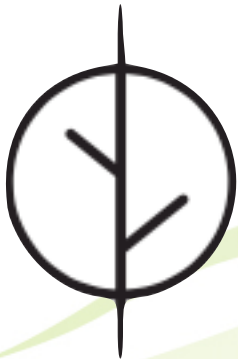


Where planning regulations and development practice collide: the multi-storey apartment building in subtropical Brisbane Australia

Dr Rosemary Kennedy



www.subtropicalcities.com



Organisers:



International Co-owners:



Background and context



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subtropical humid macro-climate

Tropical | Temperate Hybrid



Image: Centre for Subtropical Design in *Subtropical Design in SEQ*, a handbook for planners, developers and decision-makers



Image: Olivia Martin Maguire *Subtropical Brisbane through the lens* Centre for Subtropical Design 2004

Outdoor living a hallmark of Brisbane's subtropical lifestyle



Images: Centre for Subtropical Design

Apartment residents desire balconies
and they value the social and environmental benefits

Building configuration and climatic design approaches

Structural approach	Mechanical approach
Passive strategies - appropriate orientation. Building form and materials regulate heat and air flow.	Active strategies. Mechanical systems and facade regulate heat flow
Cross-ventilation (wind-induced)	Air-tightness
Greater extent of external walls with optimised fenestration	Least extent of external walls
External shading of walls and openings	External shading of walls and openings beneficial
Occasional energy use	Continuous energy use
Varying conditions	Monotonous conditions
Climate-responsive	Climate-resistant



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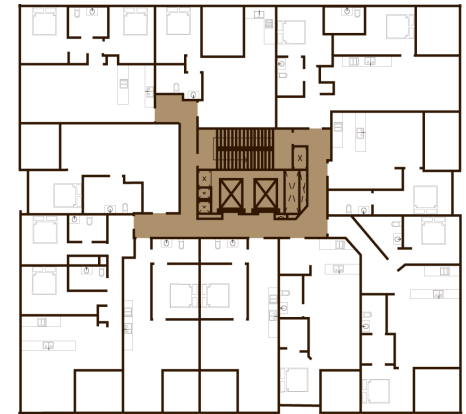
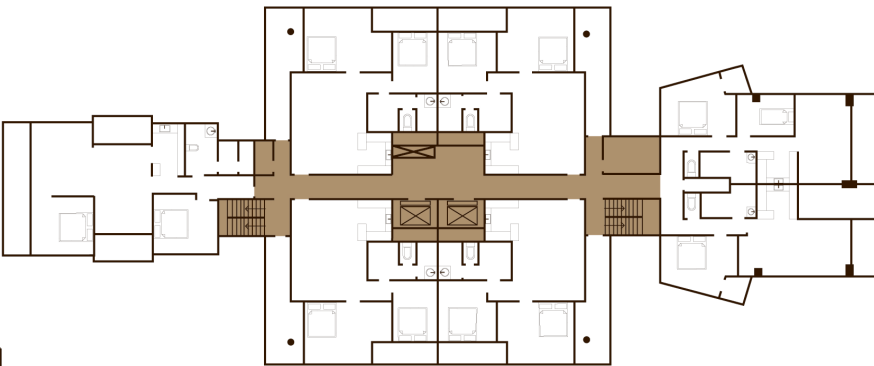


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Building form and configuration

SA m²/Vol m³ key metric



Main Rd

0 5 15m



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The Multiple Dwelling Code

- **The *Multiple Dwelling Code* - Brisbane City Council Planning Scheme ePlan, City Plan 2014, Section 9.3.14.** (the Code) seeks to align built outcomes with residents' expectations for quality residential environments and policy-makers' sustainability objectives:
- **Provide amenity (pleasant living environment) to residents and adjoining neighbours AND**
- **Enhance city's character and identity as a liveable subtropical city**



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MDC | the structural approach

Performance Outcomes	Acceptable Outcomes
<p>PO 20 Development includes buildings that exhibit subtropical design character and subtropical living</p>	<ul style="list-style-type: none"> • 1 of: Dual aspect / greater than 2.4m ceilings / <u>Habitable rooms with 2 windows or openings</u> • Weather and sun protected external doors and windows to habitable rooms • Sun-shading or deep recesses on North • Sun-protection on West
<p>PO 28 Development must provide attractive and functional private open space for residents</p>	<ul style="list-style-type: none"> • 12m² min balcony area • 3m min dimension
<p>PO 29 Development provides a resident with functional outdoor living space that receives natural light but is shaded to protect the resident from direct sunlight</p>	<ul style="list-style-type: none"> • Solar access (form, materials, orientation)
<p>PO 36 Development provides screening and partial enclosure of balconies.</p>	<ul style="list-style-type: none"> • Screening or solid balustrades (form and materials, and orientation)



