APPENDIX A
CASE STUDIES

This appendix is incomplete. It is provided in an incomplete form because the sustainable developers listed in it, ASA and Michael Mobbs and Patterson Britton have not had the time or resources to complete it. The information that is missing is important and resources need to be found from government and the private sector to provide it. Governments and the community need clear, simple factual and complete data about sustainable development as it's the only viable option for sustaining Australia's scarce land and water resources, and for reducing climate change.

We provide this appendix in its incomplete form because there is valuable information in it and the gaps, having been identified, can be filled in by others in the next year or so during which we anticipate this research will be completed by the three universities with which we have agreed this research needs to be done.

The analysis of the data presented in the report has, however, been completed and the results are in the report. There are some anomalies in some of the data which require closer scrutiny during later reviews and testing of the data but they are minor and do not affect the analysis. It's important to remember that most of these projects have been operating for less than five years and none more than ten years

The authors of this report accept responsibility for the facts and details presented in these case studies. The authors have issued surveys to the developers and taken the answers of the owners, as well as other publicly available information, to create the case studies. In doing so the authors accept that there may be unintentional errors and if there are any such errors the authors will revise the case studies in further revisions of this report which are expected to be made by the universities with which the ASA has an understanding to conduct ongoing research into these projects.

1.1 RESIDENTIAL (SINGLE DWELLING)

1.1.1 Campbell - Turramurra, Sydney

Project Name: The Campbell House
Location: Turramurra, NSW
Sustainable design: Michael Mobbs
Completion Date: March 2006
Project size: Site: 796m^2;
Project description: Two-storey house with sustainable water, sewage and passive ventilation systems.
Site costs: Site acquisition costs: $1.2m
Construction costs: $520k

Sustainable Design features:

- Rainwater tank – 20,000l concrete tank under driveway
  - Rainwater provides all potable water needs
- On-site wastewater treatment
  - Recycled wastewater provides water for flushing toilets, laundry, and garden.
- Passive solar design
- Productive garden

Lessons learned:

- Testing of systems for one year before commissioning has associated expenses, and the recycled water is not utilised. In this time all their water needs were met by rainwater.

Owners	Campbell
Number of People	4
Potable (Rain) Water consumption (L/day)	228
Per Capita Potable (Rain) Water consumption (L/day)	57
Recycled water consumption (L/day)	220
Per Capita Recycled water consumption (L/day)	55
Mains consumption (L/day)	0
Per Capita Mains consumption (L/day)	0
Total Water Consumption (L/day)	448
Per Capita Total Water Consumption (L/day)	112
Water treated (L/day)	296
Water treated (L/year)	107,923
Water taken from dam (L/year)	0
Water left in dam (L/year)	163,520
Untreated Water discharged to ocean (L/year)	0

1.1.2 Shields - Fairlight, Sydney

Project Name: The Shields House
Location: Fairlight, NSW
Completion Date: 2000
Project size: Site: 410m^2; House: 158m^2
Project description: Single-storey house with sustainable water, sewage and photovoltaic systems.
Site costs: Site acquisition costs: $348,000 (1996)
Construction costs: $135,000

Sustainable Design features:

- Water for drinking, showers, basins and kitchen supplied from rainwater tanks
  - 17,000l
- All wastewater treated on site in under-deck system.

  - Dowmus Aqua Claris installed in 2000 at $17,800
  - Recycled water used to flush toilets and in garden.
  - No maintenance expense
- Photovoltaic Energy System
  - Installed 2003 for $24,000
  - Average production of 5.35kWh per day (around one third of house electricity requirements).
- Food production in permaculture garden. 90m^2
  - Fruit trees
  - 3 Chickens
  - Vegetables

Lessons learned:

- Tilting of PV panels would give better efficiency
- Still paying fixed charges for water and sewage even though not utilising those services

Owners	Shields
Number of People	2
Potable (Rain) Water consumption (L/day)	155
Per Capita Potable (Rain) Water consumption (L/day)	78
Recycled water consumption (L/day)	104
Per Capita Recycled water consumption (L/day)	52
Mains consumption (L/day)	0
Per Capita Mains consumption (L/day)	0
Total Water Consumption (L/day)	259
Per Capita Total Water Consumption (L/day)	130
Water treated (L/day)	277
Water treated (L/year)	101,105
Water taken from dam (L/year)	0
Water left in dam (L/year)	94,535
Untreated Water discharged to ocean (L/year)	0

1.1.3 Fuller - Concord, Sydney

Project Name: The Fuller House
Location: Concord, NSW
Sustainable design: Michael Mobbs
Completion Date: 2006
Project size: Site: 556m^2; House: 188m^2
Project description: Single-storey house renovated with sustainable water, sewage and passive ventilation systems.
Site costs: Site acquisition costs: $327,000 (1996)
Construction costs: $260,000 (includes all sustainable features and house modifications)

Sustainable Design features:

- On-site wastewater treatment
  - Custom-Everhard system installed July 2005 for $15,000
  - Disconnected from mains sewage
  - Recycled water used for laundry, toilets and garden.
- Rainwater tanks
  - Disconnected from mains water
  - Used for drinking, showers
  - Installed July 2004 for $4,500
- Passive solar design

Lessons learned:

- Difficulty in dealing with NSW Health and council. Many conditions imposed, including a year of testing before being allowed to use recycled water in the house.
- Expense of testing the systems
- Some minor difficulties experienced with priming of pumps

	Owners
	Fuller
Number of People	4
Potable (Rain) Water consumption (L/day)	176
Per Capita Potable (Rain) Water consumption (L/day)	44
Recycled water consumption (L/day)	133
Per Capita Recycled water consumption (L/day)	33
Mains consumption (L/day)	0

Per Capita Mains consumption (L/day)	0
Total Water Consumption (L/day)	309
Per Capita Total Water Consumption (L/day)	94
Water treated (L/day)	422
Water treated (L/year)	154,030
Water taken from dam (L/year)	0
Water left in dam (L/year)	112,785
Untreated Water discharged to ocean (L/year)	0

1.1.4 Mobbs - Chippendale, Sydney

www.sustainablehouse.com.au

Project Name: The Mobbs House
Location: Chippendale, NSW
Sustainable design: Michael Mobbs
Completion Date: 1996
Project size: Site: 150m^2;
Project description: Three-storey townhouse with sustainable water, sewage and photovoltaic systems.
Site costs: Site acquisition costs: $23,500 in 1978
Construction costs: Kitchen and bathroom renovation total cost of $165,000 of which $48,000 was for the sustainable systems

Sustainable Design features:

- On-site wastewater treatment (disconnected from mains sewage)
- Rainwater collection (disconnected from mains water)
- Photovoltaic energy system
- Solar hot water

Lessons learned:

- Challenges to get energy, water and wastewater treatment system approved.
- Challenges to have systems designed so any tradesperson could build and maintain it and any person could live there normally.

Owners	Mobbs
Number of People	4
Potable (Rain) Water consumption (L/day)	233
Per Capita Potable (Rain) Water consumption (L/day)	58
Recycled water consumption (L/day)	384
Per Capita Recycled water consumption (L/day)	96
Mains consumption (L/day)	0
Per Capita Mains consumption (L/day)	0
Total Water Consumption (L/day)	658
Per Capita Total Water Consumption (L/day)	164
Water treated (L/day)	434
Water treated (L/year)	158,400
Water taken from dam (L/year)	0
Water left in dam (L/year)	225,000
Untreated Water discharged to ocean (L/year)	0

1.1.5 Coleby-Williams & Poole – Brisbane, QLD

http://web.mac.com/bellis_brisbane/iWeb/Bellis/home.html

Project Name: Bellis (Jerry Coleby-Williams & Jeff Poole)
Location: Wynnum, QLD
Sustainable design: Michael Mobbs
Completion Date: 2005
Project size: Site: 810m^2; House: 150m^2
Project description: Single-storey house with sustainable water, sewage and photovoltaic systems.
Site costs: Site acquisition costs: $400,000 (2003)
Construction costs: $37,000

Sustainable Design features:

- Photovoltaic energy systems
  - Pacific Solar Plug & Power - $11,800 less $3,600 rebate
  - Half of electricity needs met in summer, one third in winter.

- Rainwater tanks
  - 21,000l in-ground concrete tank costing $8,400
  - Water used for washing, drinking and gardening
- Wastewater treatment
  - Aqua Nova installed for $16,700
  - Recycled water used for flushing toilets and in garden
  - On average 242l wastewater treated every day.
  - Still paying fixed charges for sewage
- Productive garden
  - Approximately 450m^2 provides 90% of food for around four people
  - 43 crops.
- Energy conservation
  - External blinds
  - Energy efficient appliances
  - Warm clothes instead of heaters

Lessons learned:

- Some teething problems with the wastewater treatment system
- Very low rainfall in Brisbane and a large demand from the garden has meant that mains water is still required (average of 255l/day). If doing it again would increase the water storage from 20,000l to 30,000l.

