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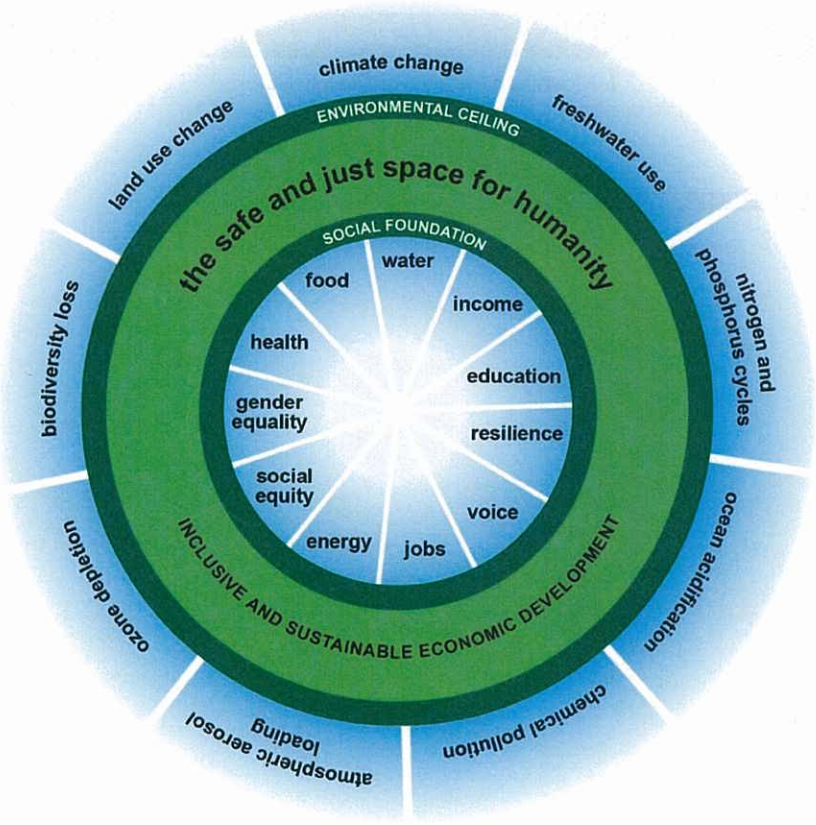

ESD Report

24 Brookes Street

Bowen Hills

BlueSky
Alternative Thinking

Document Details

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General Introduction

BlueSky Developments propose to purchase 24 Brookes Street, Bowen Hills to develop a multi-unit residential project. The land is within the former ULDA, now EDQ, Bowen Hills PDA and as a result has specific requirements for development. A pre existing DA for the development of 23 units is in place, however BlueSky wish to modify and upgrade this approval. To make the project viable BlueSky believe that the density needs to be increased. The updated proposal, if successful, would see the number of residential units increase to 36 which, subject to valuation, makes the project viable.

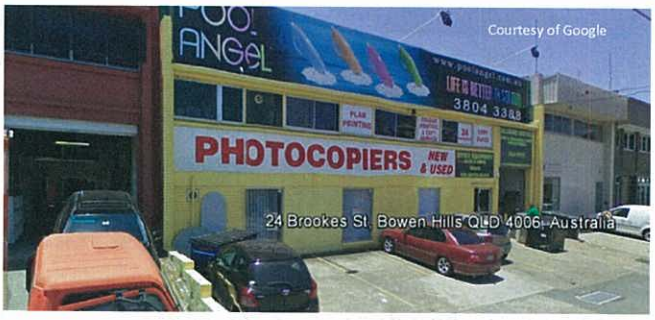
BlueSky and their architect have had some initial discussions with EDQ to determine if this increase in density would be considered appropriate and under what circumstance the increase may be approved under the planning instrument for the Bowen Hills PDA.

The Bowen Hills PDA can accommodate options outside of the planned baselines through Superior Design Outcomes (SDO's), provided there is a credible and realisable benefit to the community. Affordability, accessibility and sustainability must be addressed and it needs to be demonstrated that a proposed design solution goes above and beyond standard practice.

