Sustainable Focus

City of Burnside

Rainwater Tank Seminar

City of Burnside

23 July 2009

About Sustainable Focus

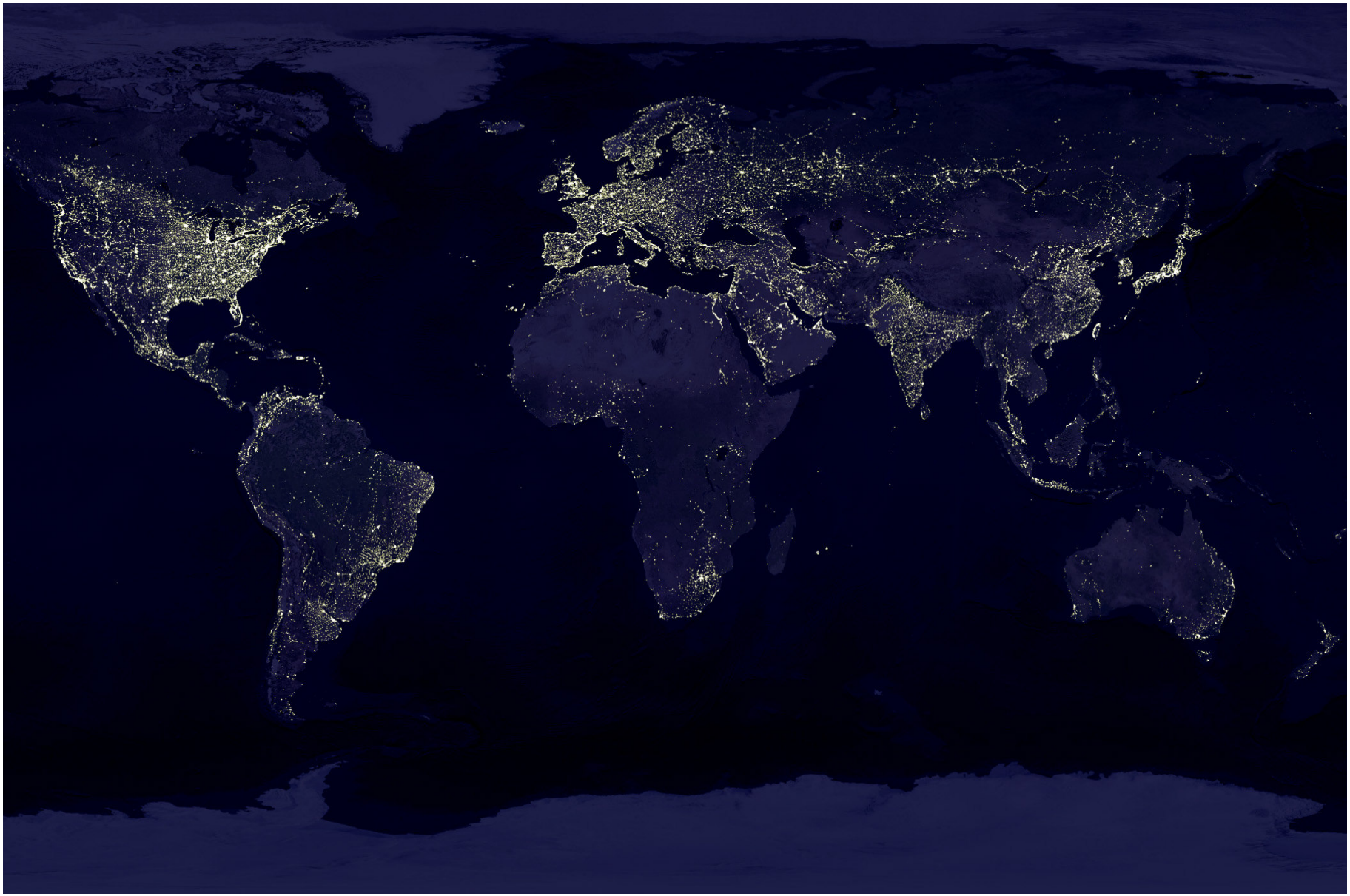
Independent energy and water specialists

