CRC for
Construction Innovation
Building our Future
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# Sustainability and Facility Management


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In Association with:

Association of Consulting Architects Australia

THE ROYAL AUSTRALIAN INSTITUTE OF ARCHITECTS

FMA AUSTRALIA

PROPERTY COUNCIL of Australia

Urban Development Institute of Australia

# Sustainable Subdivisions: Energy Efficient Design

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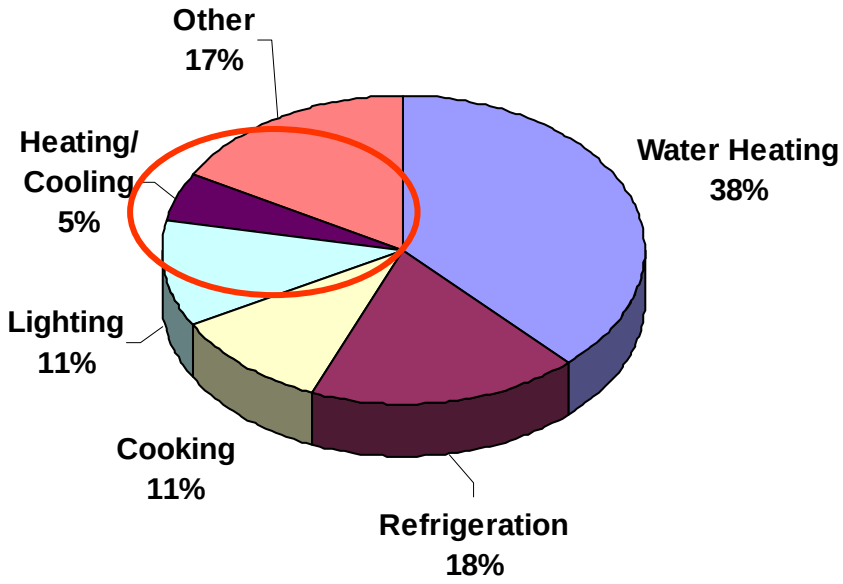
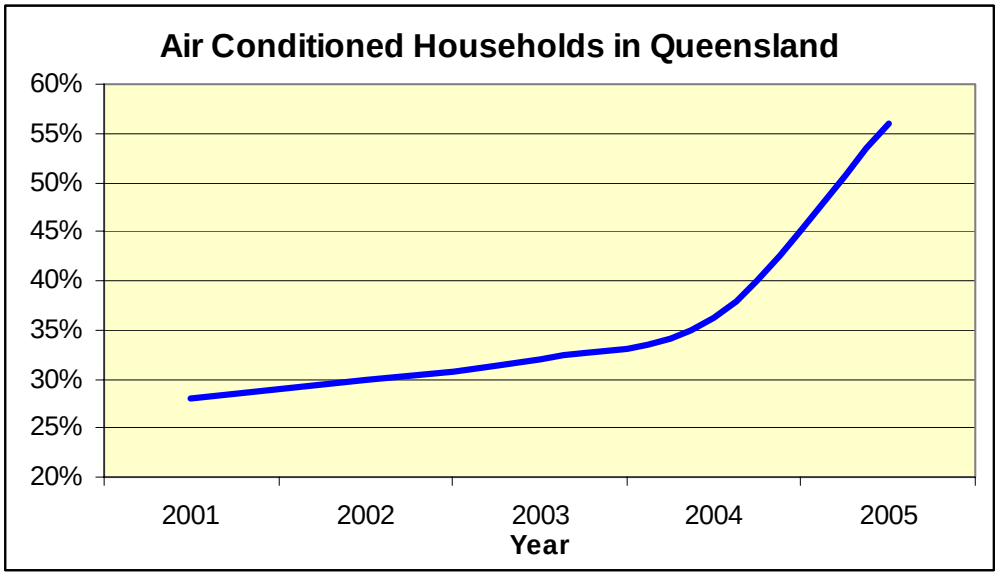
# … the problem is….