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Scope



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Method



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Method

- Identified building completions of multi-unit dwellings from 5 to 30 storeys post-2011 from PD online.
- Purposively selected sample of case studies – various scales of development, spatial configuration, locations
- Also selected Torbreck – AIA “*Significant Building of the 20th Century*” for comparative analysis
- Conducted content analysis of approved architectural drawings (plans, sections and elevations)
- Examined results under the multiple dwelling code performance criteria for assessable development most relevant to **individual dwelling design** (PO 20, 28, 29, 36).



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Spatial-structural metrics

- Form and spatial configuration - podium | core location | corridor loading | no of storeys
- FECA Typical private dwelling unit
- Wall-to-floor ratio WTF typical dwellings
- Window-to-wall ratio WWR
- SA / Vol ratio overall building
- Yield expressed as FAR (net saleable area : common areas)
- Utility of private outdoor space measured according to MDC metrics (min area 12m²; min dimension 3m)



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Results



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Results

- 16 Cases | 22 Towers (4 have multiple buildings)
- Towers – basement or podium parking
- One-level living
- Central core
- Double-loaded
- Total dwellings = 2199 (2 bed/2 bath predominant)
- Total occupancy = 3376 (based on GBCA tool)



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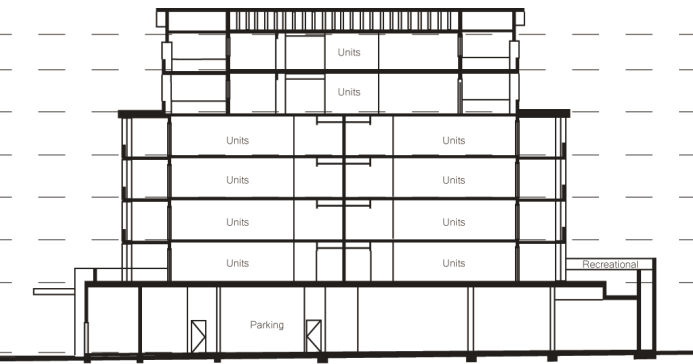


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Formulaic building form and apartments



5m



Relationship between Surface Area and Volume

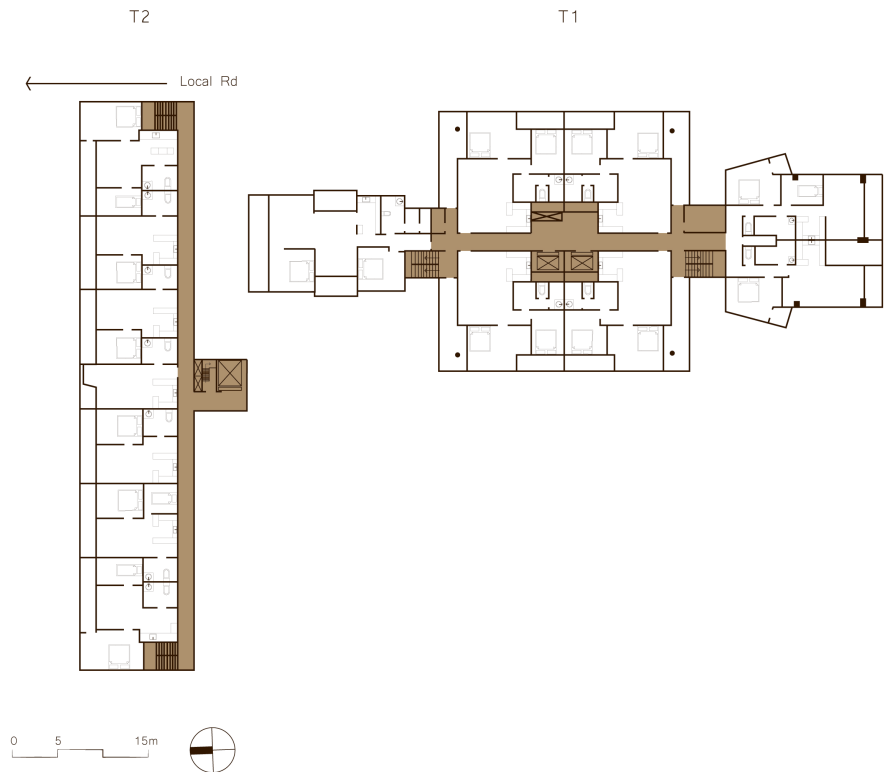
ID	Location	Height (Storeys)	SA/Vol (m ² /m ³)
1	Woolloongabba	5	0.167
2	St Lucia	5	0.174
3	Windsor	5	0.210
4	New Farm	5	T1 0.139 T2 0.136
5	Highgate Hill	5	0.107
6	Lutwyche	5	0.195
7	Lutwyche	7	0.194
8	Kelvin Grove	7	0.185
9	Sth Brisbane	7	0.168
10	Indooroopilly	7	0.242
11	Sth Brisbane	20	0.125
12	Sth Brisbane	10	0.166
13	Sth Brisbane	15	0.082
14	Fortitude Valley	30	T1 0.090 T2 0.265 T3 0.237
15	West End	29 12 29	T1 0.097 T2 0.089 T3 0.063
16	Highgate Hill	18 7	T1 0.150 T2 0.164

