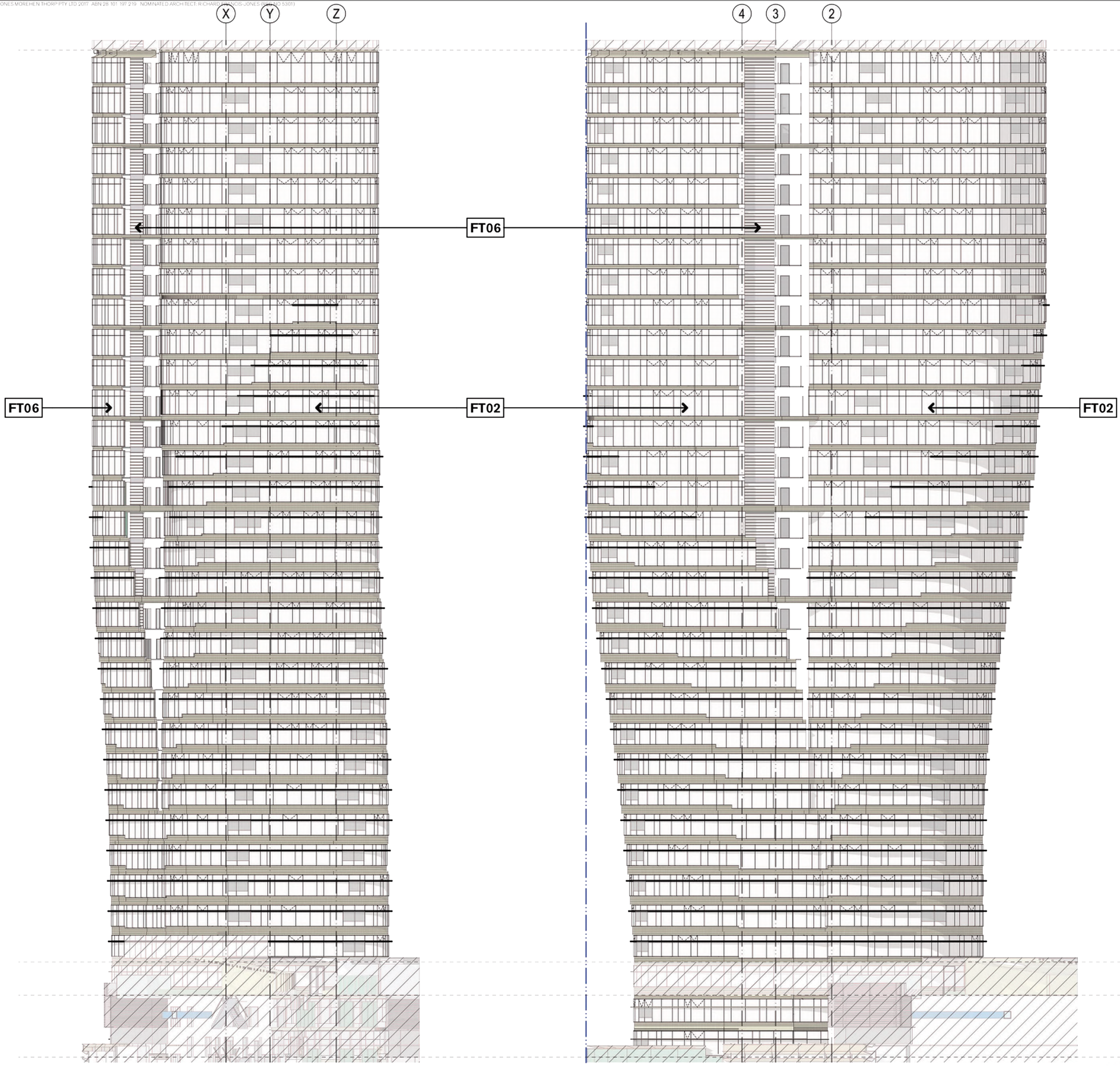
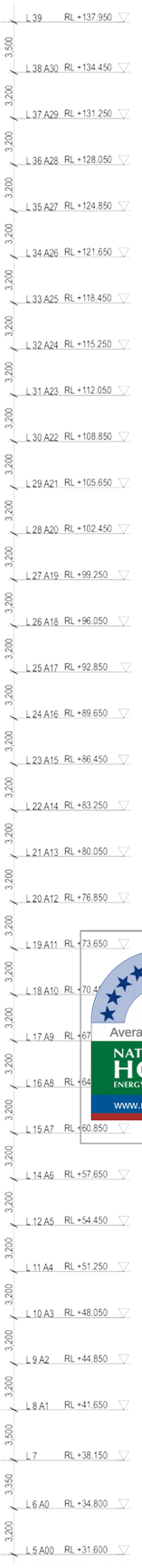


South Residential Elevation
1:200

West Residential Elevation
1:200



0 2 5 10m

GENERAL NOTES

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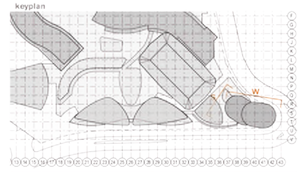
- ALL LEVELS RELATIVE TO 'AUSTRALIAN HEIGHT DATUM'
- DO NOT SCALE DRAWINGS USE FIGURED DIMENSIONS ONLY

keyplan



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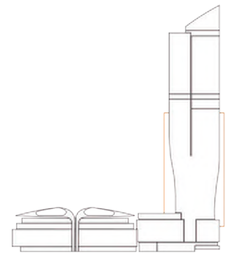

Operable Facade Legend

SITE BOUNDARY

NON-RESIDENTIAL

High Performance Glazing
Aluminium framed

Aluminium Spandrel
Sandstone coloured, insulation backed

Wintergarden Operable Facade
2x 1400x1000mm openings

Shading Louvre
300mm deep @ 2200mm AFFL

Awning Window
-1 module = 1400x400mm opening
- 1.5 modules = 1400x400mm + 700x400mm opening
- 2 modules = 1400x400mm + 1400x400mm opening

FACADE TYPES

FT02 RESIDENTIAL FACADE
Aluminium framed high performance glazing with operable interstitial light sheer curtain and medium tinted sandstone coloured spandrel, in 500-750mm randomised modules. Slot grille in spandrel for

FT06 CORE CLADDING

8.0
Average star rating
NATIONWIDE HOUSE ENERGY RATING SCHEME
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Certificate Number: GAD1RM2336
Assessor Name: Nicholas Asha
Accreditation number: VIC/BDAV/16/1
Certificate date: 2 Aug 2018
Dwelling address: 20-80 Pyrmont St, Pyrmont NSW 2009
planter details
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rev	date	name	by	chk
DA01	1/9/17	DEVELOPMENT APPLICATION	NY	SMP

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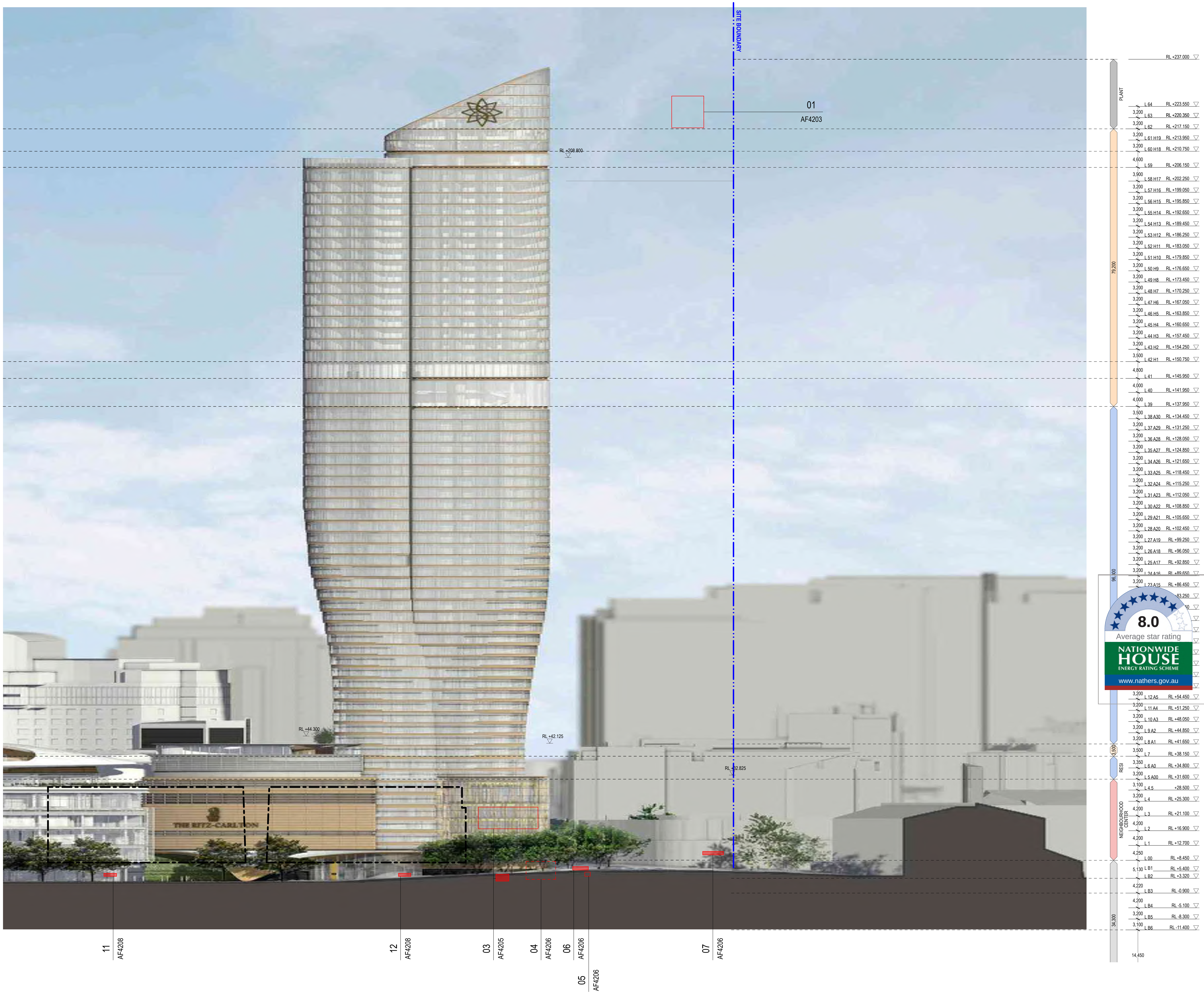
project
Modification 13
80 PYRMONT STREET
PYRMONT NSW 2009

title
Detail Elevations
South & West Residential Elevations

scale	1:200 @ A1	first issued	1/9/17
project code	sheet no.		revision
SM13	AF4104		DA01



0 5 10 20m

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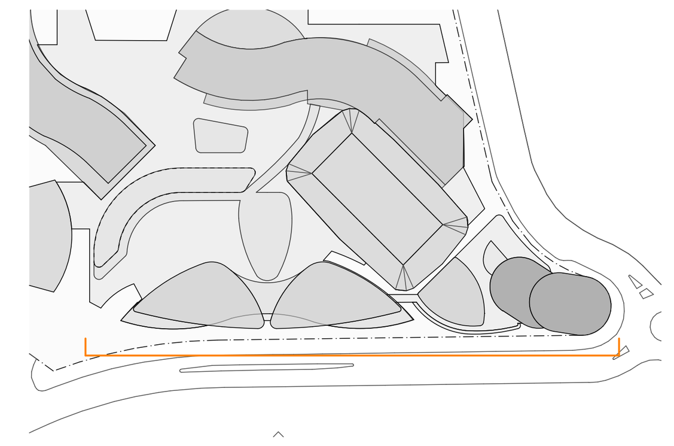
legend