…increasing power consumption




- 28% in 2001
- 36% by 2004
- 56% by 2005

# sustainable subdivisions: energy

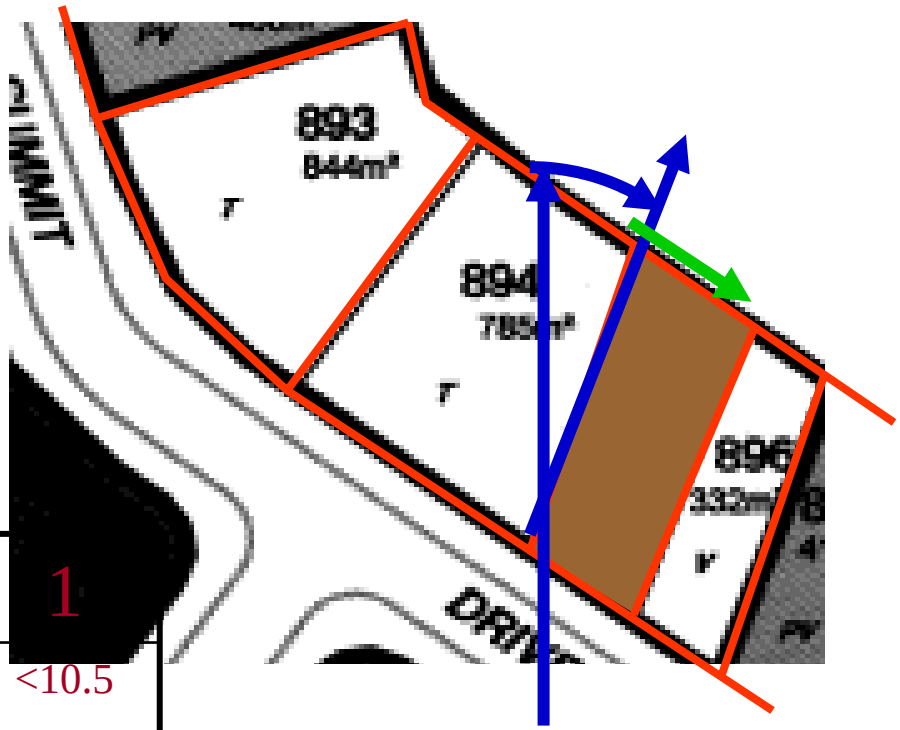
- ☑ examined connection between sub division performance and dwellings energy efficiency
- ☑ assessed the performance of a range of subdivisional layouts
- ☑ assessed the energy efficiency performance of a range of dwellings using a new energy-rating thermal tool designed for sub-tropical climates
- ☑ develop criteria for possible future lot rating methodology to improve dwelling energy efficiencies