> Establishment of a close working relationship with tertiary institutions and private industry to identify projects demonstrating superior design outcomes to be instituted in the UDA.
>
> Bowen Hills Urban Development Area Development Scheme
> Effective 3 July 2009

It was agreed at the meeting that the affordability and accessibility can be achieved through the existing design. To increase the overall benefit it was suggested that a high level of sustainability should be included to work in conjunction with the other two deliverables. BlueSky engaged Ecolateral Pty Ltd, a sustainability consultancy, to work with the architects to provide a high level of sustainability consistent with the Superior Design Outcomes. This report is the culmination of that work and sets down the sustainability initiatives proposed to be undertaken on this development.

Challenges of the Site



The site is presently occupied by a one and a half storey warehouse common to this area of Bowen Hills. Integrated and attached to the adjoining buildings through common walls, the proposed building has challenges around site size and access. The removal of the existing building will mean the first floor of the new building will have the existing wall of the adjoining property addressing its eastern boundary. This has been considered and a solution offered in the following table of initiatives.

The demolition material from the existing building will be reused and recycled wherever possible and all care will be taken to retain and reuse appropriate materials on site. Notwithstanding the restrictions of this infill site, the design has achieved a high level of amenity and provides a good mix

of one and two bedroom units around a central spine. The common areas have been kept to a minimum to maximise the usable space and the corridor to all floors is naturally ventilated to reduce air conditioning loads and introduce natural light. The provision of a dedicated shop space, the reduction of car parking, proximity to public transport and the inclusion of bicycle storage means that trip frequency by motorised transport should be reduced.

Initiatives

To date, the Australian approach to addressing climate change has primarily centred on a mitigation strategy aimed at the reduction of greenhouse gas emissions. Central to this approach is containing the operational emissions of the built environment, in particular the residential sector, which accounts for 9% of Australian total annual emissions[1].

Past and present Governments agree a reduction in greenhouse gas emissions of 5% on the 2000 level by 2020 is a realistic target. However with the target date just seven years away some scepticism is setting in about our ability to meet this reduction. The current prediction for global temperature increase is in the range of 3.5 - 4 degrees by 2050-2070, significantly beyond the 2 degrees necessary to sustain our present planetary conditions. While this should not distract us from our mitigation efforts, the time is rapidly approaching when we must accept that change is inevitable and we need to consider how we will need to adapt to deal with the impacts of rising temperatures and the subsequent adverse climatic conditions. The inclusion of adaptation as a strategy, running concurrently with sustainability, would seem a logical step forward. Proactive adaption to change will serve us well and provide us with a more resilient future. This is an important consideration when planning their suitability for future conditions for all forms of homes.

When considering the ***resilience*** of a new home or home unit complex we can reference three essential areas: ***sustainability, endurance and adaptability.***

These three features are demonstrated by:

- sustainability of the design through its low environmental impact and suitability of use;
- endurance in the face of weather and climatic changes, utility supply inconsistencies and changing economic circumstances; and
- adaptability reflected by the buildings ability to be multifunctional, changing form and function over time to meet the demands of the occupants.

The delivery of a building with these qualities means the expected 50 year life of the building can be realised and the return on investment maximised. These considerations have informed the general approach to the proposed initiatives below. There is a balance between the initiatives environmental benefit and the cost impact of the asset. This report addresses the sustainability aspects of the proposed building but not without consideration to the other elements of adaptability and endurance. The initiatives are set out in a tabular format for ease of reading.

[1] http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/1301.0Chapter2082009%E2%80%9310