Wall-to-Floor Ratio for typical dwelling units

Case	Storeys	Typical dwelling Type	FECA m ²	External wall area m ²	WTF ratio	Glazing area m ²	Total openable area m ²
Benchmark Case 16	22	1B/1Ba	92	37.8	0.41	7	5
		2B/1Ba	107	53.7	0.50	26	13
Maximum Case 6	5	1B/1Ba	52	49	0.94	10	5
		2B/2Ba	74	58	0.78	18	5
Minimum Case 15	30	1B/1Ba	50	6.9	0.13	6.9	6
		2B/2Ba	81	8.7	0.10	8.7	6

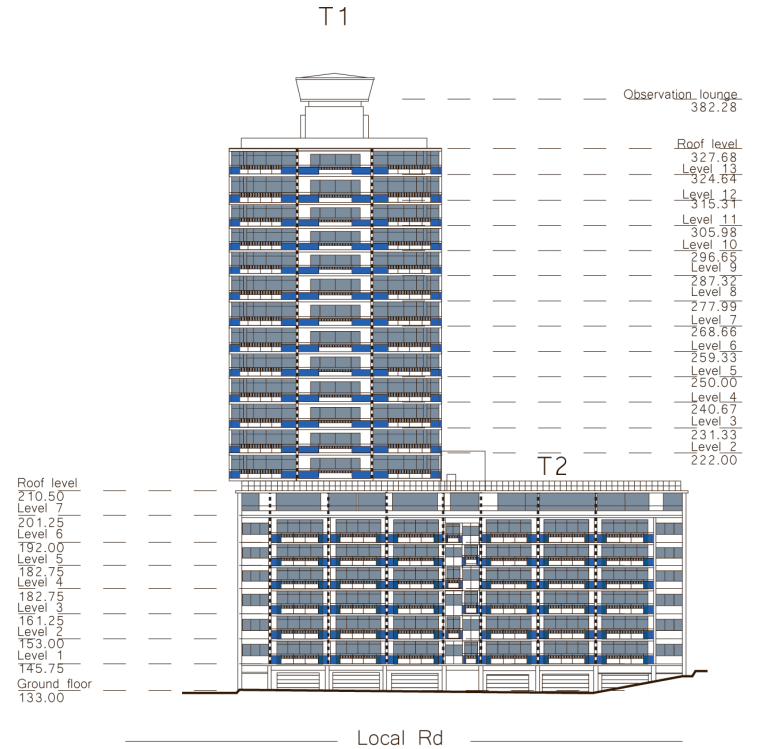
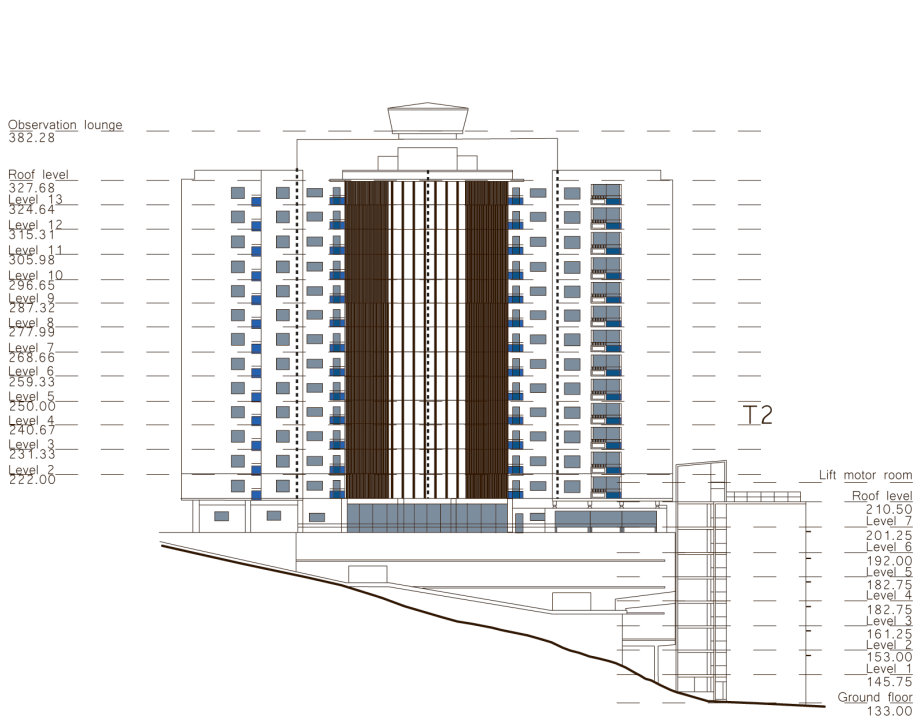
Case 16 (benchmark case)