# existing lot rating methodology

determine lot orientation

measure lot width

determine star rating

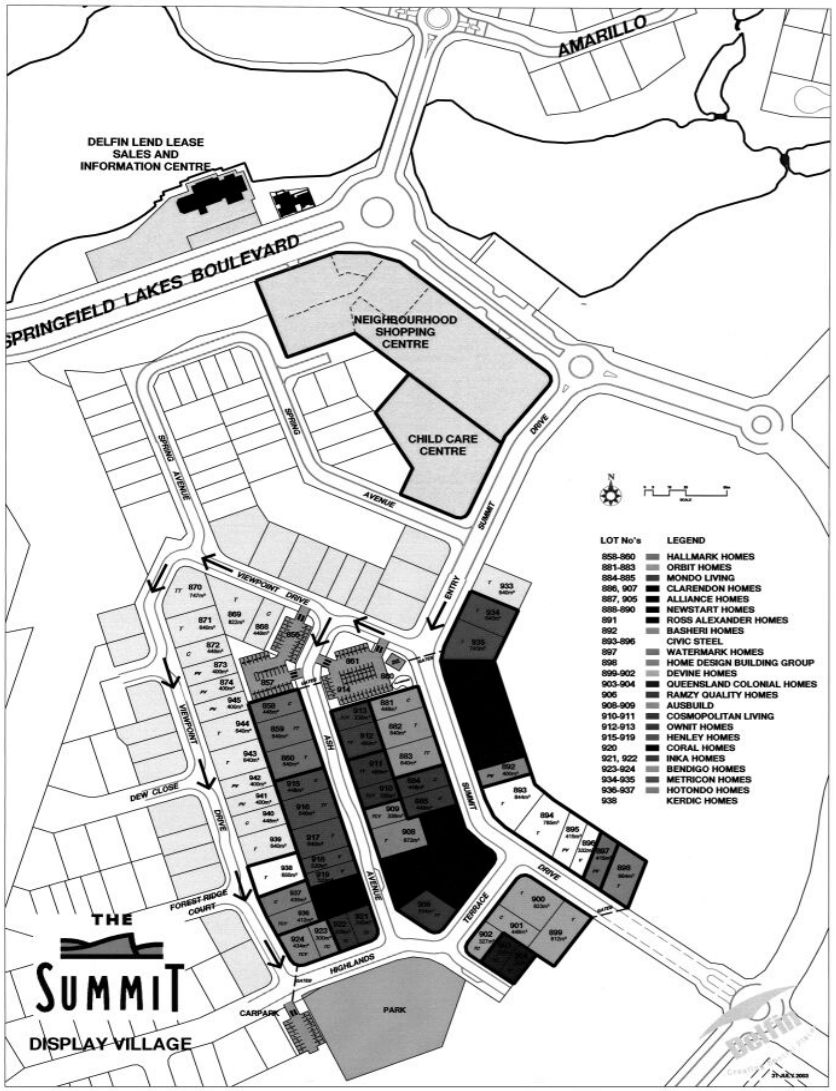



| Stars | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|
| Width | >14.1 | 12.2-14.1 | 11.1-12.1 | 10.5-11.0 | <10.5 |

# assessed a range of subdivisions

## Summit Display Village
## Springfield Lakes

- 71 Home Sites
- Includes GreenSmart village sites
- Size range 300m$^2$ - 1000m$^2$ (average 520m$^2$)

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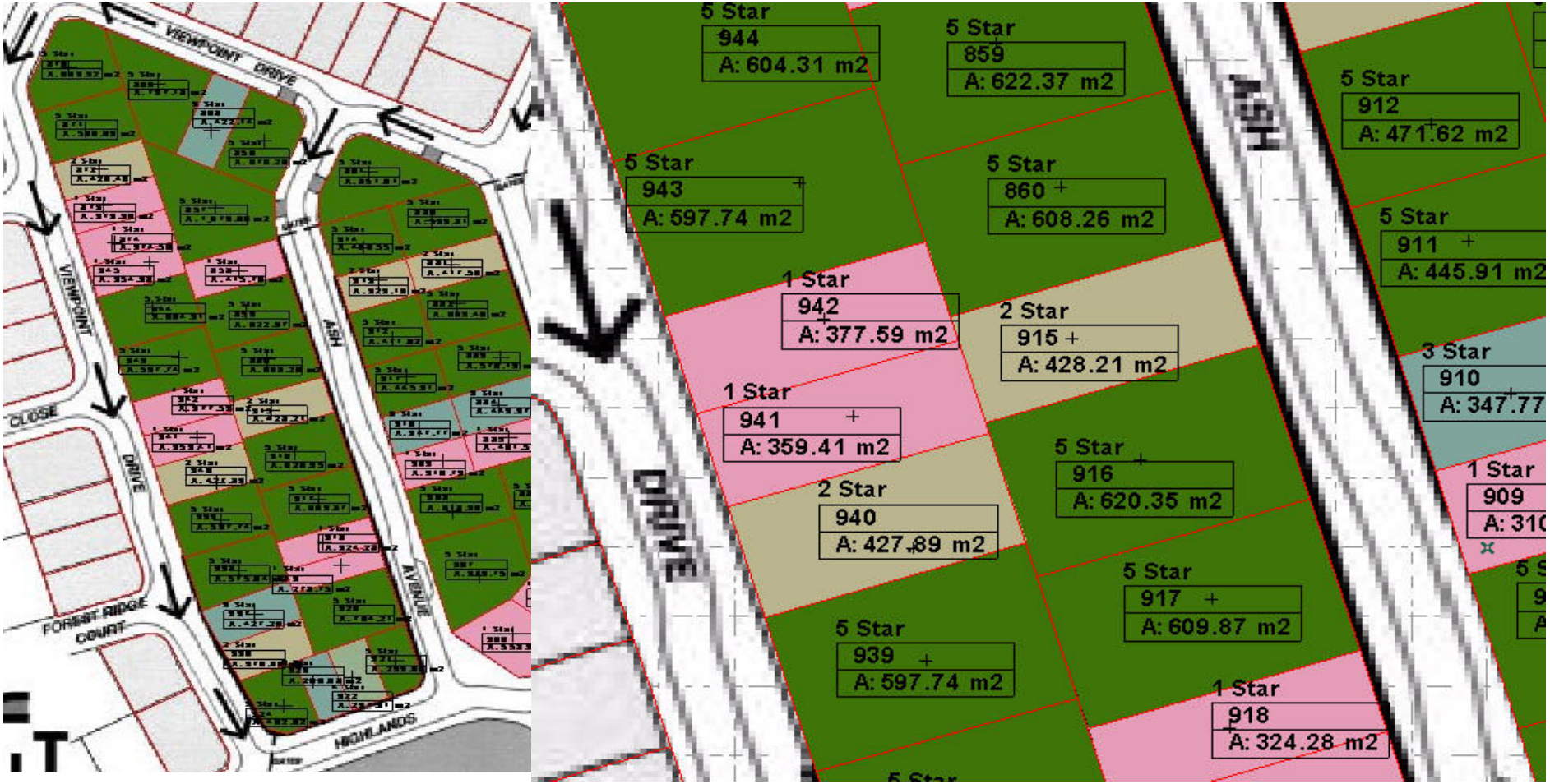
# case study subdivision

