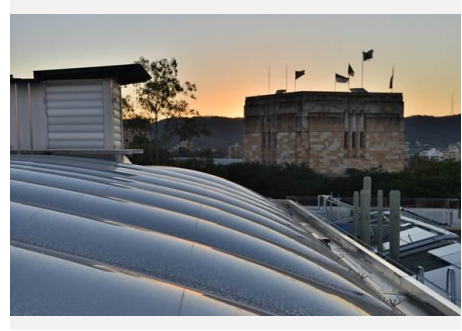
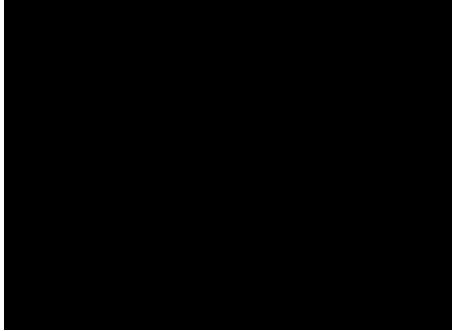
Natural ventilation

Designed to operate in natural ventilation mode for 88% of the year

Passive design strategy

Natural ventilation and natural daylight





Green wall and biofiltration wall

Biofiltration wall draw polluted air through a plant-covered wall (Green Wall)

Clean breathable air via the normal air ducts

Water cycles through and is collected in a pond at the base