- T1
- Central core access
- T2
- Gallery access
- All dwellings cross-ventilated



Case 16

WWR 0.5



East sectional elevation

North elevation



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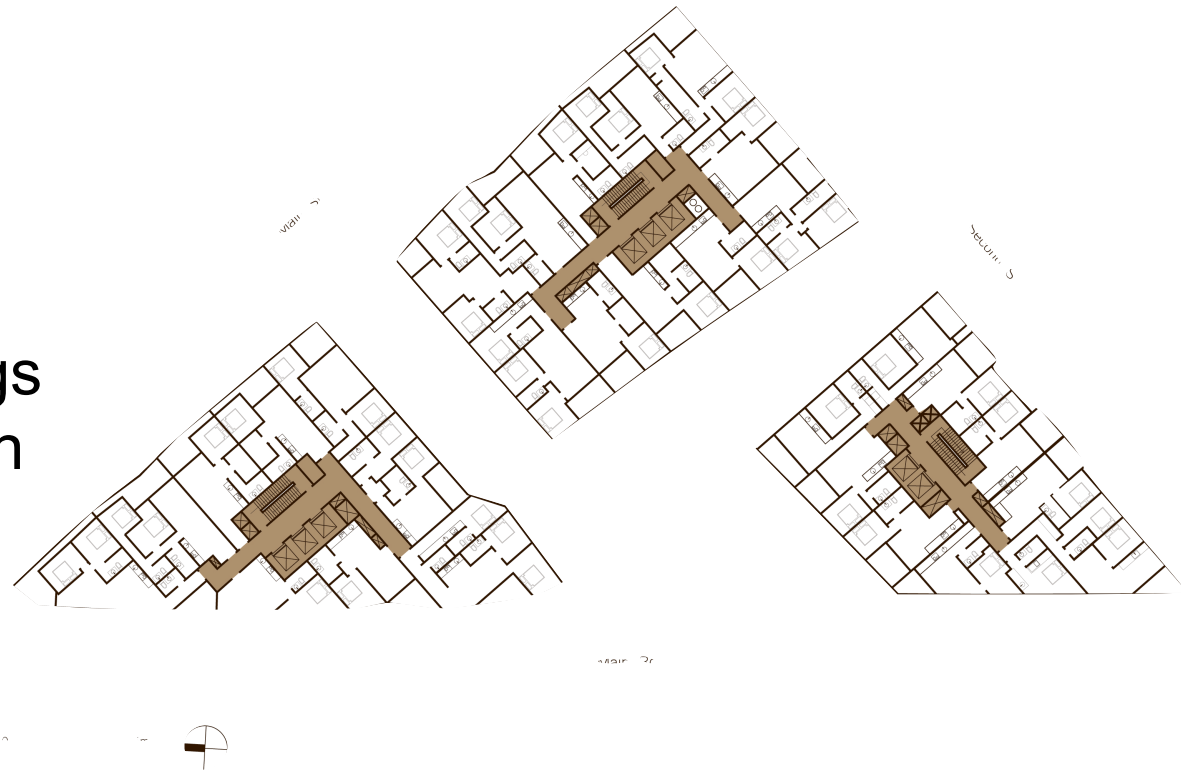