No direct work with households

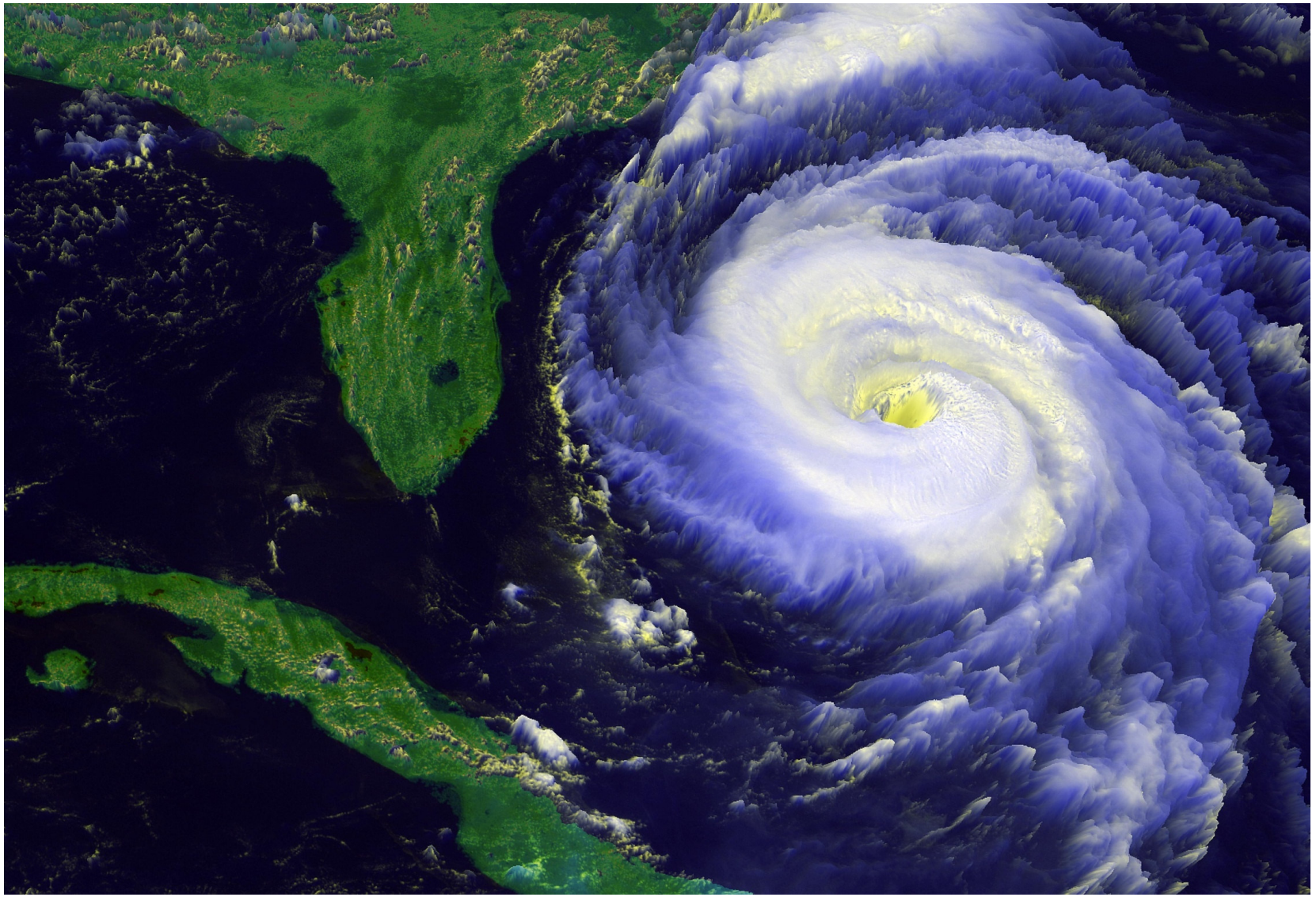
Presentation Outline

1. Climate change
2. Water use at the metropolitan and household level
3. Water efficiency opportunities
4. Reasons for installing rainwater tanks
5. Maximising rainwater yield
6. Tank types
7. Water quality and maintenance
8. System design considerations
9. Legislation/rebates and water bills
10. Greywater