8.0
Average star rating
NATIONWIDE HOUSE ENERGY RATING SCHEME
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Certificate Number:	GAD1RM2336
Assessor Name:	Nicholas Asha
Accreditation number:	VIC/BDAV/16/1712
Certificate date:	2 Aug 2018
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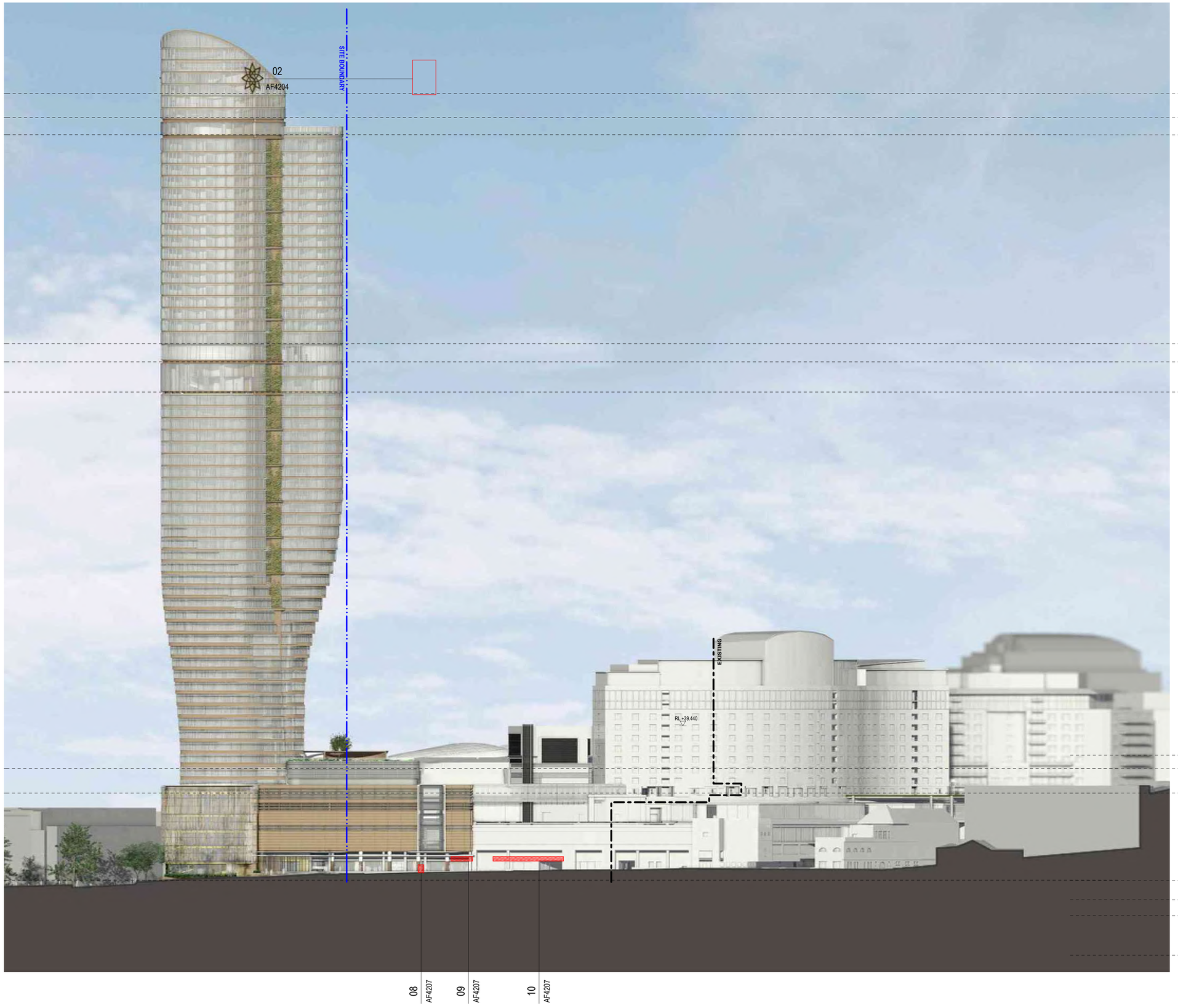
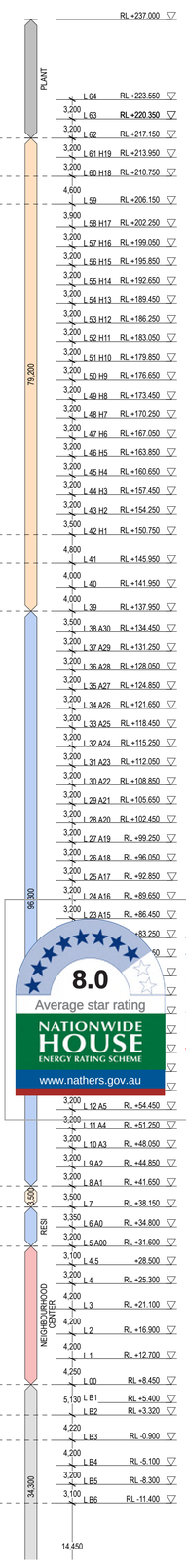
project
Modification 13
80 PYRMONT STREET
PYRMONT NSW 2009

title
Signage Elevations
Signage Eastern Elevation

scale	1:500 @ A1	first issued	1/9/17

project code	sheet no.	revision
SM13	**AF4201**	**DA01**





0 5 10 20m

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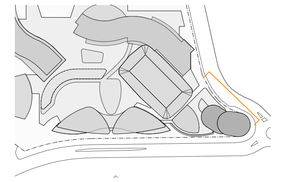
legend



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rev	date	name	by	chk
DA01	1/9/17	DEVELOPMENT APPLICATION	NY	SMP

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project
Modification 13
80 PYRMONT STREET
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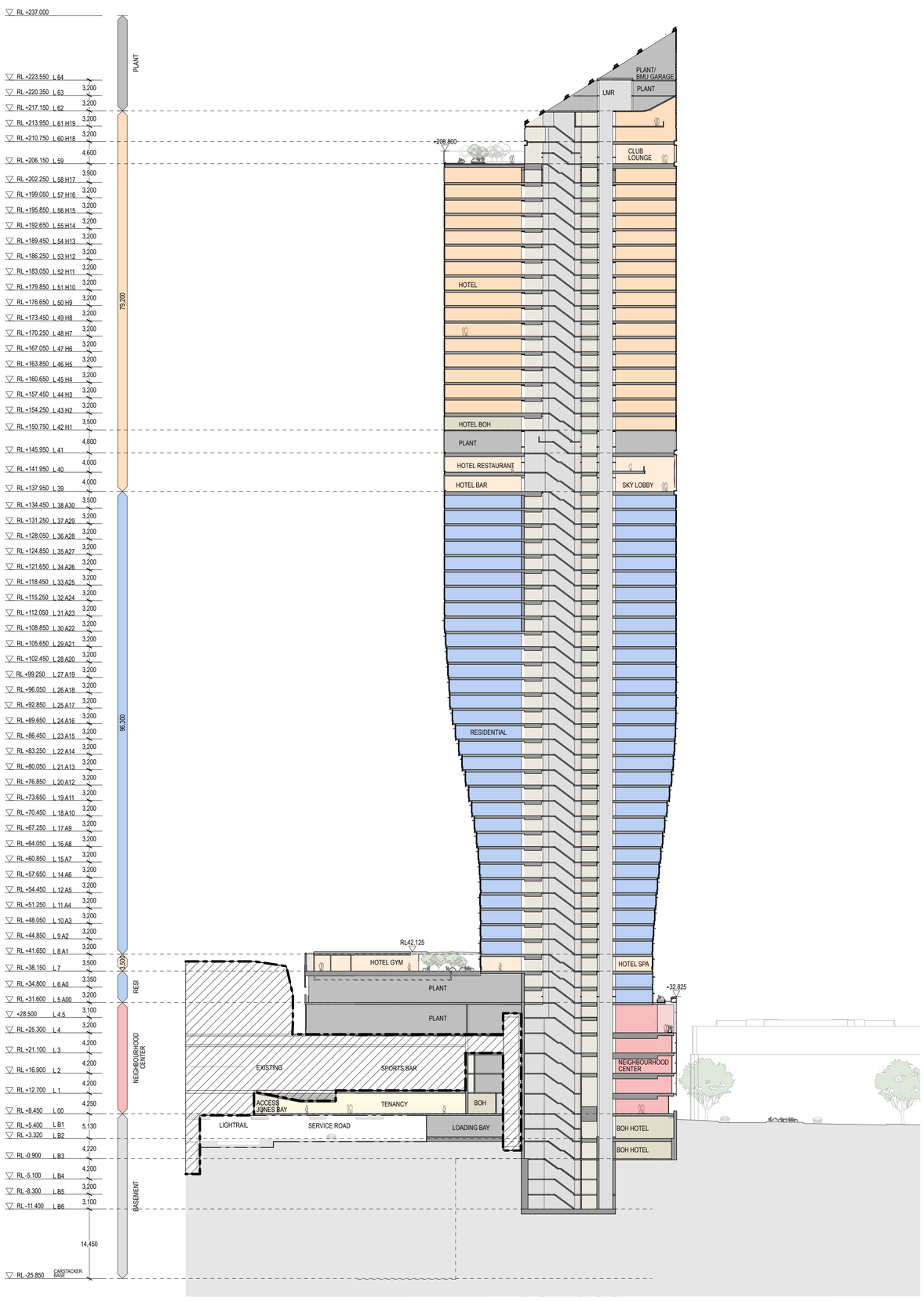
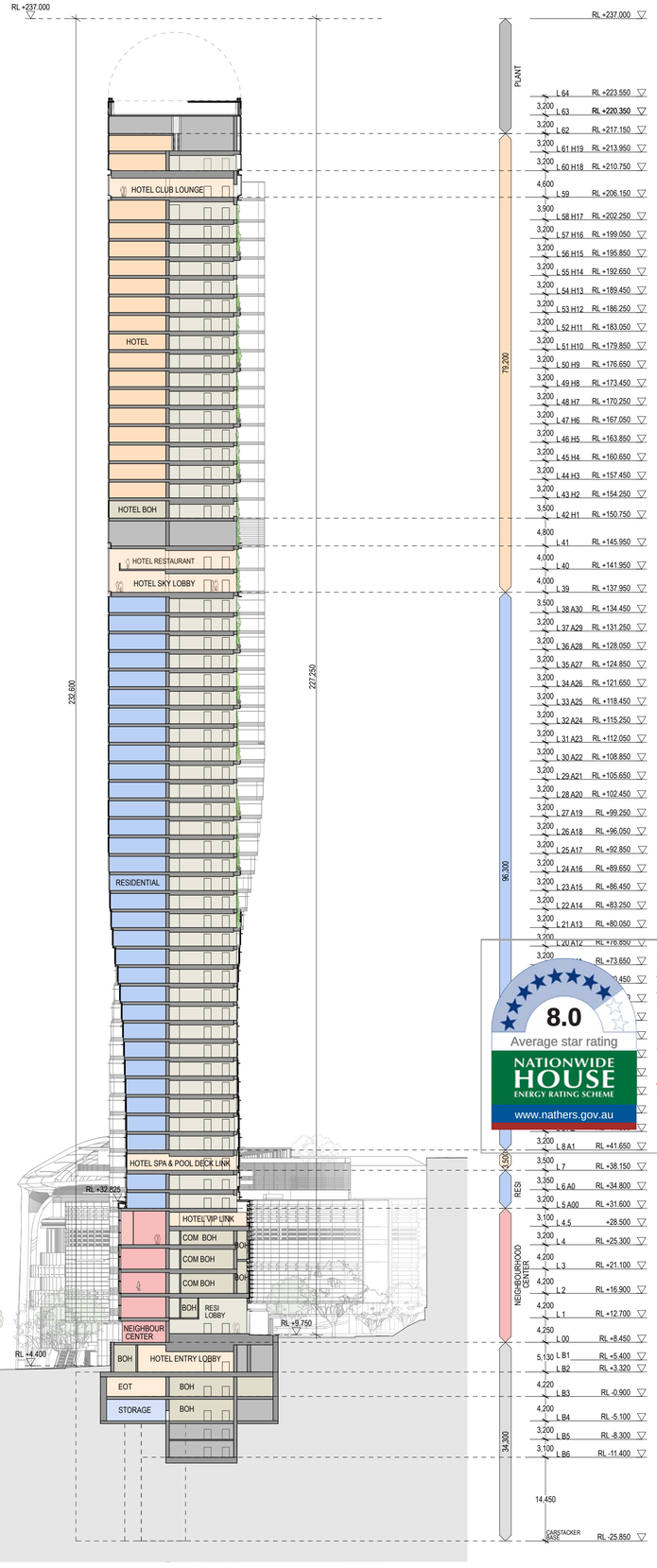
title
Signage Elevations
Signage Western Elevation

scale	first issued
1:500 @ A1	1/9/17

project code	sheet no.	revision
SM13	AF4202	DA01



1 PLAN SECTION 01
1:500



2 PLAN SECTION 02
1:500

0 5 10 20m

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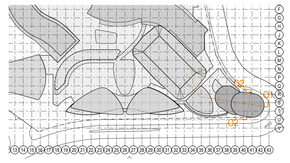
legend