1.1.6 Turmeric Gardens – Sunshine Coast, QLD

Project Name: Turmeric Gardens
Location: Palmwoods, (Maroochy Shire, Sunshine Coast), QLD
Developer: Shelley Bennetts and Peter
Completion Date: 2001
Project size: Site: 60,750 m^2
Floorspace area : 1,000m^2 (three dwellings and sheds)
Project description: Family residence, Bed and Breakfast establishment and a viable, organic spice farm and craft business.
Site costs: Site acquisition costs: $150,000
Construction costs: Family residence: $100,000

Sustainable Design features:

- **Water** for all household and guest's use is sourced from concrete and aqua plated zinc alum tanks.
- **Composting toilets** are used in the main residence and the two guest cottages.
- **Dam water and filtered grey water** is used for farming purposes.
- **Hot water** for all dwellings is generated by solar hot water systems.
- Approximately 5% of the family's food is produced on site.

- The spices produced on site include turmeric, galangal, ginger and finger limes. This produce is organically grown and supplied to local producers of cookery goods, restaurants and markets. Guests are also welcome to sample the produce.
- All dwellings employ **passive solar and ventilation design** and no air conditioning is used.
- **Recycled** hardwood and other materials were used in all the dwellings at Turmeric Gardens. The first cottage built comprises of 95% recycled material. The family residence comprises of 50% recycled materials – mainly hardwood and zinc alum.

- The property is registered with **Land for Wildlife Program**, which Green Australia (Queensland) initiative aimed at maintaining and rehabilitating remnant forest for wildlife.
- In the first cottage, all electricity was supplied by photovoltaic cells however they switched to grid power as it was not cost effective to purchase a generator that would provide a reliable source of power
- **Hot water** is generated using a solar hot water system.
- **Non-toxic furnishings and interior paints** were used.
- All **cleaning products** used **and personal hygiene goods us**ed and supplied to guests are non-toxic and mostly organic.

1.1.7 Cassells – Highgate Hill, QLD

Project Name:	Joan and Richard Cassells
Location:	Highgate Hill, Brisbane
Developer:	Joan and Richard Cassells
Completion Date:	May 2001
Project size:	Site: 800m^2 Floorspace area: 285 m^2
Project description:	Two-storey, three bedroom house that was purpose built as a residence and bed and breakfast establishment.
Site costs:	Site acquisition costs: $200,000 (2001)
Construction costs:	$450,000

Sustainable Design features:

- **Water** for the laundry, toilet and garden are supplied by rain water which is captured in two 6000L and one 5000L water tanks.
- **Sewage treatment** and **Greywater reuse** was (and is still) not permitted by Brisbane City Council.
- Passive **ventilation** reduces the need for temperature control systems - A light, open design lets air and light flow freely through the building which negates the need for air conditioning.
- The **garden** has been planted with native vegetation which attracts and shelters birds and other native animals. The garden also forms part of a gully which has been rehabilitated with the Cassells' garden and surrounding land owners.
- Photovoltaic cells were installed on the roof in 2001 at a cost of $20,000 (rebate of $4000 received). The **energy** generated is supplied to the power grid and all electrical appliances and lighting is powered by the grid. When there are two occupants in the house they sometimes generate as much energy as they need, however most often they consume more electricity than what they produce.

- The installed energy and water efficient appliances (lighting, dishwasher, washing machine and refrigerator).
- **Hot water** is generated using a solar hot water system.
- **Non-toxic furnishings and interior paints** were used including sisal carpets and Rockcote paints.

Lessons learned:

- Social sustainability
  - Houses designed such that they can be lived in through old age

1.1.8 Abrahams – Dutton Park, QLD

Project Name:	Helen Abrahams and Dick Copeman
Location:	Highgate Hill, Brisbane, Queensland
Developer:	Renovated Queenslander
Completion Date:	2005
Project size:	Site: 400m^2 Floorspace area : 120m^2 (three dwellings and sheds)
Project description:	Renovated/retrofitted Queenslander
Site costs:	Site acquisition costs: $570,000
Construction costs:	$12,000

Sustainable Design features:

- **Grey water** is collected from the kitchen and laundry and used to water trees.
- **Rain water** is collected from approximately 80m^2 of roof. This water is used for drinking, garden watering and some laundry. The water was tested by Brisbane City Council and was verified as suitable for domestic use.
- **New building works** to improve the solar passive qualities of the house involved the construction of a covered deck adjacent to the kitchen/informal dining area. New folding doors with windows were installed to join these areas to the deck and can be opened to allow breezes to cool the house during summer.
- A **permaculture garden** has been constructed around the house and supplies around 15% of their food intake.

1.1.9 Miller – Corinda, QLD

Project Name: Ray & Wendy Miller's House
Location: Corinda, QLD
Project size: Site: 564m^2; House: 152m^2
Project description: Two-storey house with sustainable photovoltaic systems, rainwater tanks and other features.
Site costs: Site acquisition costs: $81,000 (1986)

Sustainable Motivation:
Personal belief in moral responsibility; reduce running costs of house and increase household independence as a plan towards retirement.

Sustainable Design features:

- Photovoltaic energy system
  - Eighteen Solarex 85 Watt polycrystalline panels installed 20000, providing average of 6kWh per day.
  - 120% of current electrical demands met
- Solar hot water
  - Edwards solar 300L
- Energy efficient appliances
- Rainwater tank
  - 4,000l galvanized iron tank installed 2003 for $2,000
- Water efficiency measures
  - AAA rated fixtures
- Grey water from washing machine used for garden

- Productive garden
  - Approximately 10% of food produced
  - Lettuce; spinach; eggplant, celery, peas, beans, tomatoes, sweet potato, parsley, rosemary
- Fuel efficient vehicle (5l/100km)

Lessons learned:

- Better planning would allow for better solar hot water and photovoltaic systems
- The dwelling needs to be seen as a whole and designed from the ground up using passive and active solar systems. Retro fits are at best a poor compromise. The design stage is where all the major benefits and cost savings are made.

1.1.10 Wooyung Caravan Park – Mid north coast, NSW

Project Name: Wooyung Caravan Park Sustainable Cabin (Kathy & Frank Cherry)
Location: Wooyung, North Coast NSW
Sustainable design: SALA homes
Project description: Two bedroom, single-storey house with sustainable water, sewage and photovoltaic systems, within the caravan park.
Site costs: Site acquisition costs not applicable
Construction costs: $130,000

Sustainable Design features:

- On-site wastewater treatment
  - Process
    - Collection tank
    - Aeration tank
    - Sand filter
    - Storage pit
    - UV disinfection
  - Recycled water used for irrigation and toilets, can potentially be used for three cabins
  -
- Rainwater tanks
  - 11,000l
- Photovoltaic energy system
  - Three 150W panels
- Passive solar design
  - 'Chimney' walls
- Energy efficiency

    - Chimney for refrigerator
    - Gas heating and stove
    - Fluorescent lighting
- Sustainable materials

Lessons learned:

- Leaves and fruit can turn water foul.
- Tanks raised out of ground due to extreme flood.

1.1.11 Sweeney – St Clair, NSW

Project Name: Nevin Sweeney
Location: St Clair NSW
Project size: Site: 500m^2; House: 125m^2
Project description: Single storey house with sustainable water supply and photovoltaic systems.

Sustainable Motivation:
Reduce environmental impact; Reduce reliance of the 'system'; Spend less cash.

Sustainable Design features:

- Photovoltaic energy system
    - Around 10% of electricity needs produced
- Rainwater tanks
    - Rainwater used for laundry and garden
    - Total capacity 10,000l
- Solar hot water (electricity boosted)
- Productive permaculture garden 36m^2
    - 90% of vegetables in peak production time
    - Vegetables, herbs, fruit trees
    - Six chickens
- Energy efficiency
    - Home built solar oven
    - Solar food drier

1.1.12 Lever – Glenhaven, NSW

Project Name: Wayne and Avril Lever
Location: Glenhaven, NSW
Project size: Site: 1150m^2;
Project description: Single-storey house with passive solar design
Site costs: Site acquisition costs: $333,000

Sustainable Motivation:
Have a passionate desire to be sustainable, reduce greenhouse gases & make the world a better environment.