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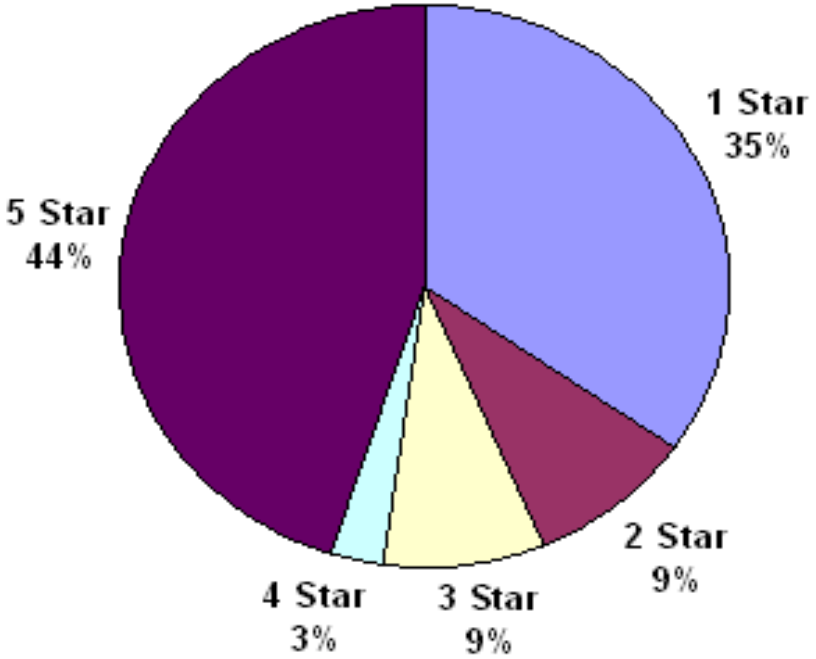
# ...results...