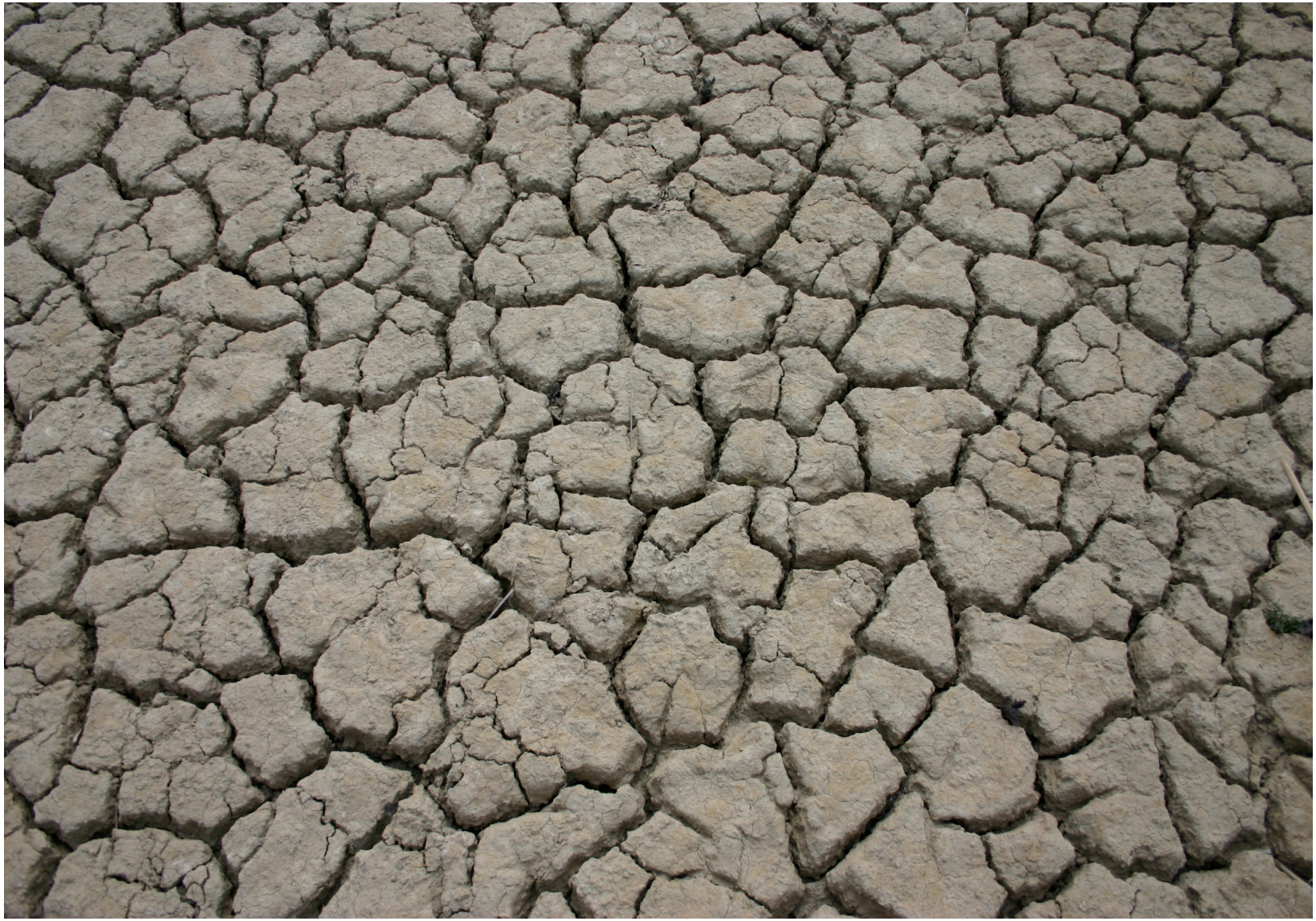
The World Sleeps



Weather patterns



Drought