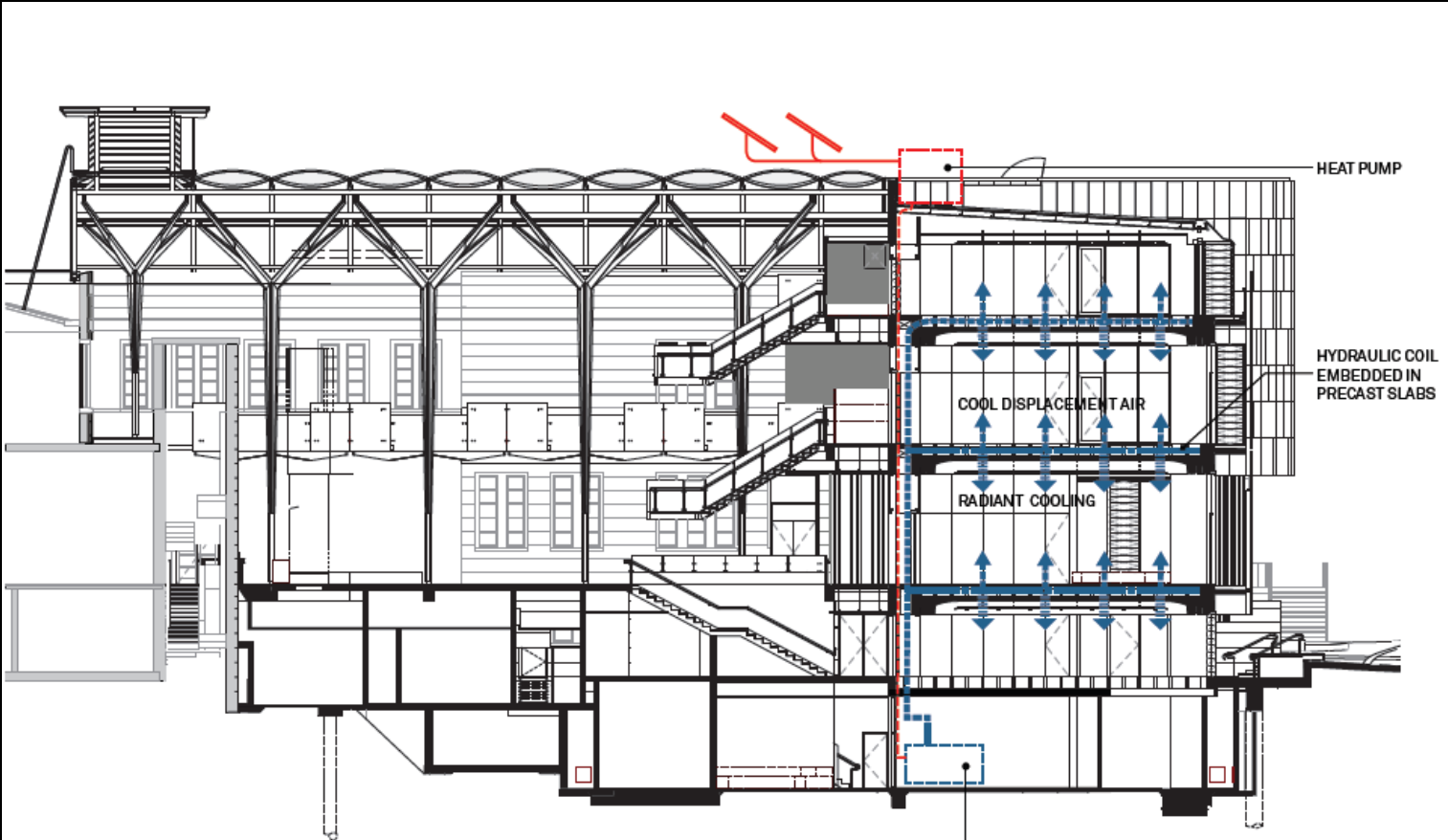
Sustainable construction

Geopolymer concrete

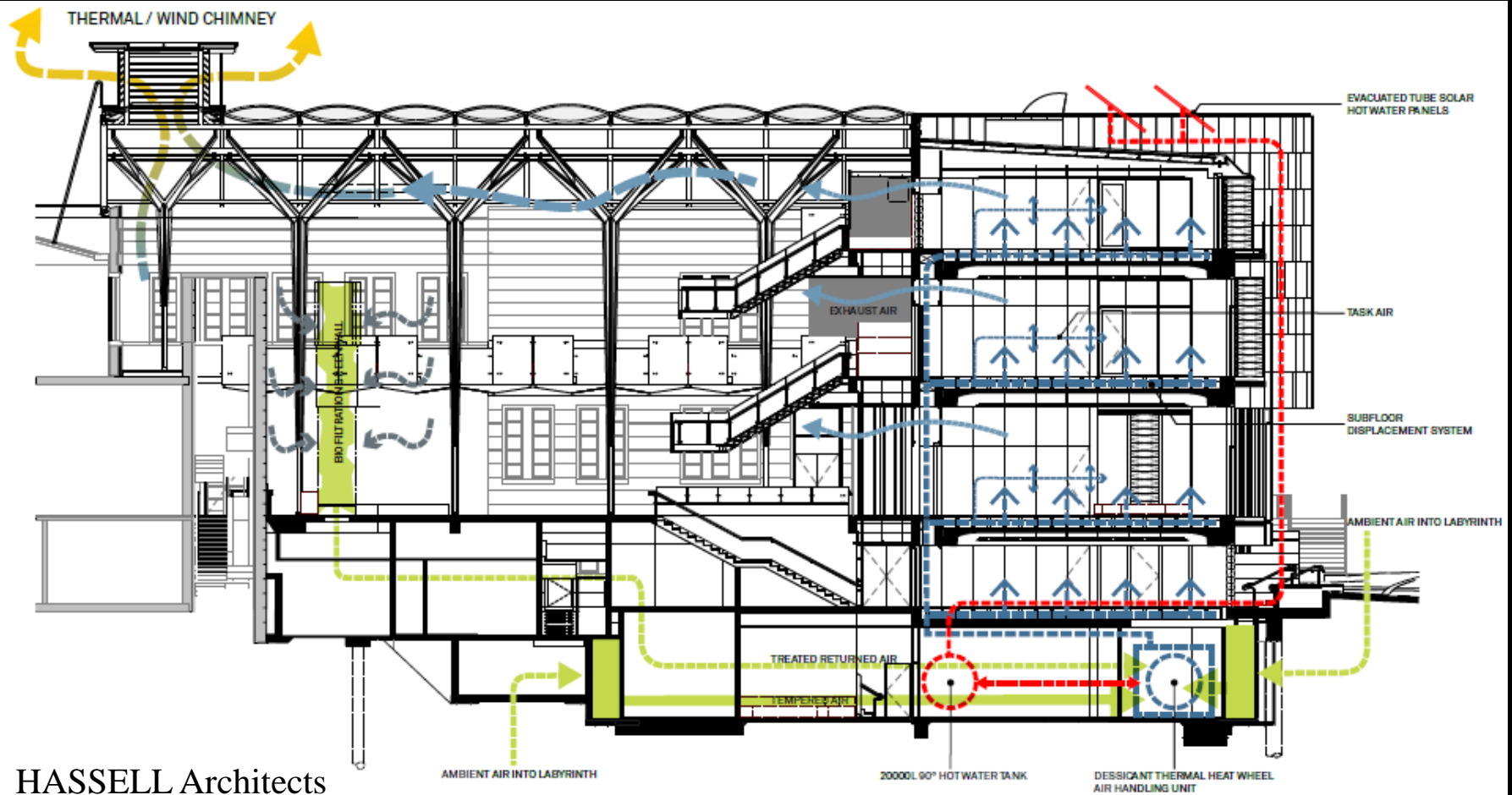
- Less embodied energy
- No normal Portland cement
- Contains: sand, ground granulated blast furnace slag (GGBS) and fly ash
- 220kg /m³ CO₂ saving
- Cast in pipes, conduits etc
- Low shrinkage
- 30% higher flexural tensile strength than traditional concrete
- Higher durability – more resistance to acids, sulphates and chloride ions
- Nice, white colour