## aim

At least 80% should achieve 5 Star - balance to achieve 4 or 3 Stars



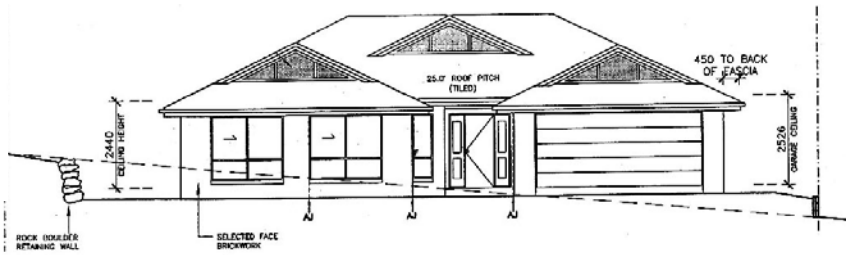

## outcome

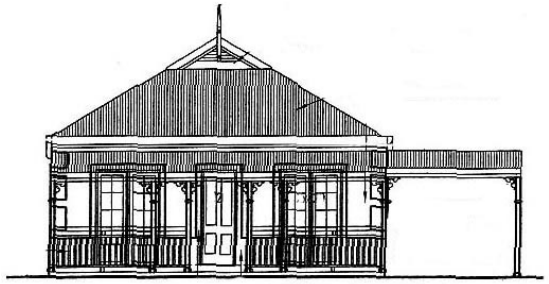
44% achieved 5 Star

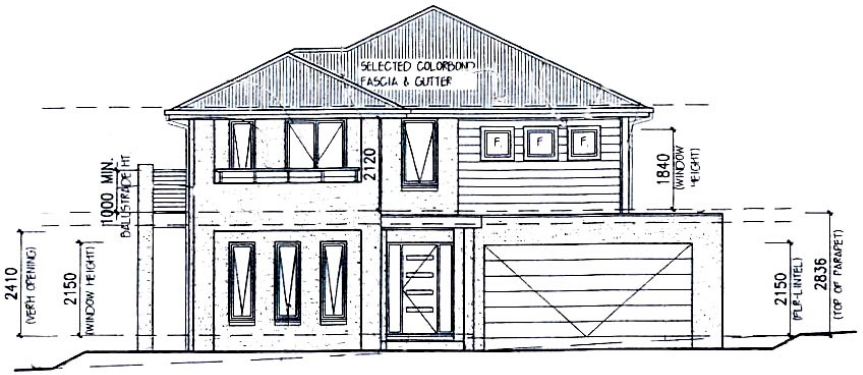
56% achieved 5-3 Stars

35% achieved 1 Star

# range of dwellings types & sizes…

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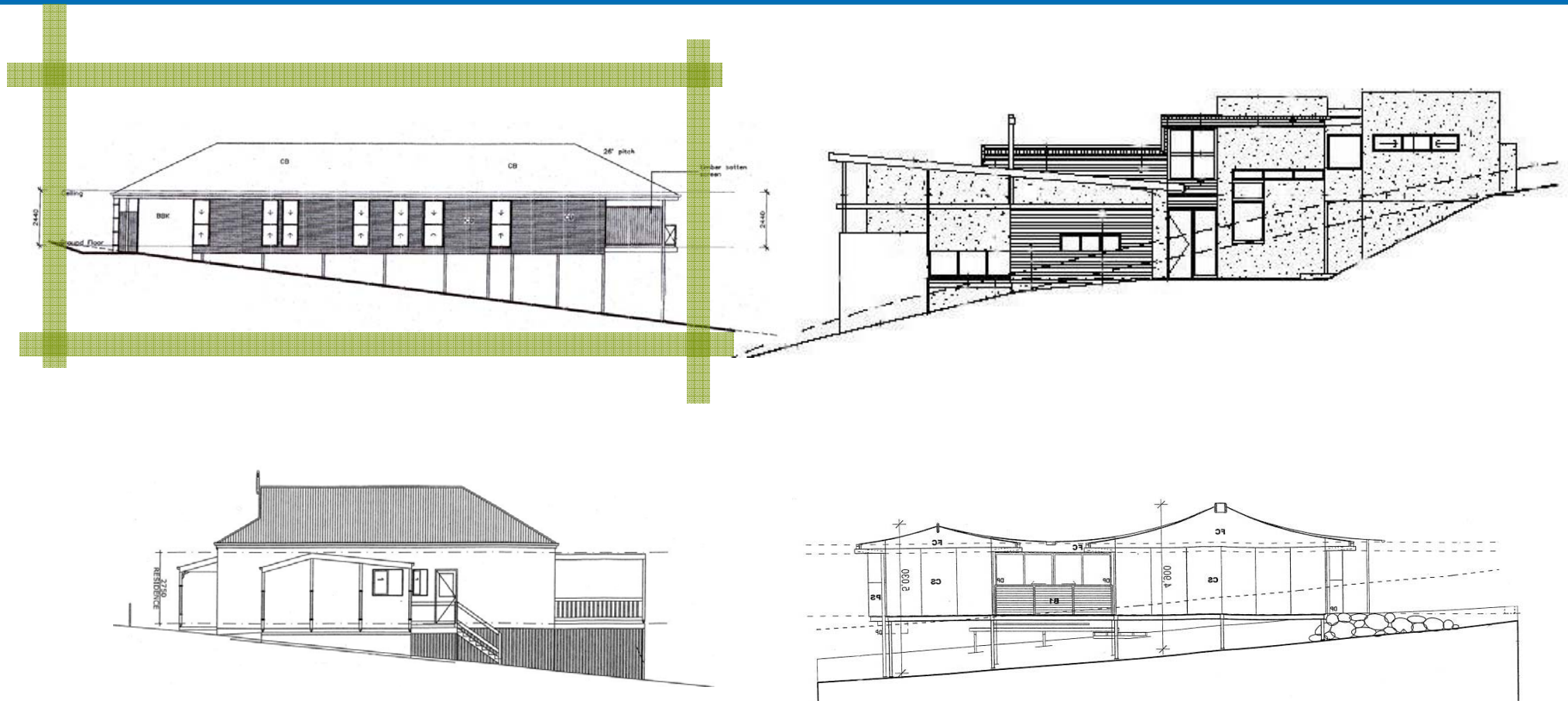
brick veneer on slab – cut & fill or flat sites