BUILDING USE

- HOTEL
- HOTEL FACILITIES
- LOADING, PLANT
- LIFTS, FIRE STAIRS, SERVICES
- ANCILLARY, BOH
- CIRCULATION
- NEIGHBOURHOOD CENTRE
- RETAIL
- FOOD & BEVERAGE
- RESIDENTIAL
- RESIDENTIAL FACILITIES

SITE BOUNDARY

EXISTING BUILT FORM

EXISTING BUILT FORM

EXTENT OF CAR STACKER BELOW

8.0 Average star rating
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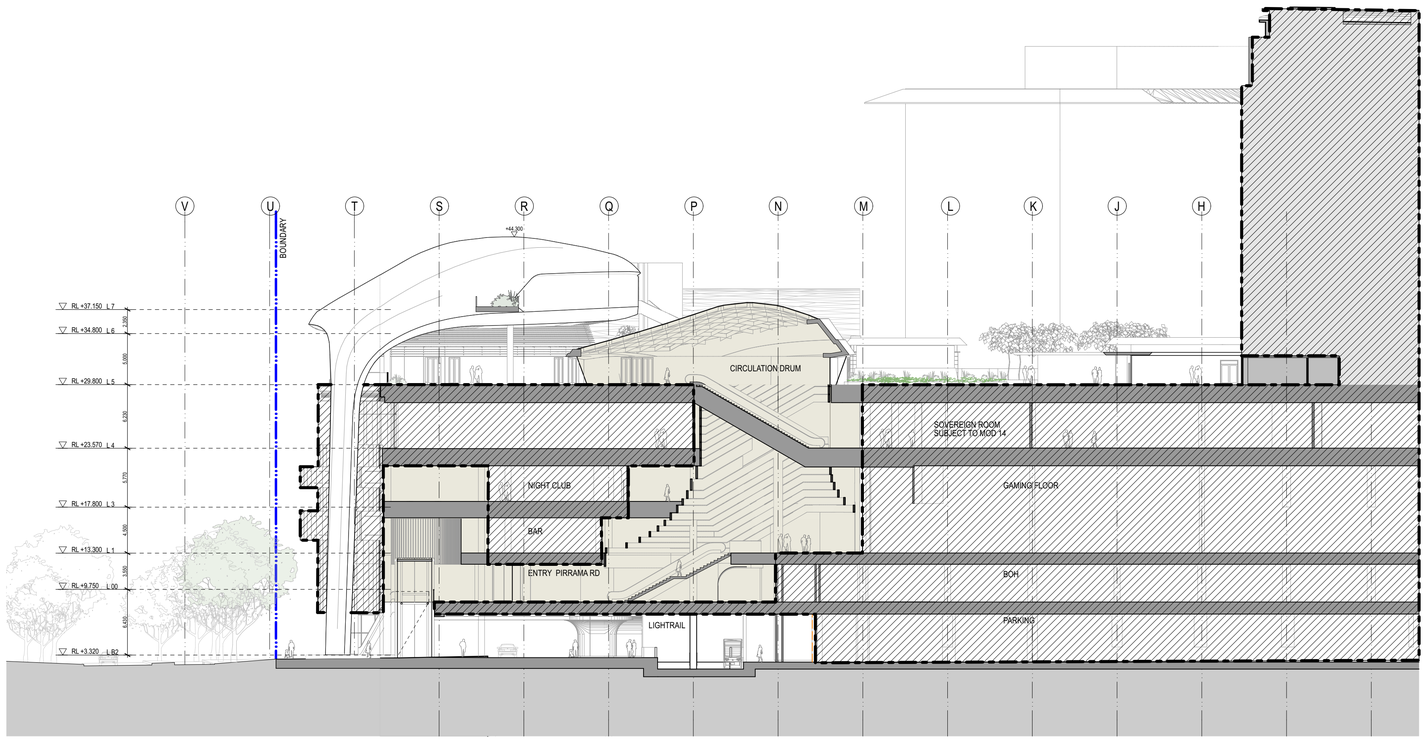
project
Modification 13
80 PYRMONT STREET
PYRMONT NSW 2009

title
Overall Sections
Section 01, Section 02

scale	1:500 @ A1	first issued	1/9/17
project code		sheet no.	revision
SM13		AF5001	DA01



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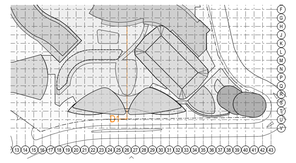
legend



BUILDING USE

- HOTEL
- HOTEL FACILITIES
- LOADING, PLANT
- LIFTS, FIRE STAIRS, SERVICES
- ANCILLARY, BOH
- CIRCULATION
- NEIGHBOURHOOD CENTRE
- RETAIL
- FOOD & BEVERAGE
- RESIDENTIAL
- RESIDENTIAL FACILITIES

SITE BOUNDARY

EXISTING BUILT FORM

EXISTING BUILT FORM

EXTENT OF CAR STACKER BELOW

8.0 Average star rating
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project
Modification 13
80 PYRMONT STREET
PYRMONT NSW 2009

title
Detail Sections
Section D01

scale	1:300 @ A1	first issued	1/9/17

project code	sheet no.	revision
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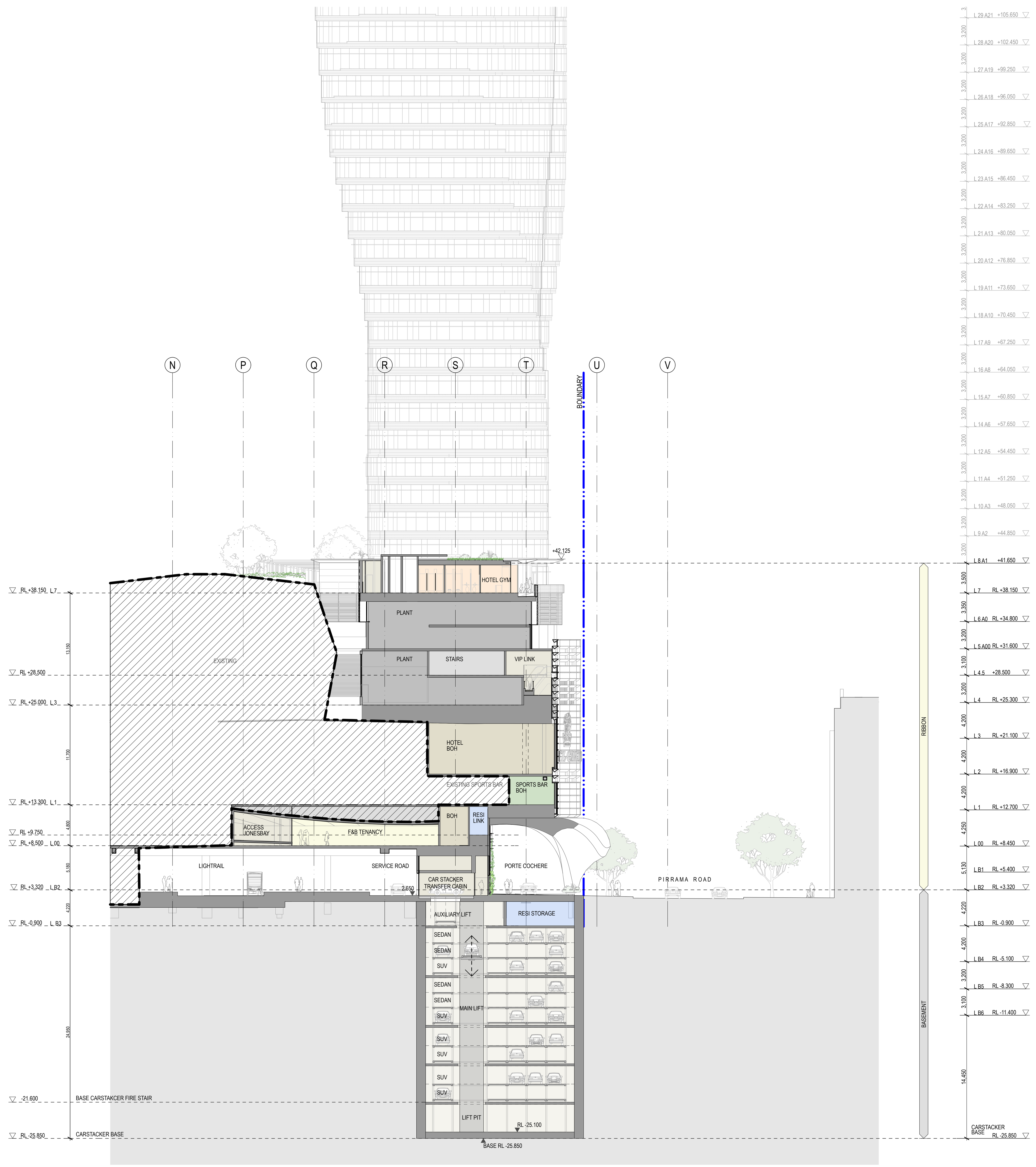

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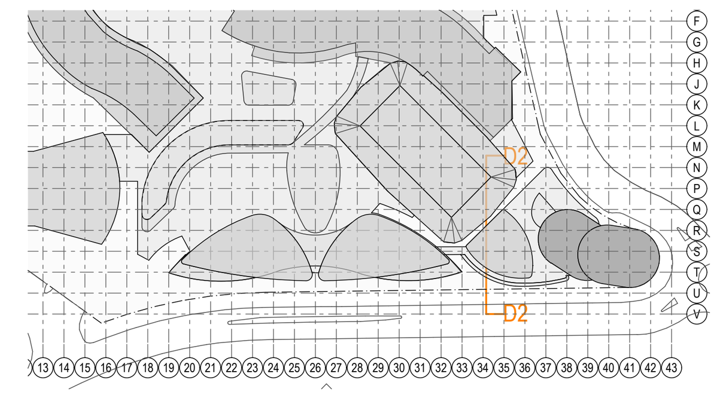
legend



BUILDING USE

- HOTEL
- HOTEL FACILITIES
- LOADING, PLANT
- LIFTS, FIRE STAIRS, SERVICES
- ANCILLARY, BOH
- CIRCULATION
- NEIGHBOURHOOD CENTRE
- RETAIL
- FOOD & BEVERAGE
- RESIDENTIAL
- RESIDENTIAL FACILITIES

SITE BOUNDARY

EXISTING BUILT FORM

EXISTING BUILT FORM

EXTENT OF CAR STACKER BELOW

8.0
Average star rating
NATIONWIDE HOUSE ENERGY RATING SCHEME
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Assessor Name:	Nicholas Asha
Accreditation number:	VIC/BDAV/16/1712
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Dwelling address:	

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rev	date	name	by	chk
DA01	1/9/17	DEVELOPMENT APPLICATION	NY	SMP

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project
Modification 13
80 PYRMONT STREET
PYRMONT NSW 2009

title
Detail Sections
Section D02

scale	1:300 @ A1	first issued	1/9/17

project code	sheet no.	revision
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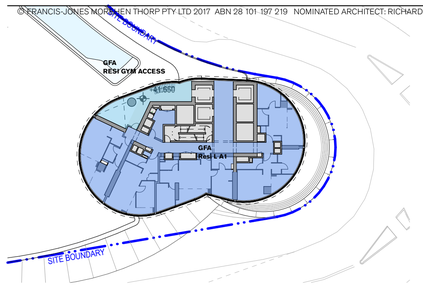
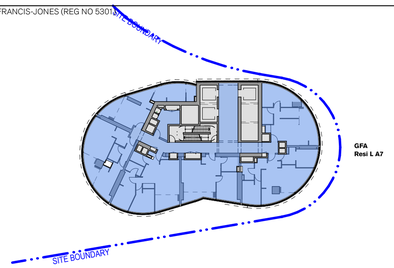


LEVEL 08 A1
1:500



LEVEL 15 A7
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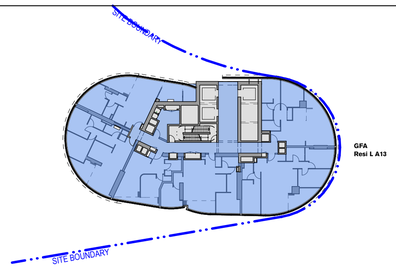

LEVEL 21 A13
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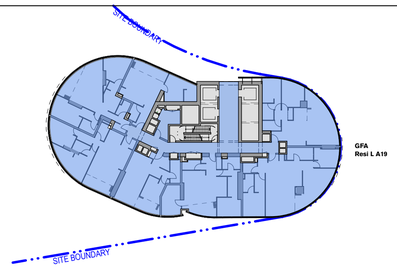