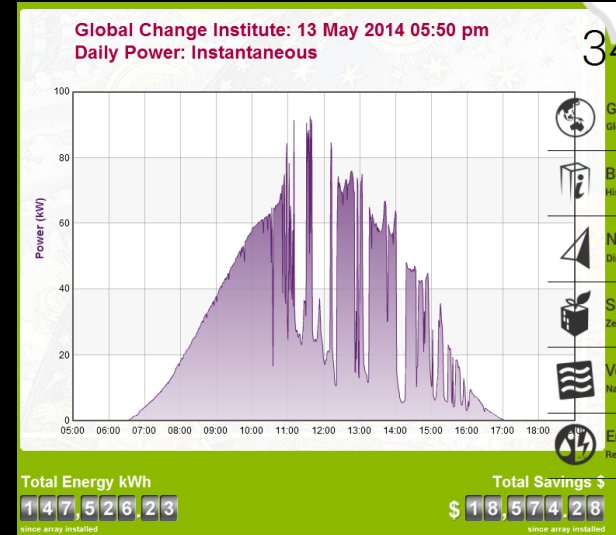
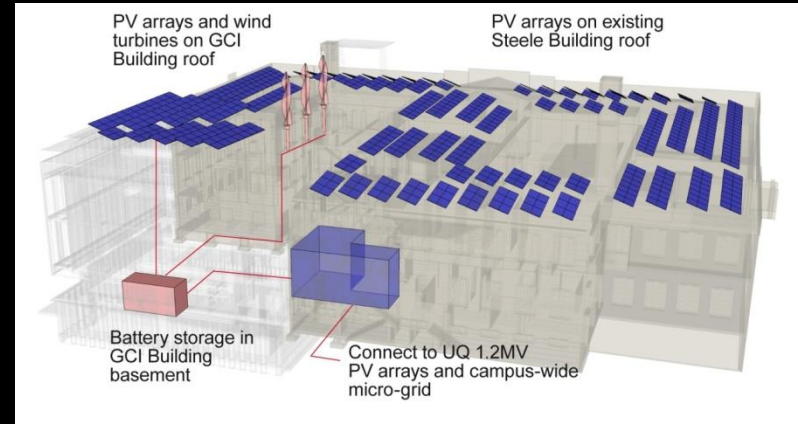
Slab hydraulic and thermal comfort systems



Mechanical air delivery systems



PV and battery storage



Greywater vs. blackwater treatment



- High level of objection for Blackwater systems by local government
- No long trail periods for the discharge grey water plant
- Supply costs of the grey water plant were substantially cheaper
- Maintenance regime for greywater only requires minimal 6 or 12 monthly checks
- The foot print of the grey water plant was less than the black water unit
- Black water systems suited to precinct scale

GCI water strategy

Blackwater
Rainwater
Stormwater
Filtration
Gardens



Material related initiatives

“The door manufacture has advised the FSC products are harder to source, cost more and can potentially have longer lead times.”



No, PEFC does not comply with this Imperative. FSC is the only compliant certification system. We recommend that you connect with FSC Australia <http://www.fscaustralia.org/> for assistance and resources. The use of salvaged wood is also a compliant option that your team might want to consider.

Lessons learned

Being innovative requires

A team with lots of commitment

Risk and hard work

Patience

Team work

Living building challenge

Tool is developed based on the American building industry

Materials sourcing and Red List

Green Star

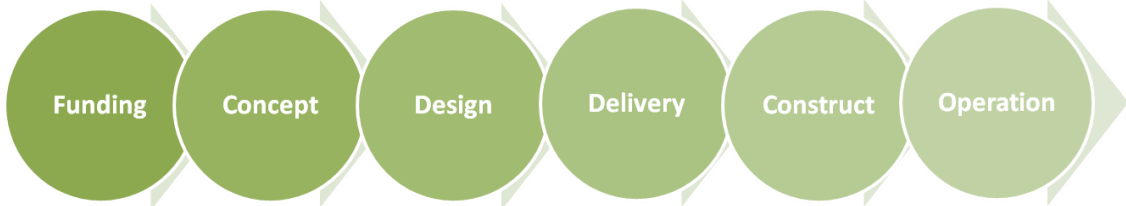
Passive design in sub-tropical climate

Geopolymer concrete (innovation)