#	Location	Initiatives	Action	Impact
1	Ground floor	Provide small cars spaces and motor cycle spaces	Provide 3 small car spaces and two motor cycle spaces	Promote fuel efficient vehicles and reduce transport costs
2	Ground floor	Hot water system/cooking	Centralised gas hot water system and reticulated gas cook tops and ovens	Reduced energy use , lower carbon foot print and increased space in the units
3	Level 1	Green wall	Provide planters and climbing trellis to adjoining wall to units 4-7 complete with starter plants in place.	Provide relief to adjoining wall and a calming backdrop to the units main entertaining area.
4	Level 1/2/3	Cross ventilation to units	Provide louvered fan lights above entry door to each unit.	Greater air movement through the units and a subsequent lower of internal temperatures in Summer.
5	Level 1/2/3	Air Change and dilution	Provide min 1200 mm sweep ceiling fan to bedrooms and to the living room.	Physiological cooling from air movement. Increased impact of air condition when run in conjunction with the fan.
6	Level 1/2/3	Increase natural light penetration into units.	Provide light coloured floors walls and ceilings to increase light penetration into the homes	Lower energy use by artificial light. Increased amenity and positive ambience in the unit
7	Level 1/2/3	Light to common areas hall ways	Promote light and air penetration through the northern and southern walls of the lift corridor	Natural air and light providing a safer and more amenable environment at each floor
8	Level 4	Planting on podium	Provide large planter boxes to the podium of each unit to encourage citrus growth. Include one patented colorbonded vegetable box to each unit to encourage the growth of vegetables	Activated and shaded podium levels with strong indoor outdoor connectivity. Encourages the occupants
9	Level 4-8	Cross ventilation to units	Subject to Certifiers confirmation provide louvered fan lights above entry door to each unit.	Greater air movement through the units and a subsequent lower of internal temperatures in Summer.
10	Level 4-8	Air Change and dilution	Provide min 1200 mm sweep ceiling fan to bedrooms and to the living room.	Physiological cooling from air movement. Increased impact of air condition when run in conjunction with the fan
11	Level 4-8	Increase natural light penetration into units	Provide light coloured floors walls and ceilings to increase light penetration into the homes	Lower energy use by artificial light. Increased amenity and positive ambience in the unit

12	Level 4-8	Light to common areas hall ways	Promote light and air penetration through the northern and southern walls of the lift corridor	Natural air and light providing a safer and more amenable environment at each floor
13	General	Builders Users Guide (BUG)	Create a BUG for the units which include basic use information for each unit including an education pack on the most efficient appliances and their use.	
14	General	Waste Management	Each unit will be supplied with a dual bin system in the kitchen for separation of waste at source.	
15	General	Meters	Provide separate Water meter per unit, gas meter per unit, energy sub meter per unit	
16	General	Light optimisation	Ensure lighting in kitchen is designed to maintain a minimum of 300 lux at 900mm at kitchen bench for safe food preparation	
17	General	Air quality	Ensure all paints, furniture and carpets have low TVOC in accordance with appropriate standards.	
18	General	Air Quality	Ensure all internal cabinetry uses E0 board. (typically Laminex.)	
19	General	Energy	Provide a kill switch to each unit at main point of exit that turns off all lights, air conditioning and heating.	
20	General	Water efficient fittings	All water fittings within the units meet the highest available WELS ratings	
21	General	Concrete	Concrete should have the following minimum fly ash content 30% in situ 20% precast 15% stressed	
22	General	Steel	Steel should be sourced from an accredited responsible manufacturer.	
23	General	Emissions	Refrigerant in AC units should have an ODP of zero	
24	General	Light Pollution	Lighting on the outside of the building should be positioned so it does not spill onto the adjoining buildings except to the extent set down in AS4282	

25	Air Conditioning units	Peak Demand Reduction	Provide peak smart air conditioners to reduce energy demand during peak periods	
26	Water storage	Make provision for water harvesting	Provide 10kl water tank to roof for irrigation of roof gardens.	Opportunity to establish an edible garden on the roof for general use.

Harvested water storage on the roof was considered for toilet flushing however there is insufficient roof area to keep a reservoir. The restrictions of the site do not allow any additional collection or storage.

Energy Optimisation.

Operational energy demand presents the greatest challenge for an expanding SEQ housing sector into the future. Government forecast have determined that appliances alone, will account for 36% of energy demand in the average home by 2020. AC loads are being brought under control following the introduction of mandatory modelling in 2003, however it must be remembered that AC loads represent approx 20%- 25 % of the annual household load in Queensland. The challenge therefore is to contain the remaining 75-80% of energy demand represented by appliances, water heating, lighting, pool filtration etc. This will also help to control energy costs and indirectly affordability.

A breakdown of this demand clearly shows two main contributing factors. Firstly the number of appliance that the clients include in their home and secondly the manner in which they use them.