LEVEL 27 A19
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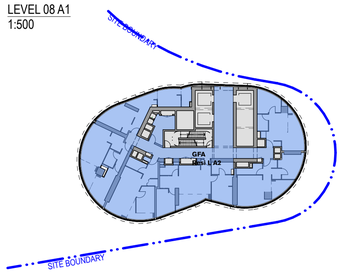

LEVEL 09 A2
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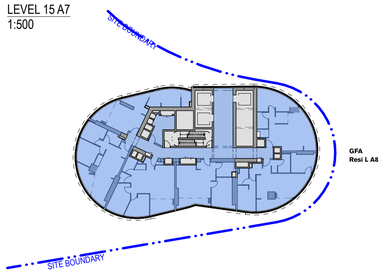

LEVEL 16 A8
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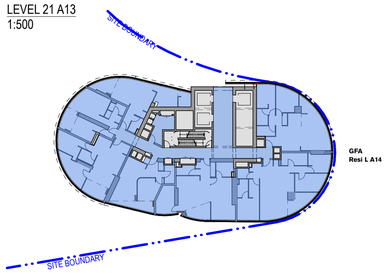

LEVEL 22 A14
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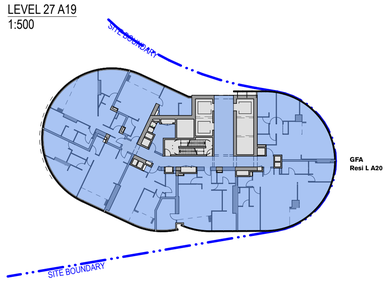

LEVEL 28 A20
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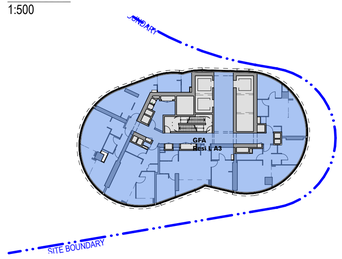

LEVEL 10 A3
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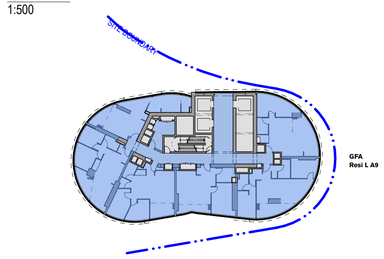

LEVEL 17 A9
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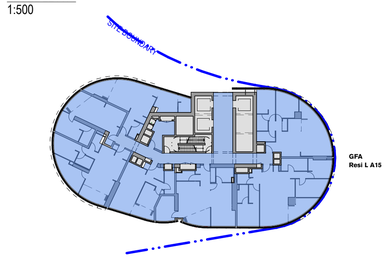

LEVEL 23 A15
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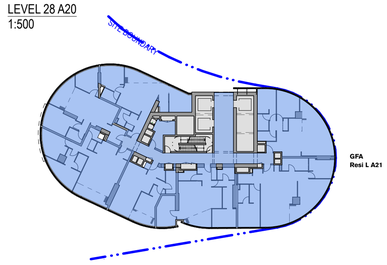

LEVEL 29 A21
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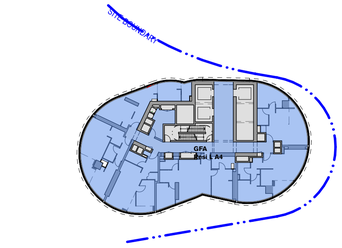

LEVEL 11 A4
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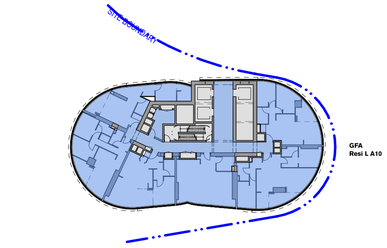

LEVEL 18 A10
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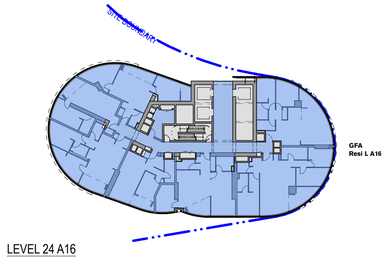

LEVEL 24 A16
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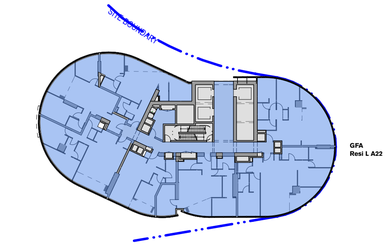

LEVEL 30 A22 - A30
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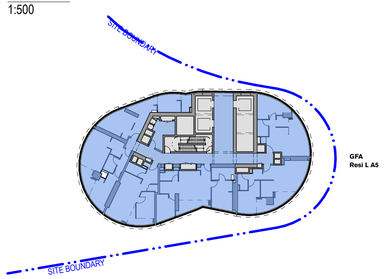

LEVEL 12 A5
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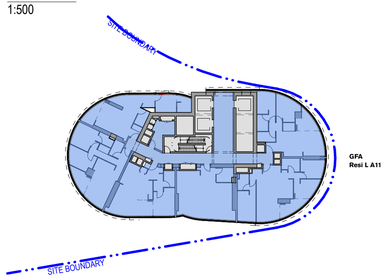

LEVEL 19 A11
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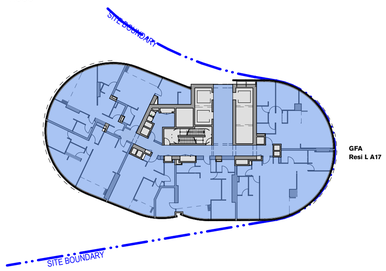

LEVEL 25 A17
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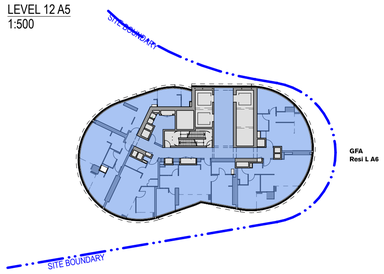

LEVEL 14 A6
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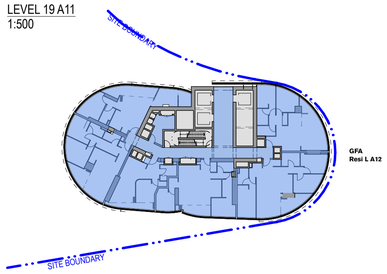

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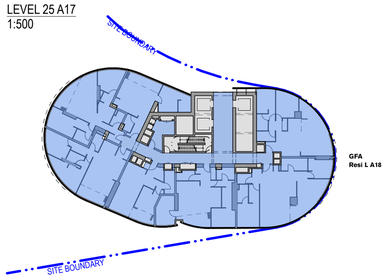

LEVEL 26 A18
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0 5 10 20m

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- ALL LEVELS RELATIVE TO 'AUSTRALIAN HEIGHT DATUM'
- DO NOT SCALE DRAWINGS. USE FIGURED DIMENSIONS ONLY

legend

PROPOSED GFA

- HOTEL GFA
- HOTEL BOH GFA
- HOTEL FACILITIES GFA
- NEIGHBOURHOOD CENTRE GFA
- RETAIL F&B GFA
- CIRCULATION GFA
- RESIDENTIAL GFA
- RESIDENTIAL FACILITIES GFA

EXISTING GFA

- EXISTING F&B GFA
- EXISTING CIRCULATION GFA
- EXISTING OFFICE GFA
- EXISTING BOH GFA
- EXISTING RETAIL GFA

EXISTING GFA AS EXTRACTED FROM DWP SUTERS SUPPLIED DRAWINGS

303496_A90B2_161205
303496_A90B1_161205
303496_A9000_161205

STOREY / REFERENCE			PROPOSED GFA		
Level	Flr code	Flr to flr	RESI	RESI FACILITES	RESI TOTAL
Level 38	A30	3500			
Level 37	A29	3200			
Level 36	A28	3200			
Level 35	A27	3200			
Level 34	A26	3200			
Level 33	A25	3200			
Level 32	A24	3200			
Level 31	A23	3200			
Level 30	A22	3200			
Level 29	A21	3200	885		
Level 28	A20	3200	879		
Level 27	A19	3200	869		
Level 26	A18	3200	859		
Level 25	A17	3200	847		
Level 24	A16	3200	825		
Level 23	A15	3200	796		
Level 22	A14	3200	764		
Level 21	A13	3200	737		
Level 20	A12	3200	706		
Level 19	A11	3200	677		
Level 18	A10	3200	641		
Level 17	A9	3200	614		
Level 16	A8	3200	594		
Level 15	A7	3200	578		
Level 14	A6	3200	565		
Level 12	A5	3200	554		
Level 11	A4	3200	547		
Level 10	A3	3200	541		
Level 09	A2	3200	535		
Level 08	A1	3200	472	54	
		TOTALS	22514	54	22567
REVISION B	22.06.17		RESI	RESI FACILITES	RESI TOTAL

Certificate Number: GAD1RM2336
Assessor Name: Nicholas Asha
Accreditation number: VIC/BDAV/16/1712
Certificate date: 2 Aug 2018
Dwelling address: 20-80 Pyrmont St, Pyrmont NSW 2009

8.0 Average star rating
NATIONWIDE HOUSE ENERGY RATING SCHEME
www.nathers.gov.au

www.nathers.gov.au

https://www.ft5.com.au/QRCodeLanding?PublicId=GAD1RM2336&GrpCert=

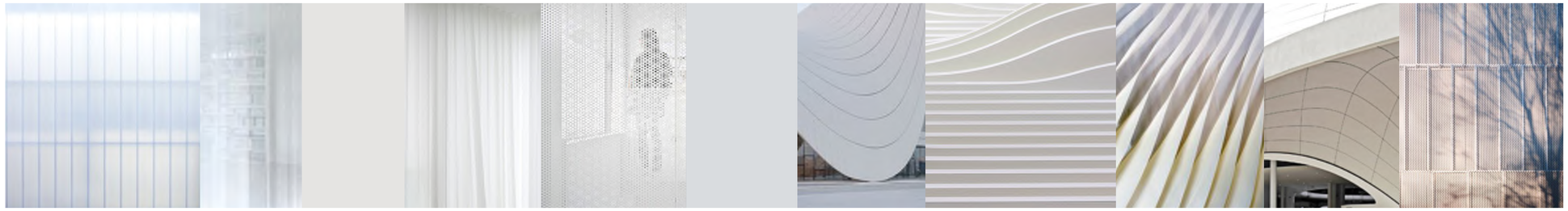
rev	date	name	by	chk
DA01	1/9/17	DEVELOPMENT APPLICATION	NY	SMP

fjmt studio architecture interiors landscape urban community
sydney melbourne uk
Level 5, 70 King Street t +61 2 9251 7077 w fjmtstudio.com

project
Modification 13
80 PYRMONT STREET
PYRMONT NSW 2009

title
GFA Plans
Tower Residential GFA Plans

scale	1:500 @ A1	first issued	1/9/17
project code		sheet no.	revision
SM13		AF6200	DA01



GENERAL NOTES

- ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR BEFORE PROCEEDING WITH THE WORK
- ALL LEVELS RELATIVE TO 'AUSTRALIAN HEIGHT DATUM'
- DO NOT SCALE DRAWINGS. USE FIGURED DIMENSIONS ONLY

legend

FACADE TYPES

FT01 HOTEL FACADE
Aluminium framed high performance glazing with operable interstitial light sheer curtain and medium tinted sandstone coloured spandrel.

FT02 RESIDENTIAL FACADE
Aluminium framed high performance glazing with operable interstitial light sheer curtain and medium tinted sandstone coloured spandrel, in 500-750mm randomised modules. Slot grille in spandrel for apartment horizontal ventilation. For location of fixed medium tinted horizontal shading louvre with building integrated PV panels to top side and various spandrel heights refer to detail elevations AF4103, AF4104 and AF2000 series plans.

FT03 SKY LOBBY
Glass fin supported high performance glazing with recessed medium tinted sandstone coloured spandrel.

FT04 CLUB LOUNGE
Glass fin supported high performance glazing with recessed medium tinted sandstone coloured spandrel.

FT05 VERTICAL SLOT - EASTERN
Dark coloured unitised cladding material

FT06 CORE CLADDING
Unitised medium tinted cladding with planters and grow wires located on specified levels to create a 'green seam'. See AF2000 plans and AF4003 for planter details.

FT07 NEIGHBOURHOOD FACADE
Point fixed framed high performance glazing with operable vertical timber shading elements.

FT08 SANDSTONE PODIUM FACADE
Sandstone or medium tinted sandstone coloured precast concrete facade panels and louvres on structural steel support.