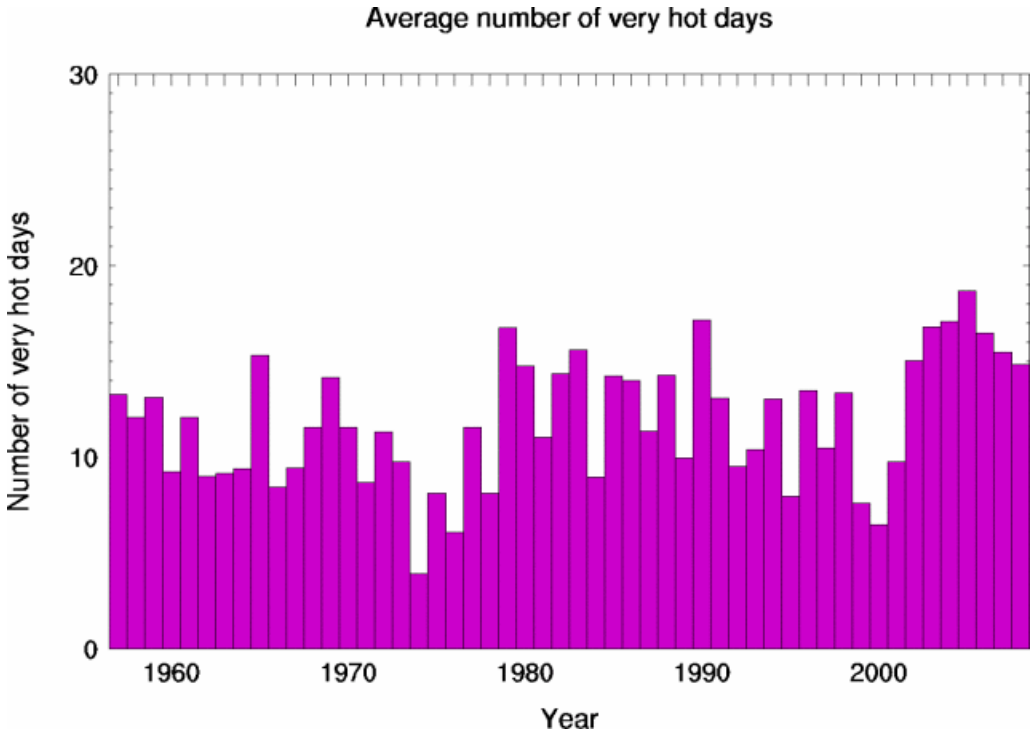


Wildfire

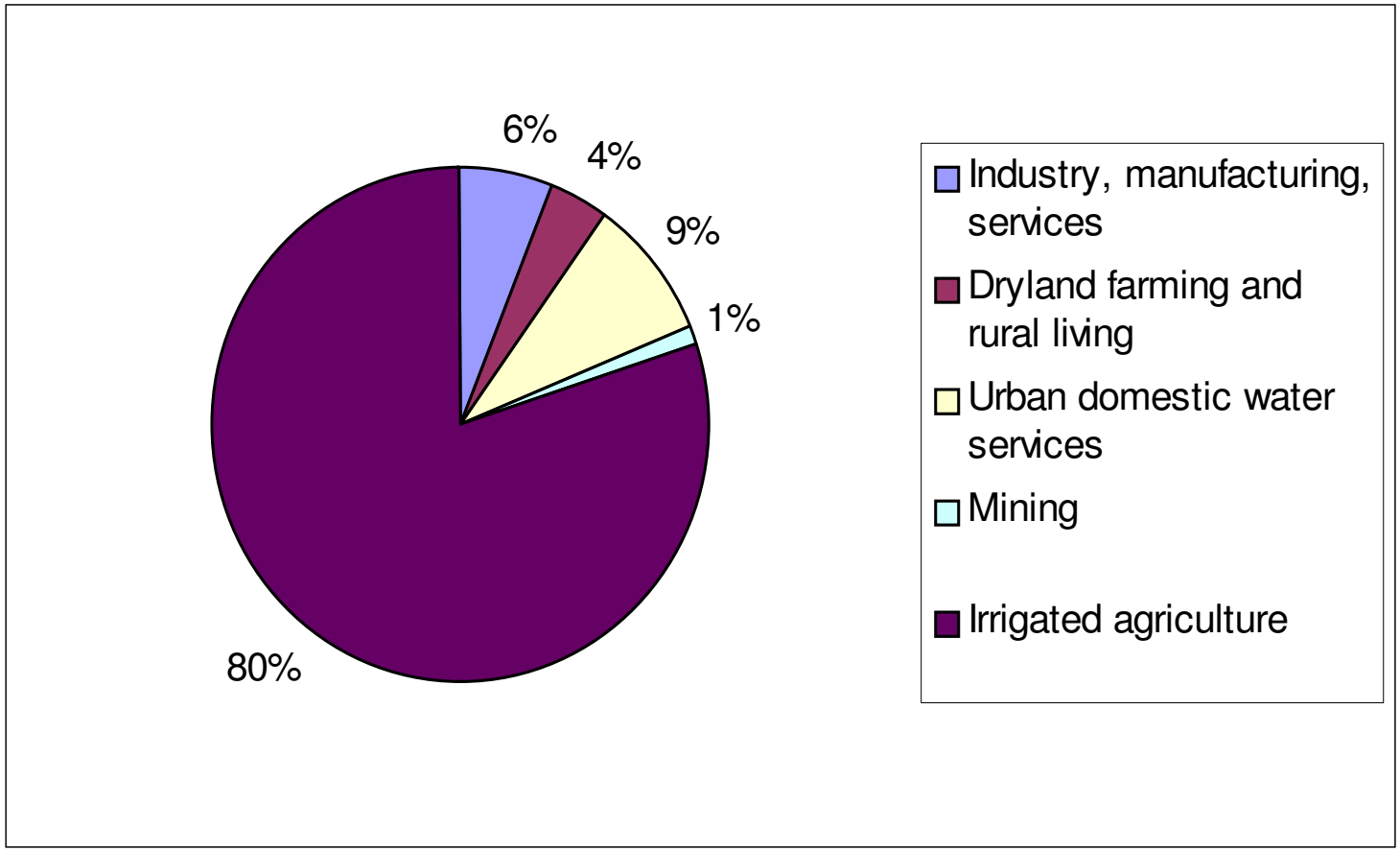
Sea level rise

Climate change impacts

- Rainfall decrease
- Rainfall intensity increases
- Change in rainfall patterns
- Temperature increases