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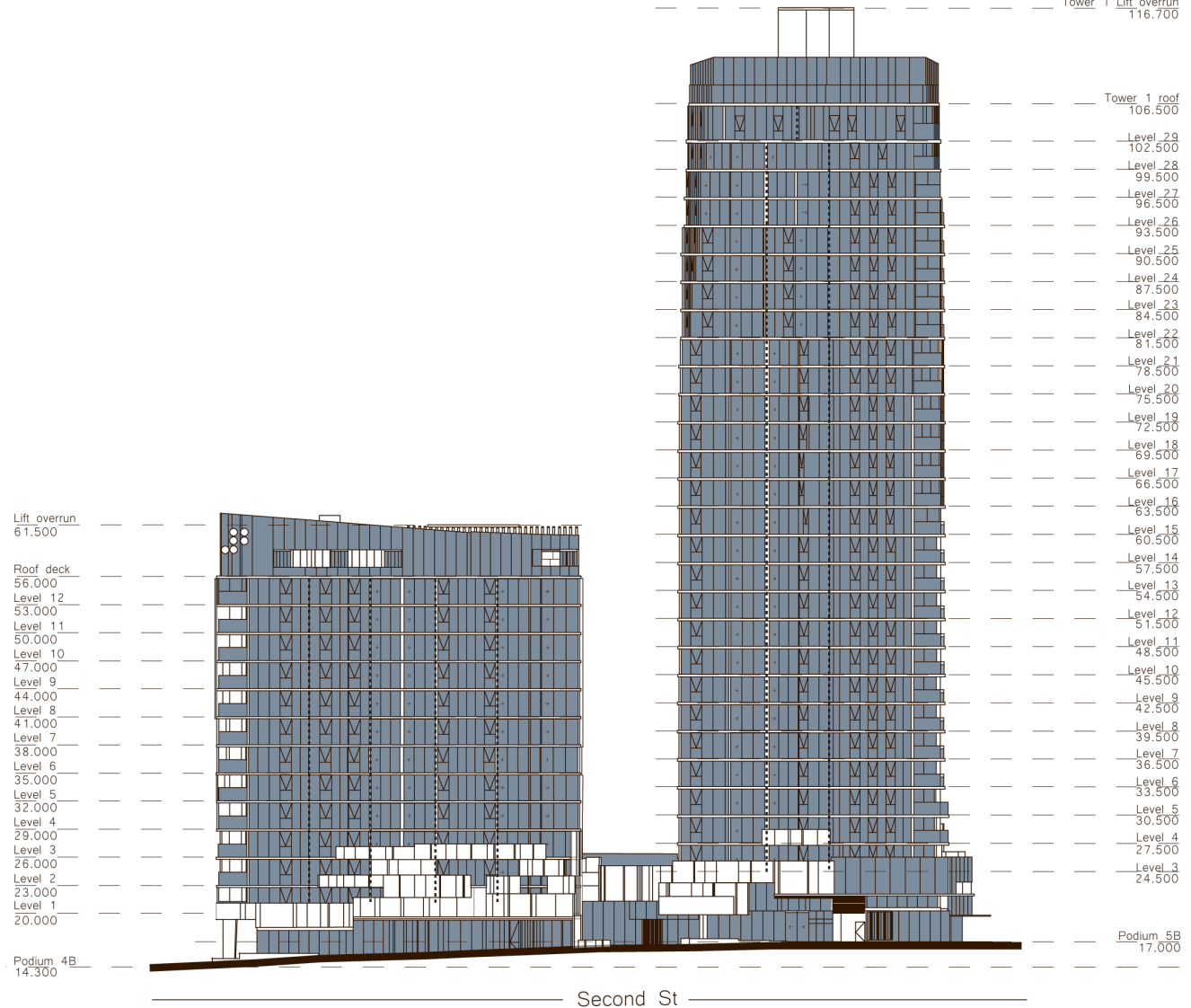
Case 15

- T1
- Central core
- T2
- Central core
- T3
- Central core
- Only corner dwellings with cross-ventilation potential.