Sustainable Design features:

- Passive solar design
  - The home faces north with 1 metre wide eaves on the north/south sides. No eaves east side & minimal eaves on west (no bedrooms only utilities)
  - Glazing/Windows – Clerestorey double glazed roof windows facing north. All windows on north side are larger than south side windows. No windows east side. Solar tint on western laundry windows
  - Thermal Storage – High level of thermal properties in walls & floors. The home incorporates an internal double brick wall which acts as a heat sink/thermal mass to help store natural heat during winter
  - Natural Ventilation Paths – Effective cross ventilation allows home to cool down during summer. Ceiling fans are located in all rooms & have Pirrella anti-static fan sleeves to prevent dust being dispersed into air
- 30 tube Endless Solar Hot Water system

- Energy efficiency
  - Energy efficient light globes (7 watt- 11 watt) fitted to all internal light fittings
  - Extensive opening/closing Vergola system for sun/shading which closes automatically when it rains
- Water efficiency
  - All internal taps fitted with enviro valves & flow restrictors that reduce water pressure & running costs. Two showers fitted with AAA rated shower heads. Dual flush toilets
  - Raintaps on 2 down pipes that collect water from roof & disperses into pond/gardens
  - Gardens are all low water usage with many natives & deciduous trees

Lessons learned:

- 13 years ago when we went to Council to build our home the plans included underground/above ground water tanks, grey/black water systems & all down pipes to be allowed to flow directly onto the gardens. Unfortunately this was not approved. We are still committed to installing all of the above plus a pv/suncube system on the roof.
- If starting again all products from ground up would be renewable, recyclable, chemically free & sustainable.

1.1.13 Clarke – Elanora Heights, NSW

http://www.greenhouse.gov.au/yourhome/technical/fs72b.htm

Project Name: Dick Clarke
Location: Elanora Heights, NSW
Project size: Site: 900m^2; House: 312m^2
Project description: Single-storey house with sustainable water, sewage and photovoltaic systems.

Sustainable Motivation
Stewardship of the planet

Sustainable Design features:

- Photovoltaic energy
  - BP system installed in 1998 at a cost of $26,00
  - 40% of energy requirements produced
- Solar hot water, gas boosted
- Rainwater tanks
  - 20,000l
  - Rainwater for all drinking, basins, showers etc.
- Greywater from showers, basins, washing machine is used to flush toilets and for irrigation.
- Passive solar design

Lessons learned:

- Some overshadowing of PV panels causes winter drop-off
- Those involved in the project "had to be steered"

1.1.14 Meloy – Bensville, NSW

Project Name: Peter Meloy
Location: Bensville, NSW
Project size: Site: 650m^2; House: 120m^2
Project description: Single-storey house with sustainable water, sewage and photovoltaic systems.
Construction costs: $25,000

Sustainable Motivation

I work in the planning field and am exposed to issues – Realise that governments are not doing enough to address catastrophic climate change – Joined Greens and now show people the practical alternatives that are possible.

Sustainable Design features:

- Photovoltaic energy systems
  - Plug 'n Power (BP solar panels) installed in 2002 for $24,000, less $4,000 federal grant and $4,000 state grant
  - 200% of electricity produced
  - Same payback price for energy as cost to buy (16.8377c/kW)
- Solar hot water
- Partially passive solar design
- Rainwater tanks with total 24,000l capacity to be installed later in 2006, aiming to disconnect from mains water
- Water efficiency
  - AAA fixtures
- Energy efficiency
- 30m^2 of productive garden
  - Tomatoes, beans, herbs, almonds, lemons
  - 5% of food requirements produced in garden

Lessons learned:

- Difficulties with billing by energy supplier
- Would like to build new, purpose built, "sustainable" house

1.1.15 McQuire – West Brunswick, VIC

Project Name: Stuart McQuire
Location: West Brunswick
Project description: Single-storey house with sustainable water and energy systems.

Sustainable Design features:

- Rainwater tanks
  - 20,000l capacity
  - Rainwater used for showers, hot water, laundry & garden
- Greywater treatment
  - Envirowater (mineral & biological filters, then UV treatment) installed for $3,500
  - Recycled water used for flushing toilet and in garden
- Photovoltaic energy system
  - Twenty-four 83W panels installed for $15,000
  - Provides in excess of the power requirements of house.

- Energy efficiency by insulation, fluorescent lighting, gas heating, minimise base-load & power off at night, medium sized fridge; gas cooking
- Solar hot water
- Food production
  - 20 fruit/nut trees

Owners	McQuire
Number of People	4
Potable (Rain) Water consumption (L/day)	194
Per Capita Potable (Rain) Water consumption (L/day)	49
Recycled water consumption (L/day)	112
Per Capita Recycled water consumption (L/day)	28
Mains consumption (L/day)	23
Per Capita Mains consumption (L/day)	6
Total Water Consumption (L/day)	329
Per Capita Total Water Consumption (L/day)	82
Water treated (L/day)	245
Water treated (L/year)	89,425
Water taken from dam (L/year)	8,395
Water left in dam (L/year)	111,690
Untreated Water discharged to ocean (L/year)	30,660

1.1.16 Grimshaw - Blue Mountains, NSW

Project Name: John Grimshaw
Location: Woodford, NSW
Project size: Site: 1532m^2; House: 156m^2
Project description: Single-storey house with sustainable water and sewage systems.
Site costs: Site acquisition costs: $240,000 (1999)

Sustainable Motivation:
Felt it was the responsible path when building a house.

Sustainable Design features:

- Rainwater tanks
  - Colourbond 33,000l
  - Rainwater used for all potable uses
  - Not connected to mains water
- Wastewater treatment
  - Aquaclarus system installed in 2000
  - Recycled water used to flush toilets and for garden
  - Solids used as garden material
  - Not connected to sewer
- Energy conservation
  - Compact fluoro lighting

Lessons learned:

- During early days of the project, water quality was quite variable, with lengthy periods of odour problems. All has been running well now for more then two years.
- At time of purchase, pressure pumps were not variable speed. Looking forward to replacing with newer technology when the pumps require replacement. Fresh water "pump out to storage" pump has been serviced after failure, as has the waste water pressure pump. About $200 worth of work.
- The biggest difference between now and then (when wastewater system installed) is the advance of technology and understanding of local councils. The things that would be done differently now would simply be that I would not need to spend so much time convincing people to allow this project to happen.

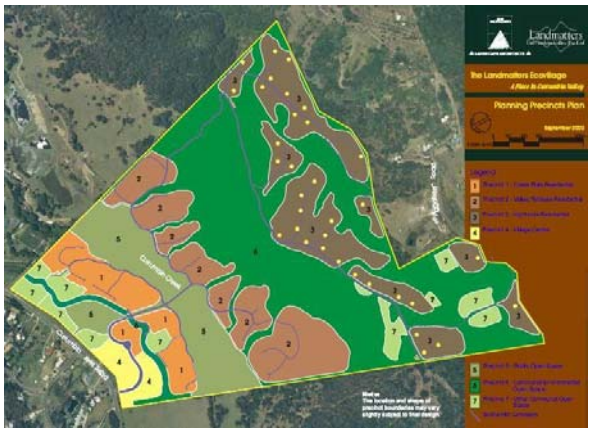
1.2 RESIDENTIAL (MULTIPLE DWELLING)

1.2.1 Ecovillage - Currumbin, QLD

http://www.theecovillage.com.au/

Project Name: The Ecovillage at Currumbin
Location: Currumbin Creek Rd, Currumbin Valley
Developer: Landmatters Currumbin Valley Pty Ltd
Status: Stage 1 under construction
Project size: Site total area: 1,100,000m^2;
Residential lots area: 220,000m^2;
Community Area: 550,000m^2;

Project description: 144 lot subdivision with sustainable water, sewage and photovoltaic systems.



Sustainable Motivation
Inspiring sustainable living/development practice and awareness.

Sustainable Design features:

- Wastewater recycling
  - 2 precincts and village centre will have centralised wastewater treatment and recycling.
  - Bore to supplement recycled water if required
- Rainwater tanks
  - 22,500l (1 bedroom)
  - 33,750l (2 bedroom)
  - 44,500l (3 bedroom)
- Photovoltaic energy
  - All houses to have minimum 1kW
  - 50% of energy requirements expected to be produced on site
- Solar hot water systems (gas boosted)
- Energy conservation
  - Passive solar design
  - Gas cooking & space heating
  - Buildings to have minimum 5 star energy rating
- Food production
  - Food producing street scaping and landscaping
  - 2 acres rice
  - Small scale aquaculture
  - Market gardens

- Ecovision – integrated monitoring & control system to monitor energy, photovoltaics, gas and water consumption

Lessons learned:

- Workshops and working with the community (and listening to them) has been essential, as well as making council partners.
- Get to know the area of land then develop around what suits it best.
- Sustainability consulting still a developing field
- Trust your own judgement, and keep questioning consultants

1.2.2 Jarlanbah (Robyn Frances) - Nimbin, NSW

Project Name: Jarlanbah
Location: Neem Rd, Nimbin
Status: 36 currently occupied
Project size: Site total area: 220,000m^2;
Average lot area: 2,000m^2;
Project description: 43 lot subdivision with each dwelling being sustainable for water and wastewater, and various other sustainable features.