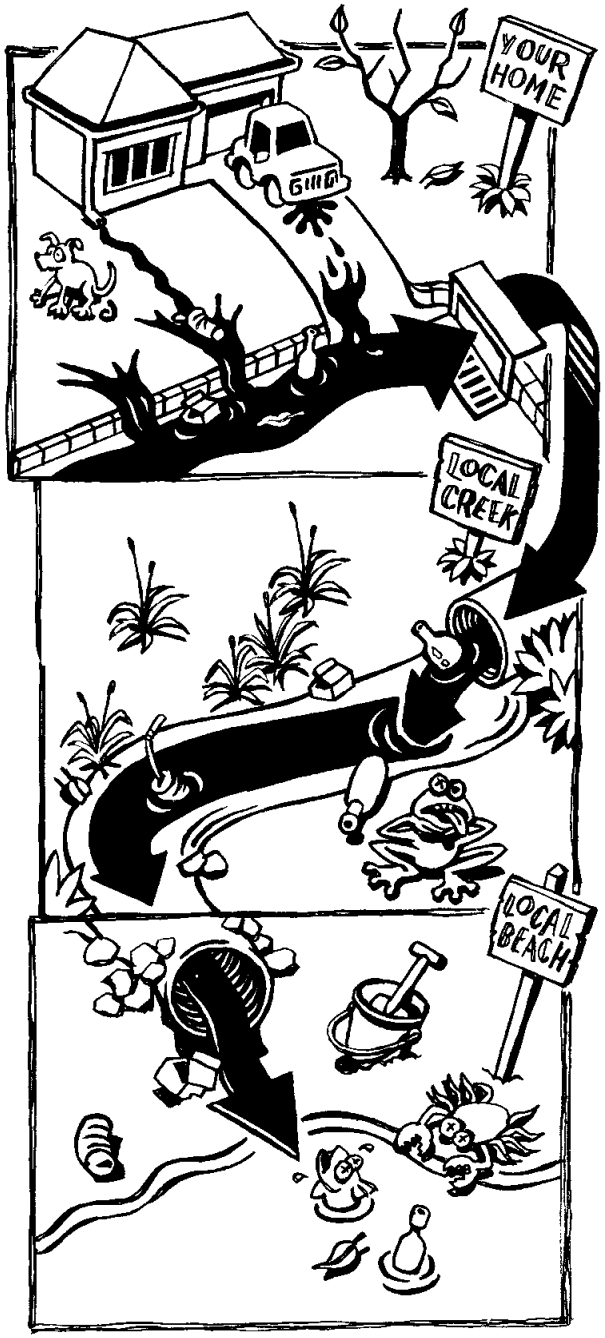


Water use in SA

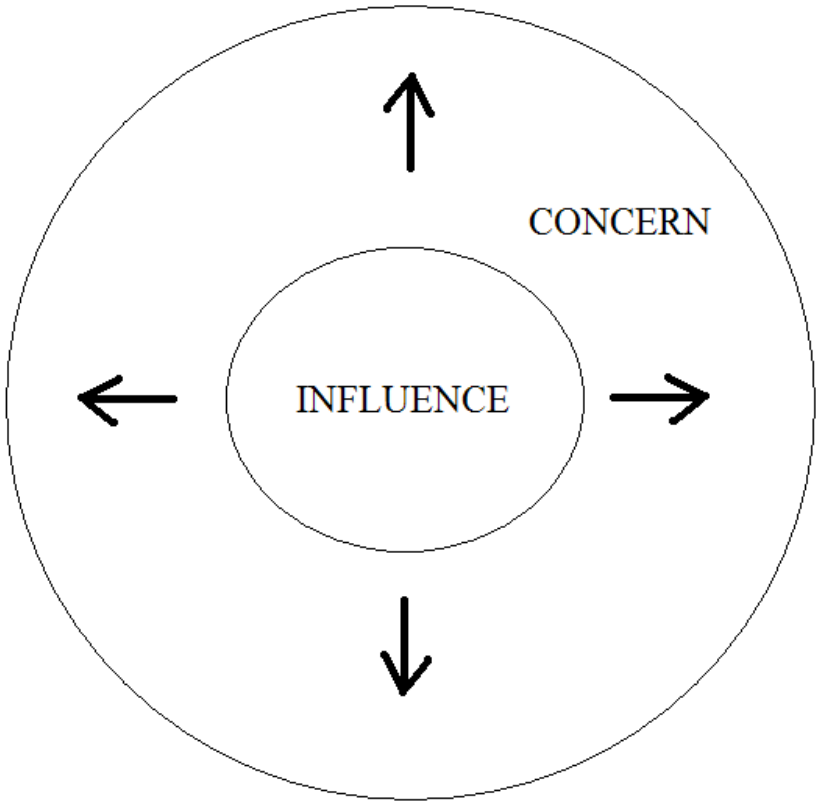


Reasons to manage water at home…