Case 15

WWR 1.0



0 5 15m



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Extensively glazed facades



Image: http://elenbergfraser.com/#!/project/13060_fortitude-valley downloaded 19 May 2015

Private outdoor space



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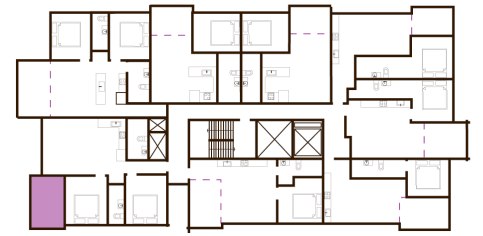


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Private outdoor space



Main Rd

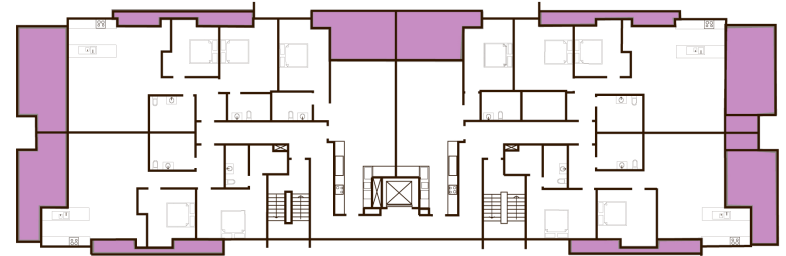
0 5 15m



T1



T2



Local Rd

0 5 15m



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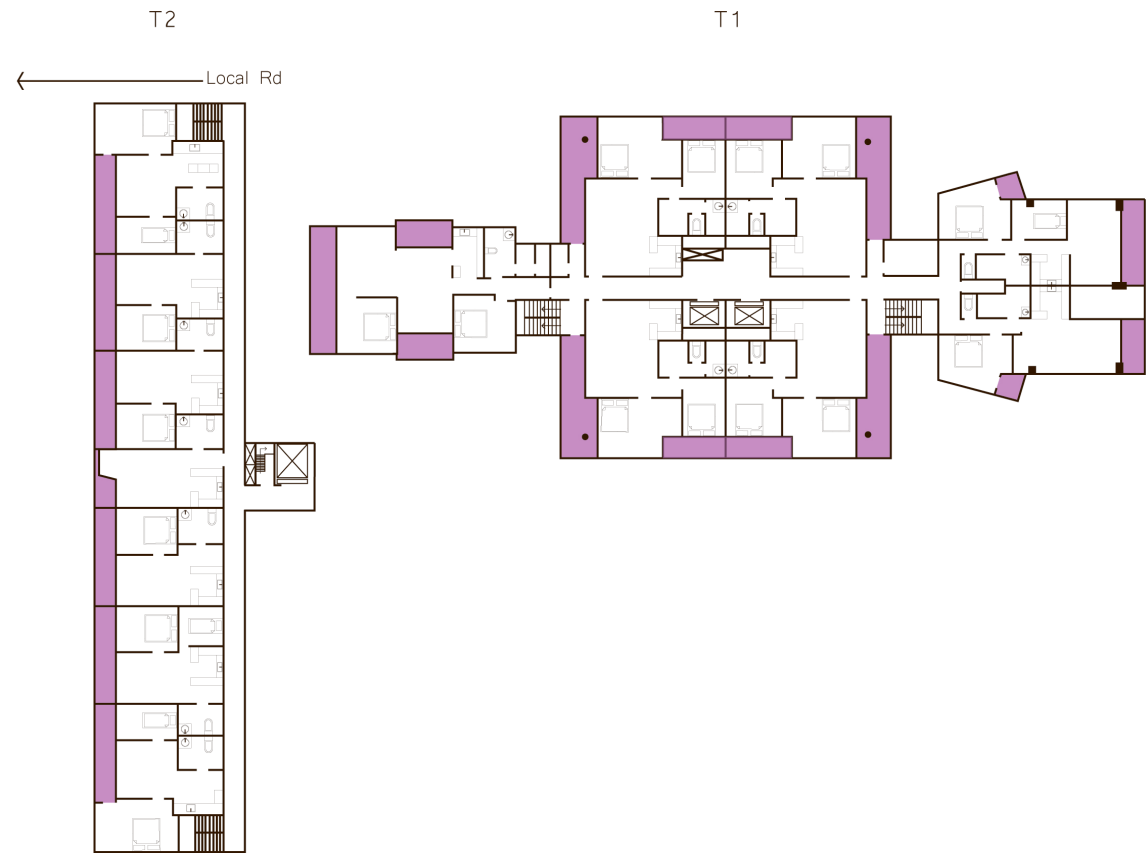