Sustainable Design features:

- By-laws ensure each house is sustainable. Guidelines relating to
  - Landscaping
    - Productive permaculture gardens
  - Building
    - Passive solar design
    - Energy efficiency
- Water self sufficiency
  - Each house has minimum 45,000l rainwater tank
- No black-water produced – Most houses have composting toilets
- Energy efficiency
  - Supply to each house is 20amp (single phase), thereby restricting the amount of power that can be drawn.
- Most houses have productive gardens
- Woodlots, re-forestation, sustainable agriculture are all allocated on subdivision

Lessons learned:

- The community centre needs to be completed before any other houses are built.

1.2.3 The Green – Logan, QLD

http://www.thegreen.com.au/

Project Name: The Green
Location: Logan, QLD
Status: Ongoing redevelopment. 12 sustainable homes have been completed.
Project size: Site total area: 33,300m^2;
Community area: 4,000m^2;
Park area: 6,000m^2;
Average lot area: 250m^2;
Project description: 40 lot caravan park converted to sustainable retirement village with sustainable water, sewage and photovoltaic systems. Further 40 lots proposed.
Site costs: Site acquisition costs: $750,000
Construction costs: $450,000 (pre-development)
$45,000 (authorities)
$100,000 (Infrastructure)

Sustainable Motivation
Desire to 'do the right thing'. We had discovered a cost effective way of doing so. Allowed us to differentiate ourselves from the competition. Where our interests lay.

Sustainable Design features:

- SALA homes
  - Passive solar design: Vented walls, vented fridge, subterranean heating and cooling, complimentary landscaping and shading, colour selection
- Rainwater tanks
  - Individual tanks for each house: 30,000 to 40,000l
  - Used for all purposes within the house (disconnected from mains water supply)
  - Materials: compressed straw, plantation timber, plantation plywood, hoop pine doors and windows, colorbond, steel and timber frames
- Water efficient homes
- 12 houses use 'Plug & Power' photovoltaic energy system ($7,000 less $2,640 rebate)
  - SALA homes consume less energy than the PV system produces
- Centralised wastewater treatment plant – existing 30 year old plant to be upgraded to Biolytix system, with water to be used for irrigation.
- Food production
  - Fruit trees
  - Common vegetable patch
- When all caravans are replaced with SALA homes the site will be self sufficient, and will disconnect from mains water supply.

Lessons learned:

- Initially galvanised rainwater tanks were used, but have switched to poly for durability
- We received no state government help and very little local council support - they hindered the process if anything.
- much slower to develop, time delays impacted on cashflows. Next time around if will be much cheaper and quicker - based on what we have learned
- Planning burden/cost: Time - if you do not fit into one of their boxes, expect delays. Lack of knowledge - we spent a lot of time and money (probably $50K) educating council officers about sustainable practice

1.2.4 Christie Walk – Adelaide, SA

http://www.christiewalk.org.au/

Project Name:	Christie Walk EcoCity Development
Location:	105 Sturt St, Adelaide, SA
Project size:	Site total area: 2,000m^2;
Site costs:	Site acquisition costs: $368,000 (1999)
Project description:	27 lot subdivision. Redevelopment of inner-city site with new buildings & landscaping with sustainable water, sewage and photovoltaic systems. 4 x 3 storey attached townhouses; 6 x apartments (in 3 storey block); 1 x 3 storey detached cottage; 3 x 2 storey detached cottages; 13 x apartments (in 5 storey block).

Sustainable Motivation

To create a community prepared for a world in which climate change is a given and to demonstrate that the solution of 'ecological cities' was attainable in the here and now. It was hoped that a workable model for future development could arise from the project

Sustainable Design features:

- Passive solar design
- Photovoltaic electricity production
- Rainwater harvesting
  - 40,000l capacity
  - Used for flushing toilets and irrigation
- Water efficient fixtures
- Food production
  - All garden areas (700m) have edible plants
- Solar hot water

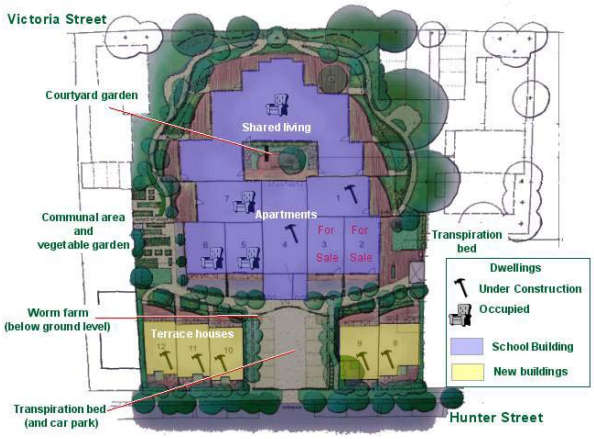
- Energy efficiency
  - Aims to reduce energy demands overall by at least 50%
  - Rated appliances
- Transport
  - No internal traffic
  - Reduced car park provision (11 spaces for 27 dwellings)

Lessons learned:

- Original sewage system used too much energy. New system to be installed at end of 2006 - Biolytix full treatment of sewage with treated effluent irrigating nearby public land square. No direct benefit to CW residents, trialling new cross-sectoral infrastructure arrangements.
- Solar hot water to houses works well, but to 6 Stage 2 apartments uses too much gas back up – inappropriate system design seems likely.
- Earthcrete wall construction was logistical problem. Integrating volunteer input had costs and benefits still difficult to quantify but 'ownership' of project by wider community greatly assisted by volunteer element.
- Most of those engaged in the process would do this again they could although the community now lacks the resources to do any further similar developments. Similar projects could be done on a more commercially viable basis if there were a developer with the wit and imagination to realise the overall benefits.
- Very few financial or other planning burdens imposed by Government

1.2.5 Westwyck - Brunswick West, VIC

http://www.westwyck.com/



Project Name: Westwyck
Location: 44A Hunter St, Brunswick West, VIC

Project description: 12 lot subdivision with sustainable water, sewage and photovoltaic systems.
7 apartments
5 terraced houses

Sustainable Motivation
Aims to create a demonstration ecovillage in an urban location.

Sustainable Design features:

- Photovoltaic electricity production
- Solar hot water (gas boosted)
- Grey water recycling
  - Vermiculture pits & transpiration beds
  - Recycled water used to flush toilets and in garden
- Rainwater tank
  - 5,000l capacity, used for hot water system.
- Water efficiency
  - Covenants requiring flow restrictors, efficient appliances and fittings
- Energy efficiency
  - Energy conserving lighting & appliances
- Productive garden
- Aims to reduce reliance on motor vehicles

1.2.6 George St Apartments – Fitzroy, VIC

Project Name: George St Apartments
Location: 58-62 George St, Fitzroy VIC
Project size: Site total area: 811m^2; Building footprint: 500m^2;
Project description: 11 lot subdivision with sustainable water, sewage and photovoltaic systems.

Site costs: Site acquisition costs: $555,000
Construction costs: $2,994,000

Sustainable Motivation
Commitment to environmental principles. Desire to set an example to developers in the commercial medium density housing market.

Sustainable Design features:

- Rainwater harvesting
  - 50,000 litres plus detention tank. Includes short term detention tank to manage release of overflow to local stormwater system
  - Rainwater used to flush toilets and water garden
- Solar hot water (gas boosted)
- Construction materials
  - Recycled concrete (flyash extender), recycled steel, bricks, recycled timber, plantation timber, tiles, recycled cork flooring, bamboo flooring, low allergy mdf, pvc pipes, cedar and aluminium window frames, mosaic floor from stonemason's offcuts, non-recycled metal roof
- Water and energy efficient appliances

Lessons learned:

- A small reduction in storm water discharge fees was obtained from local council
- Next time, would ensure engineers had environmental expertise to maximise integration of environmental concerns in all aspects of building design. Would ensure ongoing/full time environmental input to building supervision. Would size tank appropriately (the one we built and excavated for was oversized).Would spend less time and money on negotiation, consultation and revision of plans with opponents (some residents and Green Party councillors). Would aim for more cost-efficient architectural design.
- This type of development was found to be financially unviable. Currently pursuing ESD-focussed urban fringes greenfield subdivision
- Very high planning costs associated with prolonged dispute and redesign(s) rendered project financially unviable.
- Exorbitant car parking requirements necessitated large and expensive underground car park. Rigid application of planning rules by (Green Party) council meant we couldn't adjust the design of the solar hot water system to improve performance. Disjuncture between planning and building approval processes within council required expensive redesign. Extraordinarily slow processing of every stage of planning increased costs. Out of the ordinary advertising requirements maximised opposition. Relentless obstructiveness and antagonism on the part of Green Party councillors and local opponents.