The average Australian home in the 1960s had 5 electrical items. Today the average home has 63 electrical items and the associated energy demand has put significant pressure on the infrastructure. Controlling the number of items in a home is difficult to say the least, but influencing residents purchase choices to encourage efficient models is significantly more achievable. If residents have the opportunity to understand the short and long term financial and environmental benefits when make a choice, buying patterns can change in favour of appliances that have a lower demand profile.

The second part of the challenge is the residents use patterns. Eradicating poor practices and developing a culture of conservation can only be achieved through education. Residents have to change their habits and understand for instance that leaving fridge doors open for 10 minutes while they make a decision on what to have comes at a cost. People's habits will change over time but only with stewardship and direction. The impact of energy cost increases will only have a short term impact as the recency effect means people soon recalibrate the household budget to account for the higher costs. However the combined impact of interest rates, water charges increases and a selection of other household budgetary impacts has focused people one the forecast energy increases of up to 21% over the next 2-3 years and has promoted a positive mindset toward conservation and energy use containment.

It is proposed to manage the energy use of these units under two key initiatives. Achieve an optimum level of energy use for AC demand and educate the occupants on what efficient appliances to buy and how to use them in a way that will reduce energy bills significant and rationalise the demand on the grid.

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Star Ratings of Units.

Under the QDC MP 4.1, class 2 buildings are required to achieve a 5 star average rating across the development, with no unit achieving less than 4 stars. As was discussed above the air conditioning and heating loads generally represent about 25% of the total energy consumed by dwellings. So increasing the star rating beyond a set point will result in diminishing returns for energy demand management. The quest to increase the building envelopes performance grows increasingly more expensive while the return in energy efficiency decreases. Ecolateral believe that a 7 star average across all of the units represents a high performance level and any further star increases could be counterproductive from an affordability perspective. The following table sets out the performance level of each unit and notes its heating and cooling loads. The higher the load the more energy will be required to retain the internal temperature in the comfort zone.

Unit	Run	Cooling Load (MJ/m2)	Heating Load (MJ/m2)	Total Load (MJ/m2)	Star Rating
Level 1					
Unit 1	4	36.0	6.0	42.0	6.0
Unit 2	4	40.3	7.7	48.1	5.0
Unit 3	4	26.0	5.3	31.3	7.0
Unit 4	4	22.3	8.4	30.7	7.0
Unit 5	4	10.2	12.0	22.2	8.0
Unit 6	4	10.6	12.0	22.6	8.0
Unit 7	4	9.7	16.3	26.0	7.5
Level 2					
Unit 8	3	38.5	5.1	43.5	5.5
Unit 9	3	33.1	4.8	37.9	6.5
Unit 10	3	27.9	2.7	30.5	7.0
Unit 11	3	14.0	10.9	24.9	8.0
Unit 12	3	14.2	4.7	18.8	8.5
Unit 13	3	20.2	9.3	29.5	7.5
Unit 14	3	25.6	1.6	27.2	7.5
Level 3					
Unit 15	2	39.6	24.9	64.6	4.0
Unit 16	2	29.4	6.1	35.5	6.5
Unit 17	2	29.8	9.8	39.6	6.0
Unit 18	2	19.7	41.3	61.0	4.5
Unit 19	2	14.2	4.7	18.8	8.5
Unit 20	2	18.7	14.6	33.3	7.0
Unit 21	2	15.2	43.7	58.8	4.5
Level 4					
Unit 22	3	20.9	9.3	30.3	7.0
Unit 23	3	12.8	3.5	16.3	9.0
Unit 24	3	37.2	1.7	38.9	6.0
Level 5					
Unit 25	2	20.8	9.6	30.4	7.0

Unit 26	2	13.0	1.5	14.4	9.0
Unit 27	2	32.0	2.0	33.9	7.0
Level 6					
Unit 28	2	20.6	9.8	30.5	7.0
Unit 29	2	12.8	1.5	14.3	9.0
Unit 30	2	31.8	2.1	33.9	7.0
Level 7					
Unit 31	2	20.6	9.9	30.5	7.0
Unit 32	2	12.8	1.5	14.3	9.0
Unit 33	2	31.7	2.1	33.8	7.0
Level 8					
Unit 34	2	21.0	18.5	39.5	6.0
Unit 35	2	14.3	6.2	20.5	8.5
Unit 36	2	19.0	12.4	31.4	7.0
Average		22.7	9.5	32.2	7.0

To draw some meaningful outcomes from this data it is necessary to make some assumptions.