FT09 SHELL / RIBBON FACADE
Opaque solid cladding panels on timber grid structure

FT10 PODIUM GLAZING
Aluminium framed high performance glazing units with concealed/exposed spandrel

FT11 GREEN WALL
Living green wall - plant selection to future details

FT12 TOWER PLANT FACADE
Aluminium framed fixed glass louvres with aluminium plant louvres behind

FT13 PODIUM PLANT FACADE
Stainless steel rolled bars with aluminium plant louvres behind

FT14 JONES BAY WINDOW FACADE
Aluminium framed high performance glazing with exposed feature spandrel

FT15 GLAZED AWNING
Steel framed glazed awning

8.0
Average star rating
NATIONWIDE HOUSE ENERGY RATING SCHEME
www.nathers.gov.au

Certificate Number: **GAD1RM2336**
Assessor Name: **Nicholas Asha**
Accreditation number: **VIC/BDAV/16/1712**
Certificate date: **2 Aug 2018**
Dwelling address: **20-80 Pyrmont St, Pyrmont NSW 2009**

www.nathers.gov.au

https://www.frl5.com.au/QRCodeLanding?PublicId=GAD1RM2336&GnCert=

ISSUED FOR PRICING
Scoping documents

rev	date	name	by	chk
DA01	1/9/17	DEVELOPMENT APPLICATION	NY	SMP

fjmt studio architecture interiors landscape urban community
sydney melbourne uk
Level 5, 70 King Street **t** +61 2 9251 7077 **w** fjmtstudio.com

project
Modification 13
80 PYRMONT STREET
PYRMONT NSW 2009

title
Material Schedules
External Finishes Board

scale	Not to Scale	first issued	1/9/17

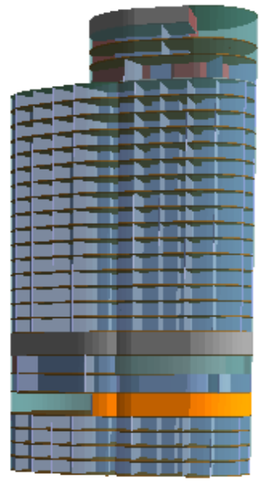
project code	sheet no.	revision
SM13	**AF7000**	**DA01**

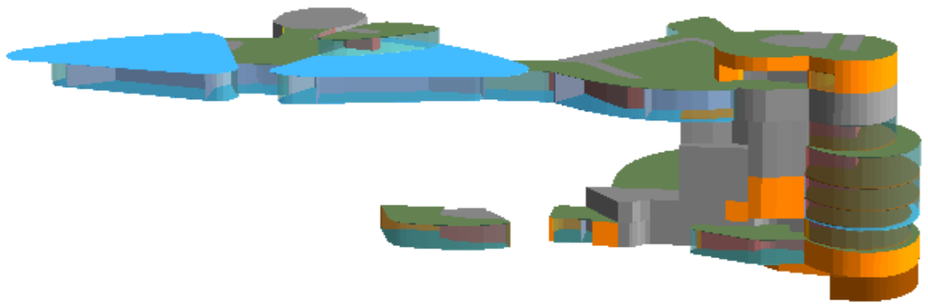
APPENDIX B NCC SECTION J REPORT

2305180U

THE STAR - MODIFICATION 13

JV3 ANALYSIS REPORT





JUNE 2017

THE STAR - MODIFICATION 13

Prepared for The Star Entertainment Group Limited

Project: 2305180U
Date: 09/06/2017

WSP Australia Pty Ltd
Level 27, 680 George St
Sydney NSW 2000
Australia

Phone: 02 9272 5100
www.wsp.com

QUALITY MANAGEMENT

ISSUE/REVISION	FOR ISSUE	FOR ISSUE	FOR ISSUE
Remarks	For Planning Approval	Updated For Planning Approval	Updated for planning approval
Date	28/02/2017	24/03/2017	09/06/2017
Prepared by	MJT	MJT	
Checked by	SNH	SNH	
Authorised by	TRP	TRP	NJA
Project number	2305180U	2305180U	
Report number	Rev00	Rev01	Rev02
File reference	2305180U.0.2/ESD	2305180U.0.2/ESD	

SIGNATURES

PREPARED BY

Martin Timperley
Sustainability Consultant

AUTHORISED BY

Sean Holmes,
Senior Sustainability Consultant

EXECUTIVE SUMMARY

WSP has been engaged by The Star Entertainment Group to undertake a BCA Section J assessment using Verification Method JV3 for the Modification 13 development of the existing Star site in Pyrmont Sydney, Australia. This assessment will relate to the hotel, restaurant, community center, club lounge, function and lobby spaces of the 61 storey tower and ribbon complex as outlined in red in Figure 1.

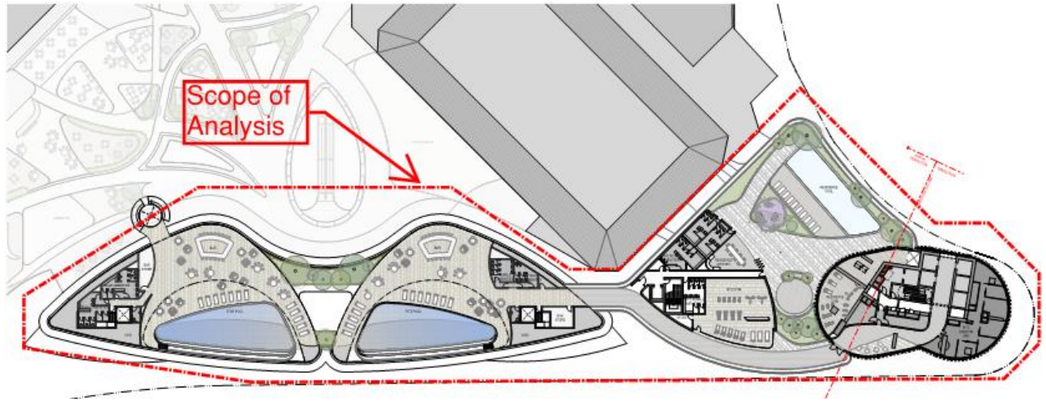


Figure 1: Scope of Section J assessment for the Star's Modification 13 development

Verification Method JV3 requires a comparison between a Reference Building — constructed in accordance to the Deemed-to-Satisfy (DTS) provisions detailed in Section J Energy Efficiency, Volume One of the National Construction Code (NCC) Series 2016—and a Proposed Building – representing the building envelope design of the proposed development.

The following simulations have been carried out:

- Reference Building + Reference Services—modelling of the building with the building envelope and services meeting the DTS provisions
- Proposed Building + Reference Services—modelling of the building with the building envelope meeting the design intent and the services meeting the DTS provisions

Table 1and Figure 2 demonstrate the predicted annual energy consumption for the simulations performed.

Building	Annual Energy Consumption (MWh/year)					
	Heating	Cooling	Fans & Pumps	Equipment	Lighting	Total
Reference Building + Reference Services	323	422	2,964	805	764	5,278
Proposed Building + Reference Services	282	453	2,862	805	764	5,165

Table 1: Simulation Results

Based on the modelling performed, the proposed building envelope is deemed to comply with the performance requirements for Section J provided that the building fabric in the body of this report and new glazing with the following thermal performance properties are implemented. For the purpose of this assessment glazing of the following performance has been used across the entire development.

Modification 13 Ribbon and Tower	SHGC (Centre of Pane)	U-Value (Centre of Pane)	VLT (Centre of Pane)
All Glazing Systems	0.32	1.62	0.64

Table 2: Compliant glazing thermal performance characteristics

It is not necessary to install the exact glazing product specified above but the U-value and the SHGC of the glazing must be less than or equal to the specified value.

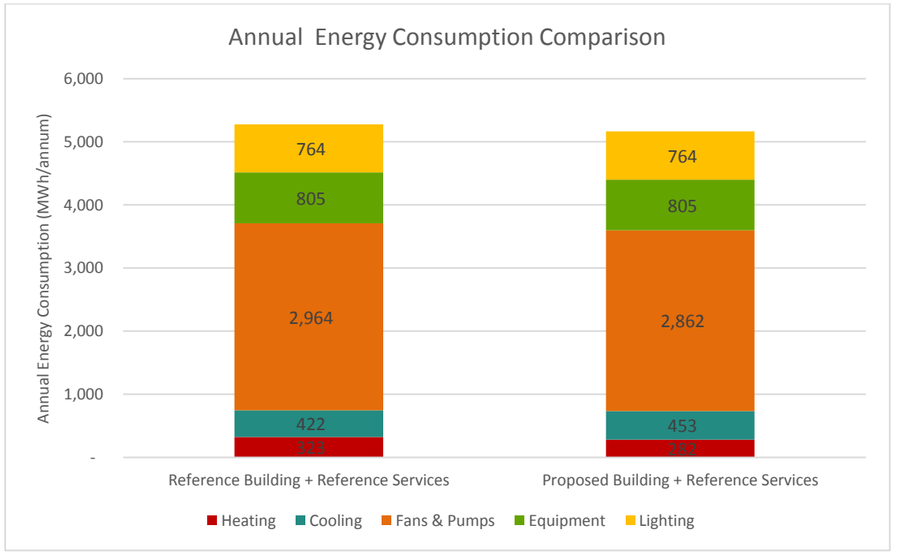


Figure 2: Simulation Results

TABLE OF CONTENTS

1 INTRODUCTION

PURPOSE OF REPORT

WSP | Parsons Brinckerhoff has been engaged by The Star Entertainment Group to undertake a Section J assessment using Verification Method JV3 for the Modification 13 development at The Star, Sydney, at 80 Pyrmont Road, Pyrmont NSW. This assessment relates to the hotel, restaurant, community center, club lounge, function and lobby spaces of the tower and ribbon development as outlined in red in Figure 1.

Verification Method JV3 requires a comparison between a Reference Building—constructed in accordance the Deemed-to-Satisfy (DTS) provisions detailed in Section J Energy Efficiency, Volume One of the National Construction Code (NCC) Series 2016—and a Proposed Building.

The following simulations have been carried out:

- Reference Building + Reference Services—energy modelling of the building with the building envelope and services meeting the DTS provisions
- Proposed Building + Reference Services—energy modelling of the building with the building envelope meeting the design intent and the services meeting the DTS provisions

This report presents the methodology used for the JV3 modelling and the results of the simulations undertaken.

EXPERT

Alan Davis has a Bachelor of Science in Mechanical Engineering and a Masters of Science in Sustainable Energy Engineering. He is an Associate Director of WSP | Parsons Brinckerhoff. Alan has eleven years of experience in energy modelling and building code compliance reporting. He is a Green Star and Infrastructure Sustainability Accredited Professional.

PERFORMANCE REQUIREMENTS

Volume One of the NCC Series 2016 Clause A0.10 Requirements

The relevant DTS Provisions considered in the Reference Building and the Proposed Building is as follows:

- Section J Part J1 Building Fabric
- Section J Part J2 Glazing

Volume One of the NCC Series 2016 JP1 Requirements

A building, including its services, must have, to the degree necessary, features that facilitate the efficient use of energy appropriate to:

- The function and use of the building and its services
- The internal environment
- The geographic location of the building
- The effects of nearby permanent features such as topography, structures and buildings
- Solar radiation being utilised for heating and controlled to minimise energy for cooling
- The sealing of the building envelope against air leakage
- The utilisation of air movement to assist heating and cooling
- The energy source of the services

2 METHODOLOGY

ASSESSMENT METHOD AND BUILDING CLASSIFICATION

Clause A0.9 of Volume One of the NCC Series 2016 stipulates that the following assessment methods, or any combination of them, can be used to determine that a building solution complies with the performance requirements:

- Evidence to support that the use of a material, form of construction or design meets a Performance Requirement or a Deemed-to-Satisfy provision as described in A2.2
- Verification Methods such as the Verification Methods in the BCA; or such other Verification Methods as the appropriate authority accepts for determining compliance with the Performance Requirements
- Comparison with the DTS provisions
- Expert judgement

The development seeks to demonstrate compliance with JP1 by using:

- **Verification Method JV3**; determining that the annual energy consumption of the Proposed Building is not more than the annual energy consumption of the Reference Building

Under Part A3.2 of Volume One of the NCC, the mixed use development includes a Class 3 residential building for the hotel portion of the tower, Class 6 retail areas for the bars, restaurants, club lounge and cafes and Class 9b assembly building for the community centre and function spaces.

The site is located within Climate Zone 5.

MODEL INFORMATION

SOFTWARE

The computer simulation package used for the thermal simulation was Tas version 9.4, by Environmental Design Solutions Limited. It is an EN ISO 13791 validated dynamic simulation modelling (DSM) software tool and is approved under the *ABCB Protocol for Building Energy Analysis Software*, *Version 2006.1*.