1.2.7 Capo Di Monte – North Tambourine, QLD

http://www.capodimonte.com.au/

Project Name:	Capo Di Monte
Location:	27-29 Capo Lane, North Tambourine, QLD
Status:	26 lots developed (18 resided in) our of 46
Project size:	Site total area: 43,000m^2; Residential lots area: 11,767m^2; Food production area: 1,500m^2; Conservation area: 7,000m^2; Community area: 24,144m^2;
Site costs:	Site acquisition costs: $1,250,000
Construction costs:	$300,000 (pre-development consultants) $85,000 (authorities) $1,350,000 (Infrastructure)
Project description:	46 lot subdivision with sustainable water and sewage systems, with passive solar design.

Sustainable Motivation
Having to provide services that are not available through the Council

Sustainable Design features:

- Centralised rainwater harvesting system
  - Rainwater collected from each individual roof and stored in two 200,000l tanks
  - Rainwater used for potable supply (kitchen, bathroom etc)
  - Water collected is pressure media filtered, and UV treated plus sodium hypochlorite
  - Rainwater supply supplemented with bore water (28% of supply)
- Water efficient fixtures and appliances
- Wastewater treatment
  - Aquatec Maxcon membrane bioreactor (MBR) system incorporating mechanically raked screens, anoxic / aerobic zones, chemical phosphorus reduction and Kubota submerged flat sheet membranes. Final disinfection is provided by high-intensity UV disinfection and residual chlorination.
  - Design for 100EP
  - 100,000L storage
  - $934,00 to install, $34,000 annual maintenance
  - Recycled wastewater used for flushing toilets, car washing, landscaping
- Energy efficient
  - Passive solar design
  - Wide soffits
  - Insulated walls and roof space
- Productive garden – 400m2, plus productive landscapes

Lessons learned:

- Next time would include solar power & provide more farming potential
- Council officers are not educated in the required process for this type of development

1.2.8 Aldinga Arts Ecovillage - SA

http://www.aldinga-artsecovillage.com.au/

Project Name: Aldinga Arts Ecovillage
Location: 173 Port Rd, Aldinga SA

Status: Of the 142 Lots (131 residential, 11 comercial), currently there are 25 houses built and occupied

Project size: Site total area: 344,500m^2;
Residential lots area: 160,000m^2;
Food production area: 12,000m^2 attached.

Project description: 142 lot subdivision with sustainable water, sewage and photovoltaic systems.

Sustainable Motivation
"Is there another option?"

Sustainable Design features:

- Generally the subdivision has about 44% set aside for community facilities and open space including orchards vegetation etc. 22000 trees and native shrubs have been planted

- Photovoltaic energy production
    - 100% of energy requirements will be produced on site
- Passive solar design
    - thermal mass, are and have superior insulation plus solar hot water services
- Energy conservation. All houses must have:
    - North facing aspect
    - Superior insulation
    - Thermal mass
    - Natural gas appliances
    - R3 and foil insulation
    - Solar hot water (gas boosted)

- Rainwater tanks
    - In-ground 10,000l capacity
    - Water used for all purposes (mains water used to top up tanks only when necessary)
- Wastewater treatment
    - All wastewater treated on site
- Food production
    - Orchards in open spaces
    - Permaculture principles to be employed
- This is Community Title and therefore has a Scheme Description and Bylaws for each owner to comply with, thereby ensuring that sustainable elements will be maintained.

Lessons learned:

- Normal assessment for council rates. Although the council is not responsible for the infrastructure in the Village the direct cost is to the council to do this is quite low. Council rates also deal with providing roads to get to the village, libraries, Parks etc, etc.. The Council has been very supportive in providing grants for community activities in the Village.
- Next time would have a requirement for people to keep records of usage etc

- There are financial costs but I feel they reflect the external costs which a wantonly passed onto each of us by those which do not move to a sustainable development
- It could be more cost effective if undertaking the project again, but on a sustainable project each one will be different and have its own issues to deal with , overcome and move forward.

1.29 Magpie Sustainable Village – Kew, NSW

Project Name: Magpie Sustainable Village (Annie Georgeson & Ian Bailey)
Location: Kew, NSW
Status: Design/Approvals stage
Project size: Site total area: 141,513m^2;
Residential lots area: 34,286m^2;
Food production area: 4,920m^2;
Conservation area: 16,270m^2;
Community area: 38,037m^2;
Road area: 4,172m^2;
Retail/commercial area: 1,500m^2;
Heritage conservation area: 800m^2;
Project description: 65 lot subdivision with sustainable water, sewage and photovoltaic systems.

Sustainable Motivation:
To lead by example
To make results available
To 'partner' council
To encourage better developments

Sustainable Design features:

- Proposed to have 100% of subdivision energy requirements produced on site
  - Photovoltaic energy
- Solar hot water
- Rainwater harvesting
  - Individual 30,000l capacity for each lot

  - Zincalume above ground or concrete underground
  - Rainwater used for kitchen, basins, bathroom, shower
- Water efficient fixtures and appliances
- Wastewater treatment
  - Separate system for each cluster or group of houses
  - Recycled water recirculated for toilet flushing, clothes washing, external use
  - No connection to sewer system
- All lots oriented to facilitate passive solar design
- Water sensitive urban design – absorption pits and swales, excess flow to dams
- Food production
  - Proposal to produce 25% of food requirements within the subdivision in 4920m2
  - 50% of new landscaping to be fruit trees
  - Chickens, bees
  - Co-op to be established
- Car share proposed

1.2.10 Koala Beach - Mid north coast, NSW

Project Name:	Koala Beach
Location:	NSW north coast (Just north of Pottsvillle)
Status:	Koala Beach is in stage six of its final land release
Project size:	Site total area: 360ha; Conservation area: 240ha;
Project description:	500 lot subdivision with ecologically sustainable development and conservation measures.

Sustainable Design features:

- The project began with the AKF conducting a two year study of the koala population that could potentially be affected by the proposed development.
- Koala Beach, home to a small but significant koala population, was the first property to be master planned and designed with the protection of the environment as its priority
- To ensure the protection of the resident koala colony and other important wildlife a number of initiatives were developed. These included:
  - No cats and dogs within the estate.
  - The inclusion of speed bumps near known koala home ranges.
  - A requirement that all fences within the estate be raised so that koalas and other wildlife can enjoy free access around the estate.
  - The provision that no koala home range or food tree be removed for development purposes.
  - The establishment of a Wildlife and Habitat Management Committee with funding from an environment levy on the rates.
- The developer and the AKF planted additional food and habitat trees for koalas and other native species living on the site. This is an ongoing project.
- To ensure the conservation of the koalas and other wildlife, an ongoing monitoring and research program was established. Subsequent studies have determined that descendents of the original koala colony appear to be living happily in the area and may not have been adversely affected by the development. Future monitoring will give more information.

Lessons learned:

- Despite initial criticism from many parties, Koala Beach has been hailed a success by developers, residents and biologists. It has provided the perfect model for the coexistence of wildlife and humans, applauded as a "made for the future development" (The Weekend Australian).

1.3 COMMERCIAL

1.3.1 CH2 – Melbourne, VIC

http://www.melbourne.vic.gov.au/info.cfm?top=171&pg=1933

Project Name: CH2 (Council House 2)
Location: 218-242 Little Collins St
Project size: Net lettable area: 9,373m^2;
Project description: Ten-storey office building with street-front retail shops and sustainable water, sewage and passive ventilation systems
Construction costs: $29.9 million (base building)
$11.3 million (sustainability features)
$7.1 million (requirements specific to council)
$2.8 million (education)

Sustainable Design features:

- Water mining plant draws wastewater from public sewer for recycling, which is then used with harvested rainwater for toilet flushing and cooling of the building.
- Water used in fire-sprinkler system testing (potable required) is recycled.
- Climate control
  - Five shower towers (1.4 metres in diameter and 13 metres long) cool air through evaporation of water. Air then directed to retail areas.
  - Thermal mass created by pre-cast concrete panel ceilings, reducing cooling system demands.
  - 100% fresh air drawn in though vents on roof, avoiding mixing of contaminated and fresh air.
- 48m^2 of solar panels to provide 60% of hot water needs
- Photovoltaic energy system - 26m^2 will generate about 3.5kW of solar power
- Gas-fired co-generation plant providing around 40% of building's electricity needs, with waste heat used for supplementary air heating/cooling system.

1.3.2 60L – Carlton, VIC

http://www.60lgreenbuilding.com/

Project Name: 60L
Location: 60 Leicester St, Carlton, VIC
Developer: The Green Building Partnership

Project size: Site total area: 1,315m^2;
Net lettable area: 3,346m^2;
Stories: 4

Project description: Part renovation and pert new building with sustainable water, sewage and photovoltaic systems.