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Private outdoor space



0 5 15m



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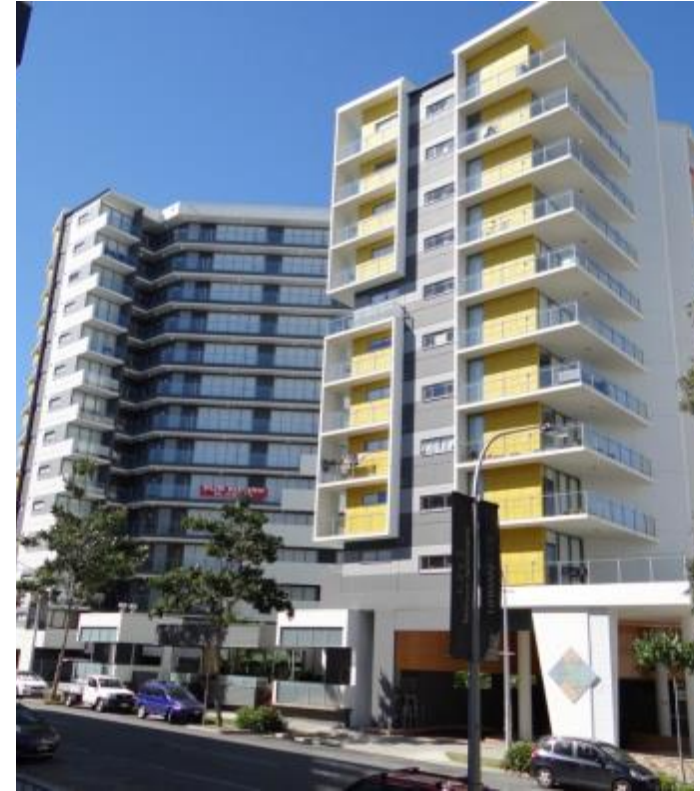
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Private outdoor space

minimal privacy; no sun protection; inhibited air flow



Development practice compared to desired policy outcomes

EMERGING TRENDS	PREFERRED OUTCOMES
Compact Form: Least extent of external walls	Slender form: Greater extent of external walls.
High rate of façade transparency	Balance between thermal mass and façade transparency
Unshaded walls and openings. High-performance glazing specified.	External shading of walls and openings Adjustable to accommodate seasonal sun angles.
Primary view takes precedence over solar orientation	Optimised fenestration with solar orientation for daylight and cross-ventilation.
Generic	Place-based
Energy-reliant technological approach	Fundamental architectural approach



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Tensions between generic outcomes and planning policy

Emerging outcomes	Desired Outcomes
Short term yield benefits to developer	Long term liveability benefits to occupant and community
Active strategies Mechanical systems and façade regulate heat and air flow	Passive strategies - appropriate orientation, building form and materials regulate heat and air flow
Climate-defensive	Climate-interactive
Monotonous conditions	Varying conditions
Limited occupant choice No interaction /automatic Passive behaviour	Occupant interaction Discretionary control Active choice - behavioural
Continuous energy use	Occasional energy use
Energy efficient	Economical

Next steps



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Conclusion and next steps

- The MDC prescribes permanent structural controls for climate-responsive architecture for apartment buildings
- Perennial tensions between perceived cost-effectiveness and climate-effectiveness persist.
- Passing standard too low.
- What's the next big move that shifts us away from energy-intensive generic design towards more locally-responsive outcomes?
- Where will the recalibration come from?



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Thank you

Acknowledgements:

- Brisbane City Council
- Independent Design Advisory Panel
- Queensland University of Technology



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