# range of site types & sizes

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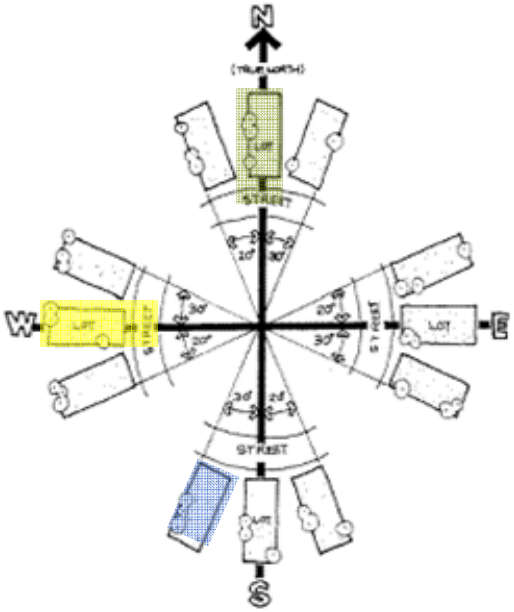
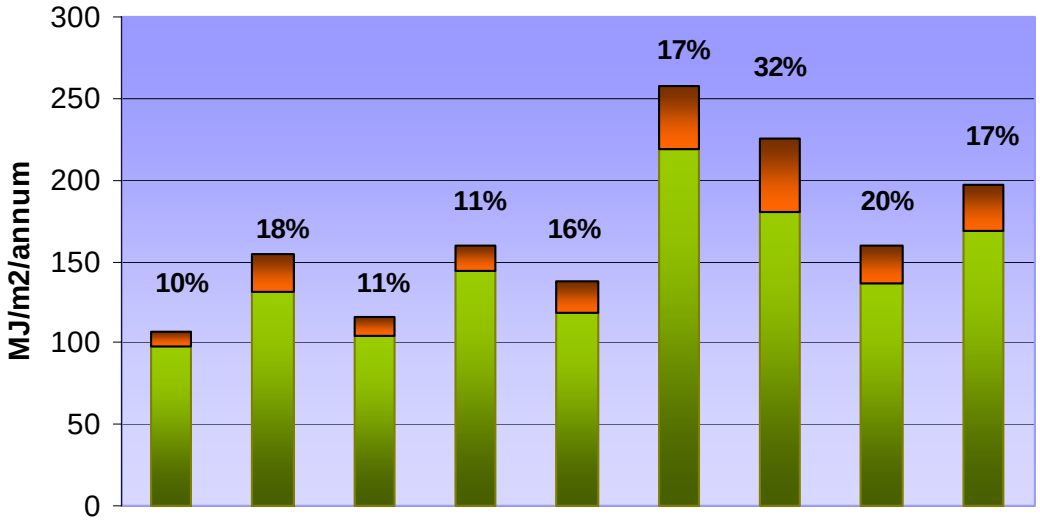
lightweight - flat or elevated sites