SOURCES OF INFORMATION

The following sources of information were used to generate the thermal model:

- Volume One of the NCC Series 2016;
- Post competition architectural model and drawings by Francis-Jones Morehen Thorp (FJMT).

EQUIPMENT LOADS

The simulations apply the following air conditioning parameters, per Volume One of the NCC Series 2016, including:

- Specification JV Table 2b and 2d for the appliances and equipment schedule;
- Specification JV Table 2h for equipment loads.

MECHANICAL SERVICES

The simulations apply the following air conditioning parameters, as per Volume One of the NCC Series 2016, including:

- Specification JV Table 2b and 2d for the air conditioning operational schedule;
- Clause JV3 (d), sub clause (i) (D) for the air conditioning temperature range;
- Maximum fan motor power, as per Specification J5.2a Table 3a.

OCCUPANCY LOADS

The simulations apply the following air conditioning parameters, as per Volume One of the NCC Series 2016, including:

- Specification JV Table 2b and 2d for the occupancy schedule;
- Specification JV, Table 2j, other applications (a) for sensible and latent occupancy heat gain;
- Table D1.13 for occupant density.

LIGHTING LOADS

The simulations apply the following air conditioning parameters, as per Volume One of the NCC Series 2016, including:

- Specification JV and Table 2b and 2d for artificial lighting schedule;
- Table J6.2a for maximum illumination power density.

3 BUILDING FABRIC PERFORMANCE PARAMETERS

This section summarises the building fabric as modelled for the JV3 analysis. It details changes to the building elements currently specified to achieve compliance.

Table 3 lists the building fabric performance parameters used in the reference and the proposed building. There is currently no proposed deviations from the “deemed to satisfy” building fabric provisions in the proposed model.

Table 3: Thermal envelope building fabric breakdown

Building Fabric Element	Reference Fabric Total R-value (m^2.K/W)	Proposed Fabric Total R-value (m^2.K/W)
Slab on ground	Nil	Nil
Enclosed floor/ceiling adjacent to a non-conditioned space mechanically ventilated by no more than 1.5 air changes per hour	1.25	1.25
Suspended floor	2.0	2.0
External wall	2.8	2.8
Enclosed envelope wall	1.8	1.8
Roof	3.2 Solar absorptance ≤ 0.4	3.2 Solar absorptance ≤ 0.4

4 BUILDING GLAZING PERFORMANCE PARAMETERS

The reference building glazing is developed in compliance with the National Construction Code Glazing Calculators (Volume One). Refer to Appendix 1 for the completed Glazing Calculators, Table 4 summarise the glazing parameters used for the JV3 analysis.

Table 4: Building glazing parameters

Level	Orientation	Glass Only (centre of pane)		Reference Building Benchmark Product	Proposed Building Thermal Performance Specification
		U-Value (W/m^{2}K)	SHGC		
B2 – Lift Lobby	NE	5.9	0.85	Viridian Vfloat Clear 3mm Aluminium Frame	China southern 6SJ68S-1 on Clear +12A + 6C, 100mm U-Value: 1.6 W/m^{2}K SHGC: 0.32 Aluminium Frame
B2 – Core Retail Area	NE	3.8	0.45	Viridian Evantage Bronze 6mm Aluminium Frame	
	E	1.9	0.3	Viridian Enviroshield Perfomance ITO SuperGreen 4 8.76mm+ Air 12mm + Clear 6mm Aluminium Frame	
	SE	1.87	0.46	Viridian Vfloat Green N 6mm+ Air 12mm + Clear 6mm Aluminium Frame	
B2 - Hotel Entry	SW	1.9	0.7	Viridian Vfloat Clear 3mm + 12mm Argon + 4mm Clear Aluminium Frame	
	S	1.9	0.3	Viridian Enviroshield Perfomance ITO SuperGreen 4 8.76mm+ Air 12mm + Clear 6mm Aluminium Frame	
	SE	1.9	0.7	Viridian Vfloat Clear 3mm + 12mm Argon + 4mm Clear, Aluminium Frame	
	E	3.8	0.63	Viridian Evantage Clear 6mm Aluminium Frame	
	NE	3.8	0.45	Viridian Evantage Bronze 6mm Aluminium Frame	
G - Resi Lobby	S	5.9	0.85	Viridian Vfloat Clear 3mm Aluminium Frame	China southern 6SJ68S-1 on Clear +12A + 6C, 100mm U-Value: 1.6 W/m^{2}K SHGC: 0.32 Aluminium Frame
	W	1.7	0.21	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + Clear 6mm Aluminium Frame	
	NW	1.7	0.21	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + Clear 6mm Aluminium Frame	
	N	1.7	0.21	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + Clear 6mm Aluminium Frame	
	NE	1.9	0.3	Viridian Enviroshield Perfomance ITO SuperGreen 4 8.76mm+ Air 12mm + Clear 6mm Aluminium Frame	

	E	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
	SE	1.87	0.46	Viridian Vfloat Green N 6mm+ Air 12mm + Clear 6mm Aluminium Frame	
Lvl01 - Community Centre	SW	1.9	0.3	Viridian Enviroshield Perfomance ITO SuperGreen 4 8.76mm+ Air 12mm + Clear 6mm Aluminium Frame	China southern 6SJ68S-1 on Clear +12A + 6C, 100mm U-Value: 1.6 W/m^{2}K SHGC: 0.32 Aluminium Frame
	W	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
	NW	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
	N	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
	NE	0.9	0.15	SHGC: 0.13 U-Value: 1.2 W/m^2.K Aluminium frame Benchmark product: Pilkington Suncool 30/17 OW, Annealed, 6 mm + 16mm Air + Optifloat Clear, Annealed, 4 mm + 16mm Air + Eclipse Advantage Grey, Annealed, 6mm	
	E	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
	SE	5.9	0.85	Viridian Vfloat Clear 3mm Aluminium Frame	
Lvl02 - Community Centre	SW	1.9	0.3	Viridian Enviroshield Perfomance ITO SuperGreen 4 8.76mm+ Air 12mm + Clear 6mm Aluminium Frame	China southern 6SJ68S-1 on Clear +12A + 6C, 100mm U-Value: 1.6 W/m^{2}K SHGC: 0.32 Aluminium Frame
	W	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
	NW	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
	N	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
	NE	0.9	0.15	SHGC: 0.13 U-Value: 1.2 W/m^2.K Aluminium frame Benchmark product: Pilkington Suncool 30/17 OW, Annealed, 6 mm + 16mm Air + Optifloat Clear, Annealed, 4 mm + 16mm Air + Eclipse Advantage Grey, Annealed, 6mm	
	E	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
	SE	5.9	0.85	Viridian Vfloat Clear 3mm Aluminium Frame	

Lvl03 - Community Centre	SW	1.9	0.3	Viridian Enviroshield Perfomance ITO SuperGreen 4 8.76mm+ Air 12mm + Clear 6mm Aluminium Frame	China southern 6SJ68S-1 on Clear +12A + 6C, 100mm U-Value: 1.6 W/m²K SHGC: 0.32 Aluminium Frame
	W	0.9	0.15	SHGC: 0.13 U-Value: 1.2 W/m².K Aluminium frame Benchmark product: Pilkington Suncool 30/17 OW, Annealed, 6 mm + 16mm Air + Optifloat Clear, Annealed, 4 mm + 16mm Air + Eclipse Advantage Grey, Annealed, 6mm	
	NW	0.9	0.15	SHGC: 0.13 U-Value: 1.2 W/m².K Aluminium frame Benchmark product: Pilkington Suncool 30/17 OW, Annealed, 6 mm + 16mm Air + Optifloat Clear, Annealed, 4 mm + 16mm Air + Eclipse Advantage Grey, Annealed, 6mm	
	N	0.9	0.15	SHGC: 0.13 U-Value: 1.2 W/m².K Aluminium frame Benchmark product: Pilkington Suncool 30/17 OW, Annealed, 6 mm + 16mm Air + Optifloat Clear, Annealed, 4 mm + 16mm Air + Eclipse Advantage Grey, Annealed, 6mm	
	NE	0.7	0.13	SHGC: 0.13 U-Value: 1.2 W/m².K Aluminium frame Benchmark product: Pilkington Suncool 30/17 OW, Annealed, 6 mm + 16mm Argon + OptiWhite 8mm, Annealed, 4 mm + 16mm Argon + Eclipse Advantage Bronze, Annealed, 6mm	
	E	0.9	0.15	SHGC: 0.13 U-Value: 1.2 W/m².K Aluminium frame Benchmark product: Pilkington Suncool 30/17 OW, Annealed, 6 mm + 16mm Air + Optifloat Clear, Annealed, 4 mm + 16mm Air + Eclipse Advantage Grey, Annealed, 6mm	
	SE	5.9	0.85	Viridian Vfloat Clear 3mm Aluminium Frame	
Lvl05 - Community Centre	W	1.7	0.17	SHGC: 0.17 U-Value: 2.2 W/m².K Aluminium frame Benchmark product: Pilkington Reflite Bronze, Annealed, 6mm + 8mm Air + Optilam OW Double White, Laminated, 8.8mm + 9mm Air + Eclipse Advantage Grey, Annealed, 6mm	China southern 6SJ68S-1 on Clear +12A + 6C, 100mm U-Value: 1.6 W/m²K SHGC: 0.32 Aluminium Frame
	NW	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	

	N	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
	NE	0.9	0.15	SHGC: 0.13 U-Value: 1.2 W/m².K Aluminium frame Benchmark product: Pilkington Suncool 30/17 OW, Annealed, 6 mm + 16mm Air + Optifloat Clear, Annealed, 4 mm + 16mm Air + Eclipse Advantage Grey, Annealed, 6mm	
	E	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
Lvl07 - Ribbon	SW	1.7	0.21	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + Clear 6mm Aluminium Frame	China southern 6SJ68S-1 on Clear +12A + 6C, 100mm U-Value: 1.6 W/m²K SHGC: 0.32 Aluminium Frame
	W	1.7	0.21	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + Clear 6mm Aluminium Frame	
	NW	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
	N	1.7	0.21	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + Clear 6mm Aluminium Frame	
	NE	1.7	0.21	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + Clear 6mm Aluminium Frame	
	E	1.9	0.3	Viridian Enviroshield Perfomance ITO SuperGreen 4 8.76mm+ Air 12mm + Clear 6mm Aluminium Frame	
	SE	1.7	0.17	SHGC: 0.17 U-Value: 2.2 W/m².K Aluminium frame Benchmark product: Pilkington Reflite Bronze, Annealed, 6mm + 8mm Air + Optilam OW Double White, Laminated, 8.8mm + 9mm Air + Eclipse Advantage Grey, Annealed, 6mm	
	S	1.9	0.3	Viridian Enviroshield Perfomance ITO SuperGreen 4 8.76mm+ Air 12mm + Clear 6mm Aluminium Frame	
Lvl09 - Resi Gym	W	1.7	0.21	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + Clear 6mm Aluminium Frame	China southern 6SJ68S-1 on Clear +12A + 6C, 100mm U-Value: 1.6 W/m²K SHGC: 0.32 Aluminium Frame
	SW	1.7	0.21	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + Clear 6mm Aluminium Frame	
	S	1.7	0.21	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + Clear 6mm Aluminium Frame	
	SE	3.8	0.45	Viridian Evantage Bronze 6mm Aluminium Frame	