Sustainable Design features:

- Photovoltaic energy production
  - BP solar arrays 9.6kW installed at a cost of $100,000
  - Provides an average of 20% (7-10% in winter; 30-35% in summer) of energy requirements of common area consumption
- Rainwater harvesting
  - 20,000l capacity
  - Rainwater micro-filtered and UV sterilised then used for all potable purposes
- Water efficiency
  - Low flow taps, showerheads, and toilet cisterns; waterless urinals
- Wastewater treatment
  - Process: Sedimentation & digestion, biofiltration, clarification & membrane filter
  - Recycled water used for toilet flushing and irrigation; any excess recycled water is directed to atrium water feature.
- Solar heat pumps for hot water system
- Energy efficiency
  - Hybrid passive-active ventilation system : Passive system uses natural ventilation with air flow via automated louvres in the light wells, up through the atrium and vented via thermal chimneys; the building automation system opens louvres when external ambient between 19-26oC (as monitored by the building's weather station). Night purging
  - Openable windows in tenancies. Active systems include fresh air supply and individual domestic-size air conditioners within each tenancy. Tenants permitted to use a/c units only when louvres & windows closed with set-points not > 19 in winter and not < 26 in summer.

    - Natural light through atrium and light wells; Lower level of lighting in non-working areas; high efficiency T5 fluorescent globes.
- Imported electricity from 100% renewable resources
- Timber planting to offset the building's carbon footprint
- Materials
    - Reused materials: The old building was reused apart from the fit-out i.e. timber, concrete steel etc. Bricks - on-site chemical-free cleaning
    - Recycled materials: Concrete - average 60% recycled content; concrete reinforcing steel; bricks. Recycled hardwood timber for floors, handrails, stair treads, window & door frames; some fit-out partitioning
    - Sustainable timber: Plantation timber (hoop pine & pinus radiata)
    - Other: No chrome fittings; > 50% reduction in PVC content (essentially none for hydraulic systems or electrical conduits); minimal internal use of materials emitting volatile organic chemicals (glues, adhesives & sealants, carpets, paints)
- Transport
    - No car park spaces in the building
    - Bike racks and showers provided

Lessons learned:

- The 60L building was intended as an exemplar of a significantly more environmentally sustainable, commercially viable, office building. It is, however, far from being a sustainable building either in construction or operation
- As stated above, 60L is not a sustainable development; rather it is significantly more sustainable than the conventional commercial office building. It is, however, a commercial operation providing a return on investment

1.3.3 Knox Place - Double Bay, Sydney

www.sustainablehouse.com.au/exampleproject.htm

Project Name:	Building K
Location:	376-382 New South Head Road, Double Bay
Developer:	Fivex Pty Ltd
Architects:	Eeles Trelease Pty Ltd
Sustainable design:	Michael Mobbs
Completion Date:	Early 2007
Status:	DA Approved 2005. Building commenced April 06.
Project size:	Site: 549.9sqm
Project description:	Four-storey office building with street-front retail shops and sustainable water, sewage and passive ventilation systems.
Site costs:	Site acquisition costs: $9.6million

Sustainable Design features:

- All **water** needs will be met on site by collecting rainwater, to be stored in an 80,000L tank below the ground floor. This will leave over 400,000L of water in Warragamba Dam annually. Because the rain falling on site will be captured rather than running off into drains, 400,000L of stormwater is prevented from polluting the harbour each year.

- All **waste water** will be treated on site to cut sewage pollution. Sewage will be recycled to produce up to 140L of surplus treated water each day, which will be used to flush the toilets and water the roof garden. This system will stop over 700,000L of sewage discharging into ocean outfalls annually had the 'business as usual' development proceeded.

- Passive **ventilation** reduces the need for temperature control systems - A light, open and glass-walled design lets air and light flow freely through the building; so tenants won't often need air-conditioning. This is expected to save around 150 tonnes of greenhouse gas emissions per year.

- The **roof garden** will help with cooling the building by absorbing heat. It will also have hardy indoor-friendly plants (including 'Silver King' and 'Janet Craig') that absorb typical office air-toxins, which can be rotated through the offices. Tenant will be able to grow edible plants such as salad and fruits in the garden or as the tenant chooses.

- The **productivity** of building employees is boosted 10-15% by the healthy work environment, with natural light and fresh air.

- **Reduced running costs** for tenants - energy bill expected to be 10-15% lower than a similar building without

sustainable features. If tenants also follow the developer's Green Building Guide and install energy-efficient lighting and appliances, running costs are likely to be reduced by 40-50%.

- No car parking on site. Planned **car-share facility** at developer's expense would reduce climate change pollution by ~ 500 tonnes per annum. Council has refused to trial this facility and has required payments for new car spaces in car park nearby. (One shared car can replace up to 7 privately-owned cars. Tenants, employees are encouraged to use the car-share system during work hours at developer subsided rates, and ride bikes or use public transport in their commute to and from work. The site is directly on several major bus routes. In this way traffic impact and parking congestion in the local area is reduced.)

Lessons learned and policy issues:

Q What legal protection there is there if, say, the building changes hands, that the sustainable elements will be maintained and up-kept?

A The water, recycled water and energy systems will continue to operate as:
- the development consent requires the systems to continue to operate;
- the current mode of operation may only change if a new development application is approved by the council;
- the building will be cheaper to run a business in (due to lower costs for water and energy) so there is no reason for an owner or tenant to change the sustainable systems;
- as the price of energy and water increases the building will become markedly cheaper to use than comparable buildings and so both the building owner and the tenants will have increasing financial benefits from using the sustainable systems as time goes by.

Q What are the financial costs and benefits?

A The capital cost of the water saving technology and its associated services cost about $350,000. Preliminary estimates put the additional capital cost for the water saving technology compared to a conventional system in the order of $200,000 to $250,000.

We estimate that the ongoing savings in the development from saved water use and saved water rates is approximately $4,000 to $5,000 pa. In turn, the ongoing savings can be capitalised (because they reduce the running costs of the building) at the rate of 6% which equates to an increase in the capital value of the building between $66,000 and $83,000. Therefore the net cost of the water saving technology ranges from $117,000 to $184,000. A fair estimate is that the net cost of the water saving technology is $150,000.

Q What are the financial burdens imposed by Government?

The removal of two burdens would pay for the sustainable systems several times over.

<u>1 Car parking levy:</u>
Woollahra Council has sought to levy a $1,300,000 s94 contribution because the development provides no car parking on our site; the council code requires 34 spaces. Yet the Greenstar Rating

system awards points for the building because it removes car spaces. The environmental footprint of this development is perhaps the smallest of any sustainable office in Australia, yet Council has effectively ignored the environmental benefits to be gained by our development and sought to force the developer to pay for the Council to build an extension to Council's car park and thereby negate one of the key environmental savings the development seeks to achieve. Council's s94 plan for Double Bay is a tax to build additional car parking; it directly promotes and increases climate change pollution; research shows the car park has a 45% vacancy rate.

2 Sub station for Double Bay, not this project:
Energy Australia made the developer demolish the rear of the building on the neighbouring property at 374 New South Head Rd and install an electricity sub-station kiosk. The developer lost 40 square metres of valuable retail space as a result and the net cost to the project will be at least $700,000 which Energy Australia has refused to compensate. Energy Australia ignored that we could build the offices while only using the existing supply to the former building on the site and insisted that the developer build the sub-station kiosk in order to cater for the energy needs of the rest of Double Bay.

1.3.4 40 Albert Rd (Szencorp) - South Melbourne

http://www.ourgreenoffice.com/

Project Name: 40 Albert Road
Location: South Melbourne
Completion Date: 2005
Project size: Net lettable area: 1,215m^2;
Project description: Four-Story commercial building renovated with sustainable water, sewage and energy systems.

Sustainable Motivation
Create the highest achievable level of sustainability;
Ensure the best possible environmental outcomes for employees, visitors and tenants;
Demonstrate the commercial viability of sustainable buildings; and
Provide a development and commercialisation platform for innovative green building products

> Evaluate rating tools
> Provide monitoring, verification and metering
> Provide flexibility to minimise churn rate
> Increase amenity through daylight and increased office volume
> Offer "walk the walk" leadership
> Increase rental returns
> Demonstrate that green is commercial

Sustainable Design features:

- On-site Energy production
  - Photovoltaic – 5.5kW

    - Ceramic fuel cells being trialled
- Passive ventilation - Natural Air flow throughout
    - Automated opening windows
    - Automated louvers
    - Open air meeting spaces
    - Weather station works in unison with BMS for ventilation

- Energy conservation schemes
    - Double-skin, double glazed facade with motorised louvers and windows for natural ventilation
    - Insulation cladding on walls and roof
    - Increased ceiling height allowing the use of the thermal mass of the building for improved energy efficiency
    - 'dry conditioning' air treatment
    - Gas engine air conditioning. 21 zones independently controlled
    - Integrated occupancy control
    - car park sensors - to minimise energy used by exhaust and lighting
    - low energy IT solution
    - central vacuum cleaning system
- Rainwater harvesting
    - Used for flushing toilets
- Water efficiencies
    - Dual flush toilets
    - Waterless urinals
    - Low flow taps
    - Aerators and instant cut-off sensors on basin faucets
- Grey water treated and reused for toilet flushing.