PV and battery storage



Questions



Green Star summary - 6 star

Category	Title	Credit No.	Points Available	Points Achieved	Points to be Confirmed
Management					
	Green Star Accredited Professional	Man-1	2	2	0
	Commissioning - Clauses	Man-2	2	2	0
	Building Tuning	Man-3	1	1	0
	Independent Commissioning Agent	Man-4	1	1	0
	Building Guides	Man-5	2	2	0
	Environmental Management	Man-6	2	2	0
	Waste Management	Man-7	2	2	0
	Learning Resources	Man-10	1	0	0
	Maintainability	Man-11	1	1	0
	TOTAL		14	13	0
Indoor Environment Quality					
	Ventilation Rates	IEQ-1	3	3	0
	Air Change Effectiveness	IEQ-2	2	2	0
	Carbon Dioxide Monitoring and Control and VOC Monitoring	IEQ-3	1	1	0
	Daylight	IEQ-4	3	2	0
	Thermal Comfort	IEQ-5	3	1	0
	Hazardous Materials	IEQ-6	0	na	0
	Internal Noise Levels	IEQ-7	2	0	0
	Volatile Organic Compounds	IEQ-8	4	2	0
	Formaldehyde Minimisation	IEQ-9	1	1	0
	Mould Prevention	IEQ-10	1	1	0
	Daylight Glare Control	IEQ-11	1	0	0
	High Frequency Ballasts	IEQ-12	1	1	0
	Electric Lighting Levels	IEQ-13	1	1	0
	External Views	IEQ-14	1	1	0
	TOTAL		24	16	0
Energy					
	Conditional Requirement	Ene-	Conditional Requirement	Yes	/
	Greenhouse Gas Emissions	Ene-1	20	20	0
	Energy Sub-metering	Ene-2	1	1	0
	Peak Energy Demand Reduction	Ene-3	2	2	0
	Lighting Zoning	Ene-4	1	1	0
	Unoccupied Areas	Ene-7	2	2	0
	Stairs	Ene-8	1	1	0
	Efficient External Lighting	Ene-9	1	1	0
	Shared Energy Systems	Ene-10	1	1	0
	TOTAL		29	29	0

Green Star summary - 6 star

Transport					
Provision of Car Parking	Tra-1	2	2		0
Fuel Efficient Transport	Tra-2	0	na		0
Cyclist Facilities	Tra-3	4	4		0
Commuting Mass Transport	Tra-4	5	5		0
Transport Design and Planning	Tra-6	1	1		0
	TOTAL	12	12		0
Water					
Occupant Amenity Water	Wat-1	5	5		0
Water Meters	Wat-2	1	0		0
Landscape Irrigation	Wat-3	0	na		0
Heat Rejection Water	Wat-4	4	4		0
Fire System Water	Wat-5	1	1		0
Potable Water Use in Laboratories	Wat-6	0	na		0
	TOTAL	11	10		0
Materials					
Recycling Waste Storage	Mat-1	2	2		0
Building Reuse	Mat-2	0	na		0
Recycled Content & Re-used Products and Materials	Mat-3	1	0		0
Concrete	Mat-4	3	2		0
Steel	Mat-5	2	2		0
PVC	Mat-6	2	2		0
Timber	Mat-7	1	1		0
Design for Disassembly	Mat-8	1	0		0
Dematerialisation	Mat-9	1	0		0
Flooring	Mat-11	3	2		0
Joinery	Mat-12	1	1		0
Loose Furniture	Mat-13	3	3		0
	TOTAL	20	15		0

Green Star summary - 6 star

Land Use & Ecology				
Conditional Requirement	Eco -	Conditional Requirement	Yes	/
Topsoil	Eco-1	1	0	0
Reuse of Land	Eco-2	1	1	0
Reclaimed Contaminated Land	Eco-3	0	na	0
Ecological Value of Site	Eco-4	4	1	0
	TOTAL	6	2	0
Emissions				
Refrigerant ODP	Emi-1	1	1	0
Refrigerant GWP	Emi-2	2	2	0
Refrigerant Leaks	Emi-3	0	na	0
Insulant ODP	Emi-4	1	1	0
Stormwater	Emi-5	5	2	0
Discharge to Sewer	Emi-6	2	2	0
Light Pollution	Emi-7	1	1	0
Legionella	Emi-8	1	1	0
	TOTAL	11	10	0
Sub-total weighted points:			86	0
Innovation				
Innovative Strategies & Technologies	Inn-1	5 points in	3	0
Exceeding Green Star Benchmarks	Inn-2	total for Inn-	1	0
Exceeding Green Star Scope	Inn-3	1,2&3	0	0
	TOTAL	5	4	0
Total weighted points:			90	0