Lvl09 - Resi Gym	W	1.7	0.21	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + Clear 6mm Aluminium Frame	China southern 6SJ68S-1 on Clear +12A + 6C, 100mm U-Value: 1.6 W/m^{2}K SHGC: 0.32 Aluminium Frame
	NW	1.7	0.21	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + Clear 6mm Aluminium Frame	
	N	1.7	0.21	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + Clear 6mm Aluminium Frame	
	NE	1.7	0.21	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + Clear 6mm Aluminium Frame	
	E	1.7	0.21	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + Clear 6mm Aluminium Frame	
	S	1.87	0.46	Viridian Vfloat Green N 6mm+ Air 12mm + Clear 6mm Aluminium Frame	
	SW	1.9	0.3	Viridian Enviroshield Perfomance ITO SuperGreen 4 8.76mm+ Air 12mm + Clear 6mm Aluminium Frame	
Lvl10 - Resi Gym	W	1.7	0.21	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + Clear 6mm Aluminium Frame	China southern 6SJ68S-1 on Clear +12A + 6C, 100mm U-Value: 1.6 W/m^{2}K SHGC: 0.32 Aluminium Frame
	SW	1.7	0.21	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + Clear 6mm Aluminium Frame	
	S	1.7	0.21	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + Clear 6mm Aluminium Frame	
	SE	3.8	0.45	Viridian Evantage Bronze 6mm Aluminium Frame	
Lvl39 - Hotel BOH	SW	1.7	0.21	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + Clear 6mm Aluminium Frame	China southern 6SJ68S-1 on Clear +12A + 6C, 100mm U-Value: 1.6 W/m^{2}K SHGC: 0.32 Aluminium Frame
	W	1.7	0.17	SHGC: 0.17 U-Value: 2.2 W/m^2.K Aluminium frame Benchmark product: Pilkington Reflite Bronze, Annealed, 6mm + 8mm Air + Optilam OW Double White, Laminated, 8.8mm + 9mm Air + Eclipse Advantage Grey, Annealed, 6mm	
	E	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
	SE	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
	S	1.9	0.3	Viridian Enviroshield Perfomance ITO SuperGreen 4 8.76mm+ Air 12mm + Clear 6mm Aluminium Frame	
Lvl40 - Sky Lobby	SW	1.7	0.21	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + Clear 6mm Aluminium Frame	China southern 6SJ68S-1 on Clear +12A + 6C, 100mm U-Value: 1.6 W/m^{2}K SHGC: 0.32

	W	1.7	0.17	SHGC: 0.17 U-Value: 2.2 W/m².K Aluminium frame Benchmark product: Pilkington Reflite Bronze, Annealed, 6mm + 8mm Air + Optilam OW Double White, Laminated, 8.8mm + 9mm Air + Eclipse Advantage Grey, Annealed, 6mm	Aluminium Frame
	NW	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
	N	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
	NE	0.9	0.15	SHGC: 0.13 U-Value: 1.2 W/m².K Aluminium frame Benchmark product: Suncool 30/17 OW, Annealed, 6 mm + 16mm Air + Optifloat Clear, Annealed, 4 mm + 16mm Air + Eclipse Advantage Grey, Annealed, 6mm	
	E	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
	SE	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
	S	1.9	0.3	Viridian Enviroshield Perfomance ITO SuperGreen 4 8.76mm+ Air 12mm + Clear 6mm Aluminium Frame	
Lvl41 - Sky Lobby Mezz	SW	1.7	0.21	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + Clear 6mm Aluminium Frame	China southern 6SJ68S-1 on Clear +12A + 6C, 100mm U-Value: 1.6 W/m^{2}K SHGC: 0.32 Aluminium Frame
	W	1.7	0.17	SHGC: 0.17 U-Value: 2.2 W/m².K Aluminium frame Benchmark product: Pilkington Reflite Bronze, Annealed, 6mm + 8mm Air + Optilam OW Double White, Laminated, 8.8mm + 9mm Air + Eclipse Advantage Grey, Annealed, 6mm	
	NE	0.9	0.15	SHGC: 0.13 U-Value: 1.2 W/m².K Aluminium frame Benchmark product: Pilkington Suncool 30/17 OW, Annealed, 6 mm + 16mm Air + Optifloat Clear, Annealed, 4 mm + 16mm Air + Eclipse Advantage Grey, Annealed, 6mm	
	E	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
	SE	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	

	S	1.9	0.3	Viridian Enviroshield Perfomance ITO SuperGreen 4 8.76mm+ Air 12mm + Clear 6mm Aluminium Frame	
Lvl58 - Typical Hotel Plan	SW	1.7	0.21	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + Clear 6mm Aluminium Frame	China southern 6SJ68S-1 on Clear +12A + 6C, 100mm U-Value: 1.6 W/m²K SHGC: 0.32 Aluminium Frame
	W	1.7	0.17	SHGC: 0.17 U-Value: 2.2 W/m².K Aluminium frame Benchmark product: Pilkington Reflite Bronze, Annealed, 6mm + 8mm Air + Optilam OW Double White, Laminated, 8.8mm + 9mm Air + Eclipse Advantage Grey, Annealed, 6mm	
	NE	0.9	0.15	SHGC: 0.13 U-Value: 1.2 W/m².K Aluminium frame Benchmark product: Pilkington Suncool 30/17 OW, Annealed, 6 mm + 16mm Air + Optifloat Clear, Annealed, 4 mm + 16mm Air + Eclipse Advantage Grey, Annealed, 6mm	
	E	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
	SE	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
	N	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
	NW	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
	S	1.9	0.3	Viridian Enviroshield Perfomance ITO SuperGreen 4 8.76mm+ Air 12mm + Clear 6mm Aluminium Frame	
Lvl60 - Sky Villa	SW	1.9	0.3	Viridian Enviroshield Perfomance ITO SuperGreen 4 8.76mm+ Air 12mm + Clear 6mm Aluminium Frame	China southern 6SJ68S-1 on Clear +12A + 6C, 100mm U-Value: 1.6 W/m²K SHGC: 0.32 Aluminium Frame
	W	1.7	0.17	SHGC: 0.17 U-Value: 2.2 W/m².K Aluminium frame Benchmark product: Pilkington Reflite Bronze, Annealed, 6mm + 8mm Air + Optilam OW Double White, Laminated, 8.8mm + 9mm Air + Eclipse Advantage Grey, Annealed, 6mm	
	NE	0.7	0.13	SHGC: 0.13 U-Value: 1.2 W/m².K Aluminium frame Benchmark product: Pilkington Suncool 30/17 OW, Annealed, 6 mm + 16mm Argon + OptiWhite 8mm, Annealed, 4 mm + 16mm Argon + Eclipse Advantage Bronze, Annealed, 6mm	

	E	0.9	0.15	SHGC: 0.13 U-Value: 1.2 W/m².K Aluminium frame Benchmark product: Pilkington Suncool 30/17 OW, Annealed, 6 mm + 16mm Air + Optifloat Clear, Annealed, 4 mm + 16mm Air + Eclipse Advantage Grey, Annealed, 6mm	
	SE	1.7	0.17	SHGC: 0.17 U-Value: 2.2 W/m².K Aluminium frame Benchmark product: Pilkington Reflite Bronze, Annealed, 6mm + 8mm Air + Optilam OW Double White, Laminated, 8.8mm + 9mm Air + Eclipse Advantage Grey, Annealed, 6mm	
	N	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
	NW	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
Lvl61 - Sky Villa	S	1.9	0.3	Viridian Enviroshield Perfomance ITO SuperGreen 4 8.76mm+ Air 12mm + Clear 6mm Aluminium Frame	China southern 6SJ68S-1 on Clear +12A + 6C, 100mm U-Value: 1.6 W/m²K SHGC: 0.32 Aluminium Frame
	W	1.7	0.17	SHGC: 0.17 U-Value: 2.2 W/m².K Aluminium frame Benchmark product: Pilkington Reflite Bronze, Annealed, 6mm + 8mm Air + Optilam OW Double White, Laminated, 8.8mm + 9mm Air + Eclipse Advantage Grey, Annealed, 6mm	
	NE	0.9	0.15	SHGC: 0.13 U-Value: 1.2 W/m².K Aluminium frame Benchmark product: Pilkington Suncool 30/17 OW, Annealed, 6 mm + 16mm Air + Optifloat Clear, Annealed, 4 mm + 16mm Air + Eclipse Advantage Grey, Annealed, 6mm	
	E	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
	SE	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
	N	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
	NW	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
Lvl59 - Club Lounge	SW	1.7	0.21	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + Clear 6mm Aluminium Frame	China southern 6SJ68S-1 on Clear +12A + 6C, 100mm U-Value: 1.6 W/m²K SHGC: 0.32

	W	1.7	0.17	SHGC: 0.17 U-Value: 2.2 W/m².K Aluminium frame Benchmark product: Pilkington Reflite Bronze, Annealed, 6mm + 8mm Air + Optilam OW Double White, Laminated, 8.8mm + 9mm Air + Eclipse Advantage Grey, Annealed, 6mm	Aluminium Frame
	NE	0.7	0.13	SHGC: 0.13 U-Value: 1.2 W/m².K Aluminium frame Benchmark product: Pilkington Suncool 30/17 OW, Annealed, 6 mm + 16mm Argon + OptiWhite 8mm, Annealed, 4 mm + 16mm Argon + Eclipse Advantage Bronze, Annealed, 6mm	
	E	1.7	0.17	SHGC: 0.17 U-Value: 2.2 W/m².K Aluminium frame Benchmark product: Pilkington Reflite Bronze, Annealed, 6mm + 8mm Air + Optilam OW Double White, Laminated, 8.8mm + 9mm Air + Eclipse Advantage Grey, Annealed, 6mm	
	SE	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
	N	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
	NW	2.3	0.18	Viridian Enviroshield Perfomance ITO SuperBlue 40 12.76mm + air 12mm + 6mm Grey Aluminium Frame	
	S	1.9	0.3	Viridian Enviroshield Perfomance ITO SuperGreen 4 8.76mm+ Air 12mm + Clear 6mm Aluminium Frame	

5 RESULTS

The following simulations have been carried out:

- Reference Building + Reference Services—energy modelling of the building with the building envelope and services meeting the DTS provisions.
- Proposed Building + Reference Services—energy modelling of the building with the building envelope meeting the design intent and the services meeting the DTS provisions.

Table 5 and Figure 3 present the predicted annual energy consumption for the simulations performed.

Based on the modelling performed, the proposed building envelope is deemed to comply with the performance requirements of the 2016 Building Code of Australia.

Building	Annual Energy Consumption (MWh/year)					
	Heating	Cooling	Fans & Pumps	Equipment	Lighting	Total
Reference Building + Reference Services	323	422	2,964	805	764	5,278
Proposed Building + Reference Services	282	453	2,862	805	764	5,165

Table 5: Simulation Results

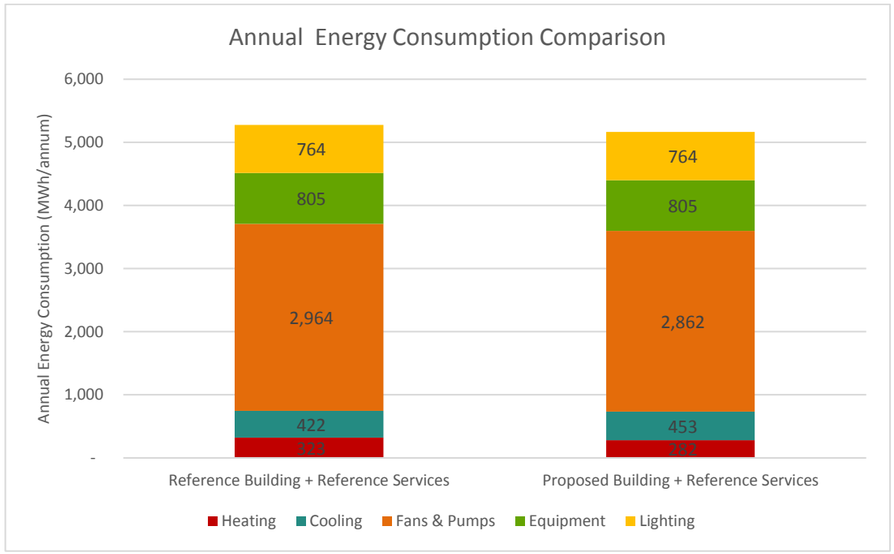


Figure 3: Simulation Results

Appendix 1

GLAZING CALCULATOR

NCC VOLUME ONE GLAZING CALCULATOR (first issued with NCC 2014)

HELP

Building name/description: **The Star - North Tower - Hotel Entry**

Application: **shop display**

Climate zone: **5**

Storey: **Basement 2**

Facade areas

	N	NE	E	SE	S	SW	W	NW	internal
Option A		195m²	36.3m²	36m²					
Option B									n/a
Glazing area (A)		*162m²*	*30.9m²*	*30.7m²*					

Number of rows preferred in table below: **8** *(as currently displayed)*

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS								SHADING		CALCULATED OUTCOMES OK (if inputs are valid)					
Glazing element		Facing sector		Size			Performance		P&H or device		Shading		Multipliers		Size	Outcomes
ID	Description (optional)	Option A facades	Option B facades	Height (m)	Width (m)	Area (m²)	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (S_H)	Cooling (S_C)	Area used (m²)	Element share of % of allowance used
1	Retail1_NE	NE		9.65	5.85		4.4	0.43	4.450	4.850	0.92	-4.80	0.22	0.37	56.45	22% of 99%
2											ROW SKIPPED (OK if intentional)					
3	Retail2_NE	NE		4.85	21.76		4.4	0.43	2.110	4.850	0.44	0.00	0.80	0.66	######	78% of 99%
4											ROW SKIPPED (OK if intentional)					
5	Retail2_E	E		4.85	6.37		2.9	0.25				0.00	1.00	1.00	30.89	100% of 95%
6											ROW SKIPPED (OK if intentional)					
7	Retail2_SE	SE		4.85	6.32		3.0	0.43				0.00	1.00	1.00	30.65	100% of 98%
8																

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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.