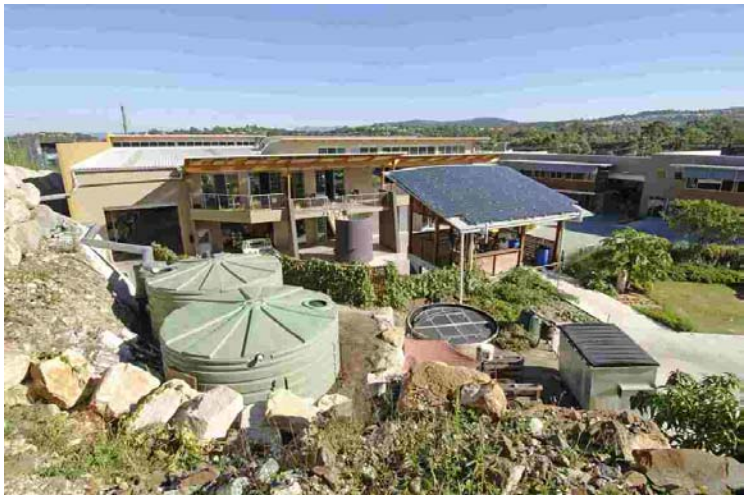
1.3.5 Rockcote – Nerang, QLD

http://agdf.org.au/cgi-bin/noticeboards/attachments/1239/7923/Case+Study+Rockcote+Design+Centre.pdf

Project Name:	Rockcote Design Centre
Location:	4 Indy St, Nerang
Project size:	Site total area: 5,680m^2; Building area: 2,850m^2;
Project description:	2 storey commercial development with sustainable water, sewage and photovoltaic systems.
Site costs:	Site acquisition costs: $680,000 (2002)

Sustainable Motivation
Many varied & interconnected, ranging from economic to, for the fun of it. Including people wrong who said it couldn't be done

Sustainable Design features:



- Photovoltaic energy production
  - 100% of energy requirements are produced on site
  -
- Passive natural ventilation
  - Aim to be energy positive. Natural systems to provide most of our heating, cooling & lighting.
- Rainwater harvesting
  - Water used for all purposes (no reliance on mains water)
  - 100,000l capacity
- Wastewater treatment
  - Primary treatment by Ozzi Kleen SBR
  - Aim to treat reclaimed water in an engineered eco system using no fossil fuels & no poisonous chemicals to achieve potable water for non potable use. Ie toilets, gardens etc
- Productive garden integrated with landscaping – approx 200m^2;

Lessons learned:

- Though the centre is not for sale, Rockcote have been inundated with offers to sell the units at record prices.
- Have not yet been able to achieve a discount in the amount of government charges for water and/or electricity
- Time to get approvals have been our largest costs
- 90% of the extra costs came from government regulations. We have experienced significant savings in running costs & huge benefits emanating from staff, customer & community engagement.
- The financial or other planning burdens imposed by Government - Arguing about arcane regulations. Mostly time
- We would be able to do it cheaper & better next time. In fact it appears really strange to us the way everyone else builds their buildings
- "We do not have an energy crisis, nor a water crisis, what we have is a crisis of logic"

1.3.6 30 The Bond – Sydney, NSW

Project Name: 30 The Bond
Location: 30 Hickson Rd, Millers Point
Developer: Lend Lease
Project size: Net lettable area: 20,000m^2;
Project description: Nine-storey office building.

Sustainable Design features:

- Energy conservation, resulting in 30% reduction in greenhouse emissions
  - Natural ventilation
  - Chilled beam cooling
  - Fully operable shading on façade
  - Sandstone cutting used as thermal mass
- Green roof
- Eight storey atrium providing natural light
- ESD Employee workshops: Aspirations identified by the workshops included greenhouse gas reduction, indoor environment quality, water management, materials selection, waste management, pollution and biodiversity. Employees ranked the aspirations, deciding that reduction in greenhouse gases and enhancement of indoor environment quality were the most important

1.4 COMMENTS ON SUSTAINABLE PROJECTS

Are these projects sustainable?

Well, not quite, and some cases not by a long way.

None of these projects is fully sustainable in the true sense of the word, but many are advancing towards being sustainable. As this report shows, until all projects use materials that are sustainably made, produce their own food on or nearby, and use energy and water that is available where they are located they will remain unsustainable as matter of environmental fact.

APPENDIX B
LIST OF BEST PRACTICE PROJECTS

1. Couran Cove island Resort, South Stradbroke Island, Queensland: www.couran.com
2. Binna Burra lodge, Lamington National Park, Gold Coast, Queensland: www.binnaburralodge.com.au
3. Rottnest island, Western Australia: www.rottnestisland.wa.gov.au
4. O'Reilly's Resort, Lamington National Park, Queensland: www.oreillys.com.au
5. Cape Otway Centre for Conservation Ecology, Otway ranges, Victoria: http://www.capeotwaycentre.com.au/about.htm
6. Tortoise head Guest House, Western port Bay, Victoria: http://twinshare.crctourism.com.au/CaseStudies/Cs12.htm
7. TENTative Nests, Kuranda, Queensland: http://twinshare.crctourism.com.au/CaseStudies/Cs9.htm
8. Treetops Lodges, Murwillimbah, New South Wales: http://twinshare.crctourism.com.au/CaseStudies/Cs11.htm
9. Bombina Cottages, Denmark, western Australia: http://twinshare.crctourism.com.au/CaseStudies/Cs3.htm
10. Inkerman Oasis, Melbourne, Victoria: http://www.melbournewater.com.au/content/library/wsud/case_studies/inkerman_oasis.pdf
11. BedZed, United Kingdom in 'The Green City: Sustainable Homes, Sustainable Suburbs' by Low, N., Gleeson, B., Green R. and Radovic, D. (2005) UNSW Press, Sydney
12. Christie Walk, Adelaide, South Australia: http://www.urbanecology.org.au/christiewalk/
13. Edenbrooke Residential Development, Brisbane, Queensland: http://www.udiaqld.com.au.cgi-bin/dm/doc_manager.pl?t=summary&p=true&c=17&aid-264
14. Mowbray Falls Enviropark, Julatten, Queensland: http://twinshare.crctourism.com.au/CaseStudies/Cs10.htm
15. Tidal River Campground, Wilsons Promontory National park, Victoria: http://www.deh.gov.au/coast/publications/coastal-tourism/
16. EcoBeach, Cape Villaret, Western Australia: http://twinshare.crctourism.com.au/CaseStudies/Cs7.htm
17. Kingfsher Bay Resort and Village, Fraser Island, Queensland: http://www.deh.gov.au/coasts/publications/coastal-tourism/
18. Barry's Country Guest House and Restaurant, Termeil, New South Wales: http://twinshare.crctourism.com.au/CaseStudies/Cs2.htm
19. 'Natural Approaches to Stormwater Management: Low Impact Development in Puget Sound' (2003): www.psat.wa.gov/Publications/LID_studies/LID_approaches.htm
20. Trial Bay Tourist Park, South West Rocks, New South Wales: http://www.trialbay.com.au/ecofriendly.htm
21. Jemby-Rinjah Lodge, Blue Mountains, New South Wales: http://www.twinshare.crctourism.com.au/CaseStudies/Cs8.htm
22. Aanuka Beach Resort, Coffs Harbour, new South Wales: <http://www.deh.gov.au/coasts/publications/coastal-tourism/>
23. Oceanway Trails, Gold Coast, Queensland: http://www.goldcoastcity.com.au/oceanway
24. Kanimbla View, Blue Mountains, New South Wales: www.kanimbla.com
25. Mawson Lakes, Adelaide, South Australia: www.mawsonlakes.com.au
26. 'Ask First: A Guide to Respecting Indigenous heritage Places and Values' (2002) Australian Heritage Commission, Canberra.
27. Koala Beach Housing Development, Pottsville, New South Wales: www.savethekoala.com/koalabeach.html

Source: *Preliminary Environmental Scoping of Proposed Gracetown Tourist Development*

Further examples:

28. Coco Eco Tourist Retreat, Broome, WA: http://www.cocoeco.com.au/

APPENDIX C
MEMORANDA OF UNDERSTANDING

THE UNIVERSITY OF NEW SOUTH WALES

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Mr Michael Mobbs
Sustainability Coach
Sustainable Projects
58 Myrtle St.
Chippendale, NSW. 2008

23 October 2006

Dear Michael

Re: Aussies Sustaining Australia: a Project for Solutions and Celebration

I write to confirm our full support for the letter forwarded by Prof Gleeson at the Urban Research Program at Griffith University concerning the the proposed research on energy, water and food sustainable practice innovation: *Identifying Ordinary Sustainability Innovators and Overcoming Institutional Barriers to Sustainability.*

We see this project as particularly important in the light of recent research that strongly suggests that it is at the level of indivudal consusmers and their households that the real advances in adopting sustainable lifestyles and attitudes will be made. A study that identifies the kinds of local initiatives being adopted around Australian cities and towns by 'ordinary' Australians and the net benefits of their actions in moving towards greater sustainability will provide important opportunities for policy and practice development.