- Combined heat and cooling energy is assumed to be used evenly throughout the floor area.
- The mega joules per sq meter per annum are assumed to be the maximum used within that rating band (5 star 71 mj/sqm/a and 7 stars 14.3 mj/sqm/a).
- The average internal floor plan size across all 36 units is 60 sq m
- Highest and lowest stars achieved are applied to the unit size achieving that star rating
- AC efficiencies has not been factored in

Under these assumptions the following conclusions can be drawn.

Highest versus lowest rated units

Unit number	Star rating	Size sq m internally	Forecast Heating and cooling loads per annum	Operational cost @ $0.25 per kWh per year	End use Carbon generation at .86 kg = 1 kWh
32	9	74	14.3	$ 74	252 kg/annum
15	4	65	64.6	$ 291	1,003 kg/annum
Improvement				75%	75%

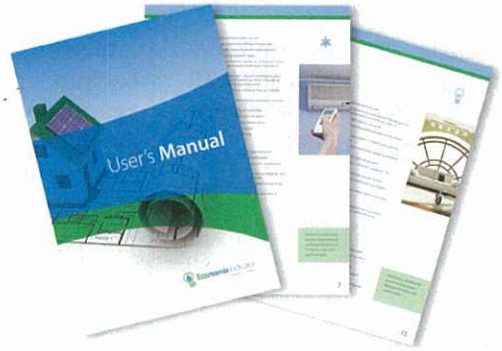
Mandatory average Star rating versus Delivered average star rating

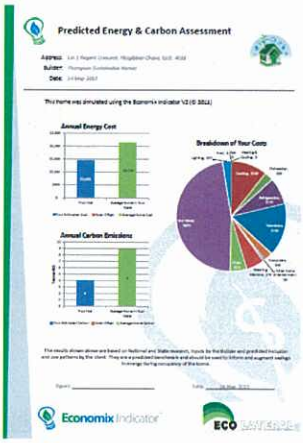
Star rating	Average size sq m internally	Forecast heating and cooling loads Mj/sqm/ per annum	Operational cost @ $0.25 per kWh per year	End use Carbon generation at .86 kg = 1 kWh
5 (mandatory)	60	71	$ 296	1018 kg/annum
7 (achieved)	60	34	$ 141	487 kg/annum
Improvement	Na	Na	53%	53%

Operational Energy

With the heating and cooling load controlled by the building envelope, attention must be paid to the remaining 75% of the energy consumed by the average South East Queensland home. This energy is a combination of lighting, water heating and the array of electrical appliances that most homes have these days. Getting control of this energy proves significantly more difficult as it is influenced by the occupant's choice of appliances and fittings and their use of those appliances and fittings once installed in the home. The returns from efficiently using an inefficient appliance is limited when compared to an efficient use of an efficient appliance. Successive Governments have introduce a myriad of rating schemes including Star Ratings, MEPS, Coefficient of performance measures, energy efficiency ratings etc. While these measures offer a wealth of information, most consumers find them confusing and in the absence of clarity, tend to make decisions based on appearance and price.

To provide a high level of appreciation of what to purchase and how to operate appliances and fittings, Ecolateral suggest each unit be provided with a pack for the occupants that delivers two essential services. Firstly, a Building Users Guide (BUG) that will provide basic information for the occupant on the environmental features of the complex and locality. Secondly, this BUG will form part of the operational procedure for the unit and will be coupled to a program called Economix Indicator (EI). The EI will model the unit based on the most appropriate appliances and use patterns and allow the occupants to appreciate that the unit can save significant amounts of energy and money if operated efficiently. The EI will include a User's Guide developed especially to cater for appliance and fittings used within the units. It is expected that a number of these units may be sold for corporate letting which, if they are efficient in operation, will make them significantly more attractive to investors. Set out below is a sample of some of the documents produced for the Economix Indicator.





Together, these initiatives can see the operational energy of the units and the building as a whole reduced significantly. Up to 50% may be achievable over time. These measures when coupled with the other initiatives such as good indoor air quality will result in a building that provides a significant return on investment both financial and environmental, for the occupants, owners and society.