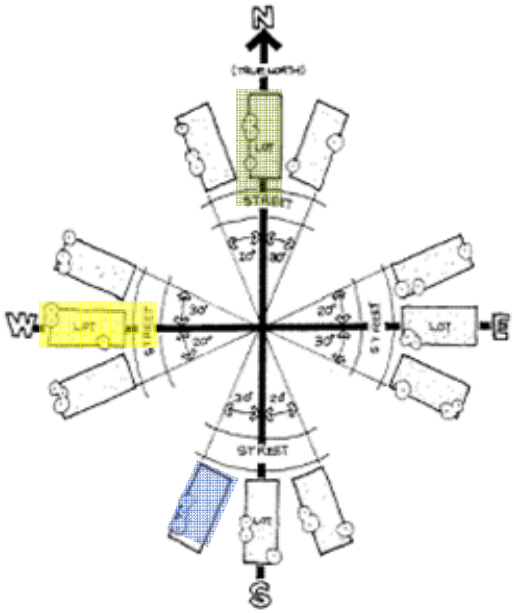
# impact of altering orientation



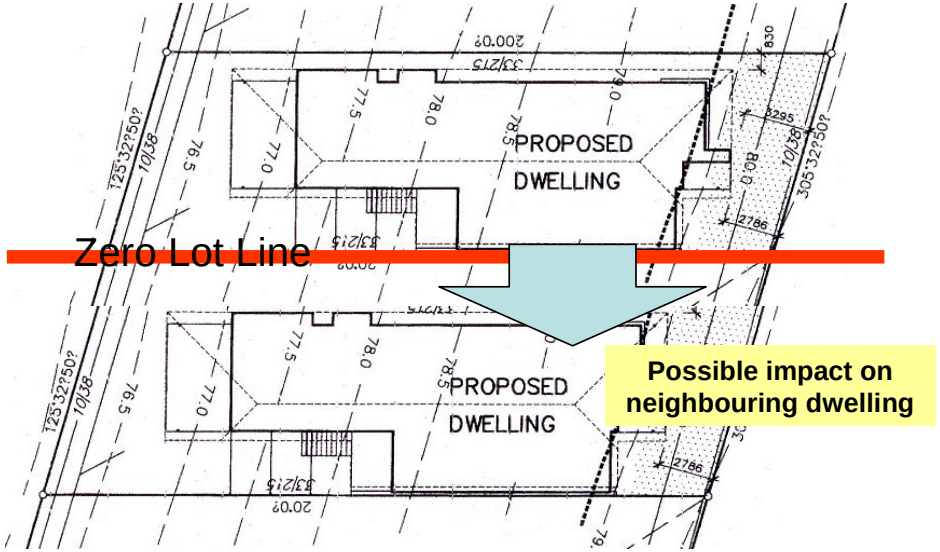

- ☑ this project quantified the impact of orientation
- ☒ altering the orientation increased the annual total load (and decreased the energy efficiency) by between 10 and 32 % above the optimum for each of the dwellings

# house + lot = ?



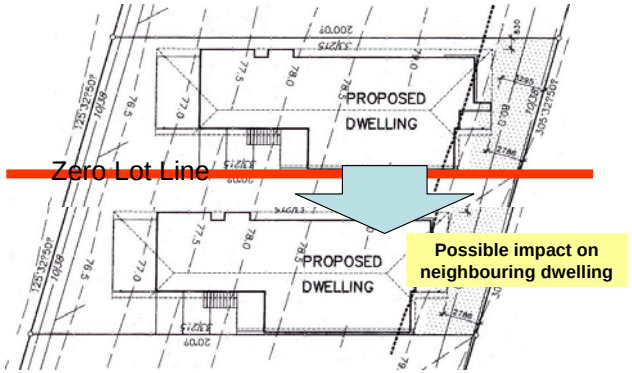

- ☒ 1/3 cases SEDA tool did not predict best orientation
- ☒ 1/3 cases SEDA tool did not predict worst orientation