We very much look forward to working in partnership with yourself on this highly timely and potentially ground breaking project.

Yours sincerely

Prof Bill Randolph
Faculty of the Built Environment
University of New South Wales

Cc Prof Peter Murphy, FBE/UNSW
Prof Martin Loosemore, FBE/UNSW

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Mr Michael Mobbs
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58 Myrtle St.
Chippendale, NSW. 2008

24 October 2006

Dear Michael,

Re: Aussies Sustaining Australia: a Project for Solutions and Celebration

I'm very pleased to confirm the Urban Research Program's interest in a two year research program that will advance the ambitions of the Aussies Sustaining Australia project. As you will see in the attached research proposal, we, with colleagues at City Futures research centre, University of NSW, propose to undertake an action research project: *Identifying Ordinary Sustainability Innovators and Overcoming Institutional Barriers to Sustainability*. There is an excellent track record of collaboration between City Futures and my own centre on research projects and this will inform the cooperative, nationally focused approach that both entities will bring to the proposed investigation.

The research proposal nominates three key questions for a practical investigation of sustainability innovation in Australia's human settlements. We will agree after further project specification how work on these questions will be distributed between the two centres, the Urban Research Program and City Futures. The overall funding request for the project is $480,000 (exl. GST) per annum for a period of two years. Please note that the estimated in-kind value of these combined university contributions is in the order of $250,000 over two years.

We envisage that the project would have a national steering committee, with membership advised by you, and including for, good governance, representation from any funding agency.

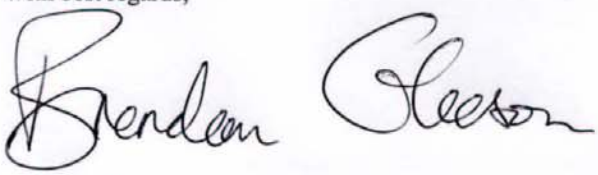
As discussed with you recently, it would be useful to have the proposed research project supplemented by additional research into the issues of water trading and catchments governance. This stage of the research is not budgeted for the in

accompanying proposal but would be a valuable extension of the work we propose to issues surrounding the institutional management of water.

We confirm our deep enthusiasm for the Aussies Sustaining Australia project and believe that the practical research program we propose will significantly advance its objects. We share your commitment to identifying the 'unsung' sustainability innovators and finding ways around and through institutional barriers to sustainability.

Bill Randolph and I look forward to working with you as part of a broader alliance of researchers, professionals and innovators committed to sustaining Australia.

With best regards,



Professor Brendan Gleeson
Director, Urban Research Program

APPENDIX D
QUALIFICATIONS FOR SUBDIVISION CALCULATIONS

Sustainable Subdivision: The Chimneys, Kew, NSW	**Typical New Subdivision**
Number of Lots	
64	64
Type of Houses	
Sustainable	*BASIX compliant*
Number of Cars	
Assume 1 per house	*Assume 1.5 per house*
1 car share car for all 64 houses	
= 1.15 tonnes CO_2-e per year	**= 2.15 tonnes CO_2-e per year**
Each car will travel 80% of standard distance travelled by vehicles (assumed); Emissions/household = 14,700 x 80% x 0.255 = 2999kg Assuming 2.6 people/household 2999/2.6 = 1.15 tonnes per person	Average car travels 14,700km/year; 0.255 kg of CO_2 is produced by a petrol-powered car per km travelled; (Source: http://www.ncc.nsw.gov.au/services/environment/ameif/climatecam/transport.cfm) Emissions/household = 14,700 x 1.5 x 0.255 = 5623kg Assuming 2.6 people/household 5623/2.6 = 2.15 tonnes per person
Electricity Consumption	
Solar energy system for each house	*40% reduction*
= 0.3 tonnes CO_2-e per year	**= 1.9 tonnes CO_2-e per year**
50% self reliant from Photovoltaic (solar) energy system (Assumed: Ian Bailey – developer) Therefore reduce emissions by 0.9 tonnes (1.9 x 50%) giving 1 tonne. Remainder of electricity requirements met by cogeneration (natural gas) 1 kWh of electricity from Western Power's south west electricity grid emits approx 0.99kg of CO2 1 kWh natural gas consumption = 0.21kgCO2 (Source = http://www1.sedo.energy.wa.gov.au/pages/emissions.asp) ie. Natural gas has 20% emissions, so 20% x 1 tonne = 0.2 tonnes	62,867 Gg CO2 attributable to residential stationary energy (Source: http://www.greenhouse.gov.au/inventory/enduse/index.html#summary) Therefore on average 3.16 tonnes per person BASIX requires 40% reduction, therefore 3.16 x 60% = 1.9 tonnes <u>ALTERNATIVE CALCULATION</u> 3,292kg CO2 per person emissions as benchmark for BASIX (Source: Energy Australia "Multi Unit Residential Buildings – Energy & Peak Demand Study) With BASIX reduction, target is 60% x 3,292kg = 1,975kg

Water Consumption	
Self sufficiency	*40% reduction*
= 0 Litres per person per year	**= 57 kilolitres per person per year**
	Typical water consumption= 261L/person/day (Source: NSW Department of Planning) BASIX 40% reduction gives 157L/person/day
Wastewater Production	
All wastewater treated onsite	*No wastewater treated onsite*
= 0 Litres per person per year	**= 43 kilolitres per person per year**
	Based on water consumption breakdown data within houses supplied by (Source: NSW Department of Planning)
Food Production	
25% of food grown on subdivision	*No food grown on subdivision*
= 2 tonnes CO_2-e per year	**= 2.6 tonnes CO_2-e per year**
Reduce emissions from unsustainable development by 25% 2.6 x 75% = 2 tonnes	27.54 tonnes CO2 per person (avg) Of which 28% is attributable to agriculture (7.7 tonnes) (Source: http://www.carbonplanet.com /home/climate_emissions.php) 66% of agricultural emissions can be attributed to exports (Source: http://www.greenhouse.gov.au/ inventory/enduse/index.html#summary "Table S6 Emissions attributable to commododities: local use and exported") Therefore Australians responsible for 34% x 7.7 tonnes = 2.6 tonnes
Local Air Temperature Change	
Minimal change	**3-6 °C warmer** (Assumed)

Ecological Footprint	
3.9 global hectares	8.1 global hectares
Ecological footprint calculator http://www.epa.vic.gov.au/ecologicalfootprint /calculators/personal/introduction.asp See assumptions below	Ecological footprint calculator http://www.epa.vic.gov.au/ecologicalfootprint /calculators/personal/introduction.asp See assumptions below
Total Annual Greenhouse Emissions	
3.4 tonnes per person	**6.6 tonnes per person**
Sum of above amounts Cars 1.15 tonnes per person Electricity 0.3 tonnes per person Food 2 tonnes per person	**Sum of above amounts** Cars 2.15 tonnes per person Electricity 1.9 tonnes per person Food 2.6 tonnes per person
Total Annual Subdivision Greenhouse Emissions	
575 tonnes	**1107 tonnes**
Assuming 2.6 people per household Cars 64 x 3 = 192 tonnes Electricity 0.3 x 2.6 x 64 = 50 tonnes Food 2 x 2.6 x 64 = 333 tonnes Total 575 tonnes	Assuming 2.6 people per household Cars 64 x 5.6 = 358 tonnes Electricity 1.9 x 2.6 x 64 = 316 Food 2.6 x 2.6 x 64 = 433 Total 1107 tonnes

Assumptions for Ecological Footprint Calculator
http://www.epa.vic.gov.au/ecologicalfootprint/calculators/personal/introduction.asp

	Sustainable	**Non-sustainable**
1.Weather	Sydney	Sydney
2.Eat animal based products	Occasionally	Often
3.Processed/packaged/imported food	One quarter	Half
4.Waste generated	< 1 bin bag	1 bin bag
5.People in household	3	3
6.Size of home	150-200	200-250
7.Housing type	Green-design residence	Free-standing house w/ running water
8.Do you have electricity	Yes, with renewable	Yes

Assumptions for Ecological Footprint Calculator http://www.epa.vic.gov.au/ecologicalfootprint/calculators/personal/introduction.asp		
	Sustainable	**Non-sustainable**
9.Public transport each week	10-25km	10-25km
10.Motorbike	No	No
11.Car Km per week L fuel per 100km Travel with others	(Car share facility) Yes 50-150km 6.5-9l per 100km Often travel with someone else (50%)	Yes 150-300km 6.5-9l per 100km Never or almost never
12.Hours flying	10-25 per year	10-25 per year
Footprint	**3.9gha**	**8.1gha**