Figure 4: NCC Glazing Calculator - The Star North Tower – Retail Glazing

NCC VOLUME ONE GLAZING CALCULATOR (first issued with NCC 2014)

HELP

Building name/description: **The Star - North Tower - Hotel Entry**

Application: **other**

Climate zone: **5**

Storey: **Basement 2**

Facade areas

	N	NE	E	SE	S	SW	W	NW	internal
Option A		65.1m²	149m²	10.4m²	6.67m²	10.4m²			
Option B									n/a
Glazing area (A)		*55.3m²*	*82.4m²*	*8.82m²*	*5.67m²*	*8.82m²*			

Number of rows preferred in table below: **12** *(as currently displayed)*

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS										SHADING		CALCULATED OUTCOMES OK (if inputs are valid)					
Glazing element		Facing sector		Size			Performance			P&H or device		Shading		Multipliers		Size	Outcomes
ID	Description (optional)	Option A facades	Option B facades	Height (m)	Width (m)	Area (m²)	Total System U-Value (AFRC)	Total System SHGC (AFRC)		P (m)	H (m)	P/H	G (m)	Heating (S_H)	Cooling (S_C)	Area used (m²)	Element share of % of allowance used
1	Hotel_SW	SW		4.85		8.82	2.7	0.65		device		2.00	0.00	0.39	0.34	8.82	100% of 86%
2												ROW SKIPPED (OK if intentional)					
3	Hotel_S	S		4.85		5.67	2.9	0.25		device		2.00	0.00	0.64	0.54	5.67	100% of 89%
4												ROW SKIPPED (OK if intentional)					
5	Hotel_SE	SE		4.85		8.82	2.7	0.65		device		2.00	0.00	0.39	0.32	8.82	100% of 91%
6												ROW SKIPPED (OK if intentional)					
7	Hotel_E	E		4.85		64.92	4.4	0.53		7.660	4.850	1.58	0.00	0.02	0.30	64.92	56% of 93%
8	Hotel_E	E		4.85		17.44	4.4	0.53					0.00	1.00	1.00	17.44	44% of 93%
9												ROW SKIPPED (OK if intentional)					
10	Hotel_NE	NE		4.85		48.21	4.4	0.43		0.680	0.450	1.51	-4.40	0.00	0.24	48.21	58% of 87%
11	Hotel_NE	NE		4.85		7.12	4.4	0.43					0.00	1.00	1.00	7.12	42% of 87%
12																	

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if inputs are valid

Figure 5: NCC Glazing Calculator - The Star North Tower – Hotel Lobby Glazing

NCC VOLUME ONE GLAZING CALCULATOR (first issued with NCC 2014)

HELP

Building name/description: **The Star - North Tower - Hotel**

Application: **other**

Climate zone: **5**

Storey: **Basement 2**

Facade areas

	N	NE	E	SE	S	SW	W	NW	internal
Option A		81.9m²							
Option B									n/a

Glazing area (A) 25.1m²

Number of rows preferred in table below: **5** *(as currently displayed)*

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS										SHADING		CALCULATED OUTCOMES OK (if inputs are valid)					
Glazing element		Facing sector		Size			Performance			P&H or device		Shading		Multipliers		Size	Outcomes
ID	Description (optional)	Option A facades	Option B facades	Height (m)	Width (m)	Area (m²)	Total System U-Value (AFRC)	Total System SHGC (AFRC)		P (m)	H (m)	P/H	G (m)	Heating (S_H)	Cooling (S_C)	Area used (m²)	Element share of % of allowance used
1	Ribbon_NE	NE		9.65	2.60		6.2	0.79		7.110	4.850	1.47	-4.80	0.00	0.25	25.09	100% of 43%
2																	
3																	
4																	
5																	

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if inputs are valid

Figure 6: NCC Glazing Calculator - The Star North Tower – Ribbon Lobby Glazing

NCC VOLUME ONE GLAZING CALCULATOR (first issued with NCC 2014)

HELP

Building name/description: The Star - North Tower - Resi

Application: other

Climate zone: 5

Storey: Ground

Facade areas

	N	NE	E	SE	S	SW	W	NW	internal
Option A	28.7m²	29.1m²	31m²	39m²	73.1m²		112m²	47.8m²	
Option B									n/a
Glazing area (A)	*23.6m²*	*23.9m²*	*25.3m²*	*23.3m²*	*22.4m²*	.....	*83.6m²*	*37.4m²*	

Number of rows preferred in table below: 26 *(as currently displayed)*

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS										SHADING		CALCULATED OUTCOMES OK (if inputs are valid)					
Glazing element		Facing sector		Size			Performance			P&H or device		Shading		Multipliers		Size	Outcomes
ID	Description (optional)	Option A facades	Option B facades	Height (m)	Width (m)	Area (m²)	Total System U-Value (AFRC)	Total System SHGC (AFRC)		P (m)	H (m)	P/H	G (m)	Heating (S_H)	Cooling (S_C)	Area used (m²)	Element share of % of allowance used
1	Apartment Lobby_S	S		3.95	2.54		6.2	0.79					0.00	1.00	1.00	10.03	45% of 68%
2												ROW SKIPPED (OK if intentional)					
3	Apartment Lobby_W	W		3.95	8.76		2.8	0.20					0.00	1.00	1.00	34.60	42% of 95%
4												ROW SKIPPED (OK if intentional)					
5	Apartment Loby_NW	NW		3.95	0.52		2.8	0.20		0.750	3.950	0.19	0.00	0.95	0.85	2.05	5% of 93%
6												ROW SKIPPED (OK if intentional)					
7	Apartment Lobby_N	N		3.95	0.75		2.8	0.20		device		2.00	0.00	0.00	0.19	2.96	
8												ROW SKIPPED (OK if intentional)					
9	Resi1_W	W		3.95	4.95		2.8	0.20		2.350	4.550	0.52	0.60	0.95	0.91	19.55	22% of 95%
10												ROW SKIPPED (OK if intentional)					
11	Resi1_NW	NW		3.95	5.32		2.8	0.20		1.840	4.550	0.40	0.60	0.99	0.93	21.01	55% of 93%
12												ROW SKIPPED (OK if intentional)					
13	Resi1_N	N		3.95	5.23		2.8	0.20		1.840	4.550	0.40	0.60	0.99	0.90	20.66	100% of 80%
14												ROW SKIPPED (OK if intentional)					
15	Resi1_NE	NE		3.95	6.06		2.9	0.25		4.840	4.550	1.06	0.60	0.87	0.65	23.94	100% of 97%
16												ROW SKIPPED (OK if intentional)					
17	Resi1_E	E		3.95	6.40		2.8	0.18		0.720	4.550	0.16	0.60	0.99	0.98	25.28	100% of 95%
18												ROW SKIPPED (OK if intentional)					
19	Resi1_S	S		3.95	3.14		6.2	0.79					0.00	1.00	1.00	12.40	55% of 68%
20												ROW SKIPPED (OK if intentional)					
21	Resi2_SE	SE		3.95	5.90		2.9	0.43					0.00	1.00	1.00	23.31	100% of 100%
22												ROW SKIPPED (OK if intentional)					
##	Resi2_W	W		3.95	7.46		2.8	0.20					0.00	1.00	1.00	29.47	36% of 95%
24												ROW SKIPPED (OK if intentional)					
##	Resi2_NW	NW		3.95	3.62		2.8	0.20					0.00	1.00	1.00	14.30	41% of 93%
26																	

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if inputs are valid

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Figure 7: NCC Glazing Calculator - The Star North Tower – Residential Lobby Glazing

NCC VOLUME ONE GLAZING CALCULATOR (first issued with NCC 2014)

HELP

Building name/description: The Star - North Tower - Resi

Application: other

Climate zone: 5

Storey: Level 01

Facade areas

	N	NE	E	SE	S	SW	W	NW	internal
Option A	39.1m²	39.1m²	42m²	19.9m²		20.1m²	33.6m²	39.6m²	
Option B									n/a
Glazing area (A)	*31.7m²*	*31.4m²*	*34.1m²*	*2.63m²*	.....	*16.3m²*	*27.2m²*	*32.1m²*	

Number of rows preferred in table below: 14 *(as currently displayed)*

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS								SHADING		CALCULATED OUTCOMES OK (if inputs are valid)					
Glazing element		Facing sector		Size			Performance		P&H or device		Shading		Multipliers		Size	Outcomes
ID	Description (optional)	Option A facades	Option B facades	Height (m)	Width (m)	Area (m²)	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (S_H)	Cooling (S_C)	Area used (m²)	Element share of % of allowance used
1	Resi_SW	SW		3.65	4.46		2.9	0.25				0.00	1.00	1.00	16.28	100% of 97%
2											ROW SKIPPED (OK if intentional)					
3	Resi_W	W		3.65	7.46		2.8	0.18				0.00	1.00	1.00	27.23	100% of 97%
4											ROW SKIPPED (OK if intentional)					
5	Resi_NW	NW		3.65	8.80		2.8	0.18				0.00	1.00	1.00	32.12	100% of 91%
6											ROW SKIPPED (OK if intentional)					
7	Resi_N	N		3.65	8.69		2.8	0.18				0.00	1.00	1.00	31.72	100% of 91%
8											ROW SKIPPED (OK if intentional)					
9	Resi_NE	NE		3.65	8.60		1.4	0.15				0.00	1.00	1.00	31.39	100% of 95%
10											ROW SKIPPED (OK if intentional)					
11	Resi_E	E		3.65	9.33		2.8	0.18				0.00	1.00	1.00	34.05	100% of 96%
12											ROW SKIPPED (OK if intentional)					
13	Resi_SE	SE		3.65	0.72		6.2	0.79				0.00	1.00	1.00	2.63	100% of 44%
14																

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if inputs are valid

Figure 8: NCC Glazing Calculator - The Star North Tower – Level 1 Glazing

NCC VOLUME ONE GLAZING CALCULATOR (first issued with NCC 2014)

HELP

Building name/description: The Star - North Tower - Resi

Application: other

Climate zone: 5

Storey: Level 02

Facade areas

	N	NE	E	SE	S	SW	W	NW	internal
Option A	43.5m²	44.5m²	46.7m²	22.2m²		24.4m²	37.3m²	44m²	
Option B									n/a
Glazing area (A)	*36.1m²*	*35.7m²*	*38.7m²*	*2.99m²*	.....	*18.5m²*	*31m²*	*36.5m²*	

Number of rows preferred in table below: 14 *(as currently displayed)*

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS								SHADING		CALCULATED OUTCOMES OK (if inputs are valid)					
Glazing element		Facing sector		Size			Performance		P&H or device		Shading		Multipliers		Size	Outcomes
ID	Description (optional)	Option A facades	Option B facades	Height (m)	Width (m)	Area (m²)	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (S_H)	Cooling (S_C)	Area used (m²)	Element share of % of allowance used
1	Resi_SW	SW		4.15	4.46		2.9	0.25				0.00	1.00	1.00	18.51	100% of 91%
2											ROW SKIPPED (OK if intentional)					
3	Resi_W	W		4.15	7.46		2.8	0.18				0.00	1.00	1.00	30.96	100% of 100%
4											ROW SKIPPED (OK if intentional)					
5	Resi_NW	NW		4.15	8.80		2.8	0.18				0.00	1.00	1.00	36.52	100% of 93%
6											ROW SKIPPED (OK if intentional)					
7	Resi_N	N		4.15	8.69		2.8	0.18				0.00	1.00	1.00	36.06	100% of 93%
8											ROW SKIPPED (OK if intentional)					
9	Resi_NE	NE		4.15	8.60		1.4	0.15				0.00	1.00	1.00	35.69	100% of 94%
10											ROW SKIPPED (OK if intentional)					
11	Resi_E	E		4.15	9.33		2.8	0.18				0.00	1.00	1.00	38.72	100% of 98%
12											ROW SKIPPED (OK if intentional)					
13	Resi_SE	SE		4.15	0.72		6.2	0.79				0.00	1.00	1.00	2.99	100% of 45%
14																

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if inputs are valid

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Figure 9: NCC Glazing Calculator - The Star North Tower – Level 2 Glazing