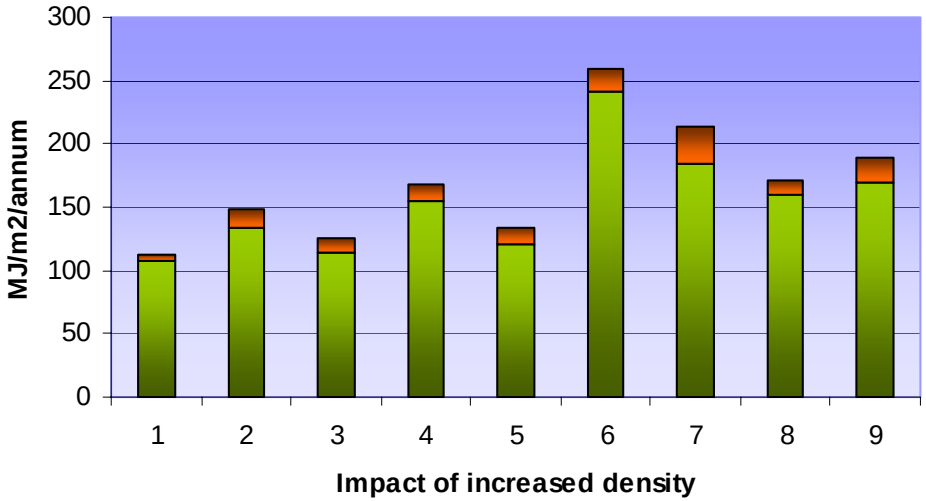
# impact of increasing urban densities




Source: Author photograph, April 2004

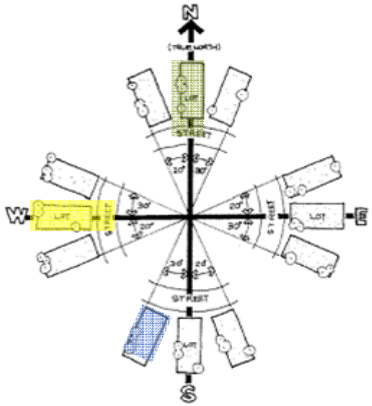
# impact of increasing urban densities

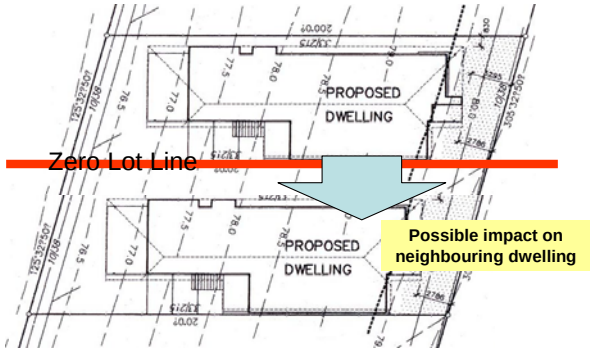


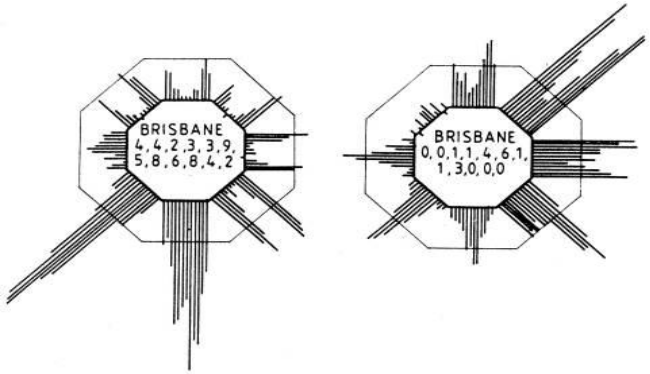




- ☑ this project quantified the impact of increasing suburban densities on dwelling energy efficiency
- ☒ the impact of increasing the external shielding is similar to the impact of altering the orientation alone
- ☒ increasing urban densities has the same potential to increase dwelling energy use as poor lot orientation

# focusing on the lot



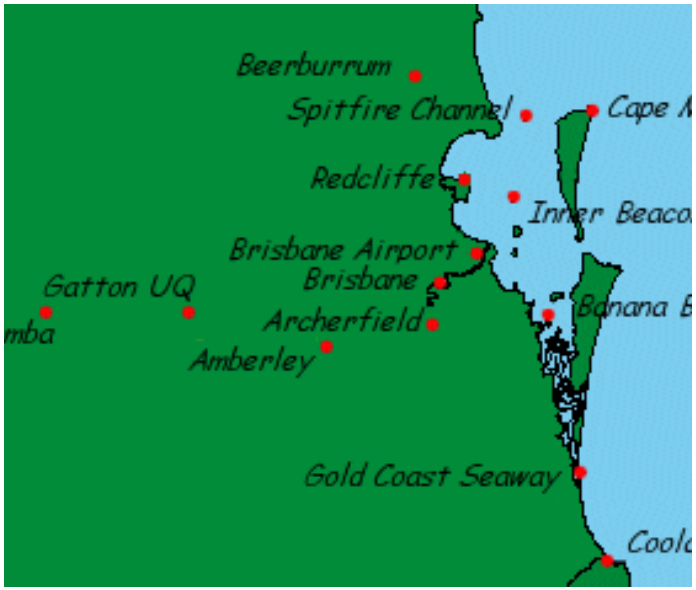

- SEDA methodology assessed for appropriateness for SEQ
- larger lot sizes could meet guidelines
- smaller lots generally could not
- ventilation and shading are important issues in SEQ, but not measured by methodology

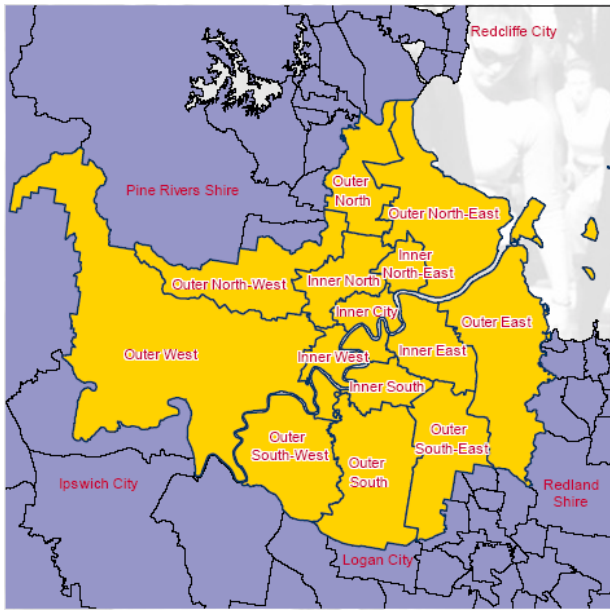
# is there a solution?

# sustainable subdivisions: ventilation

- ☑ verify and quantify the role of ventilation
- ☑ develop an enhanced lot rating methodology
- ☑ designers to orient for solar protection and ventilation
- ☑ inform the development of sub tropical thermal tools
- ☑ consider the impact of increasing urban densities

# verify and quantify ventilation



# …sub tropical lot rating methodology