- Stormwater
- Household per capita water use
- Potable water



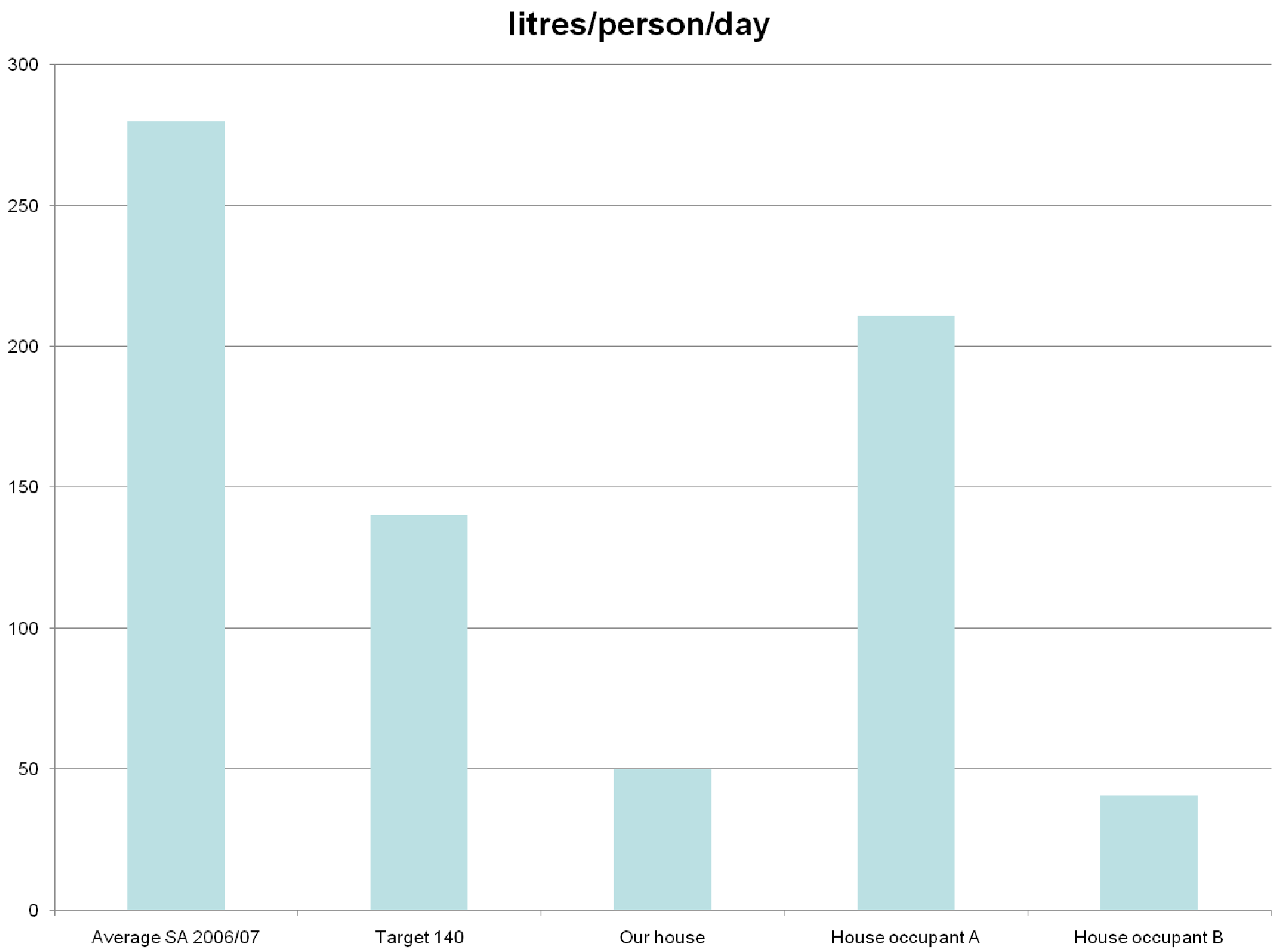
Sphere of influence



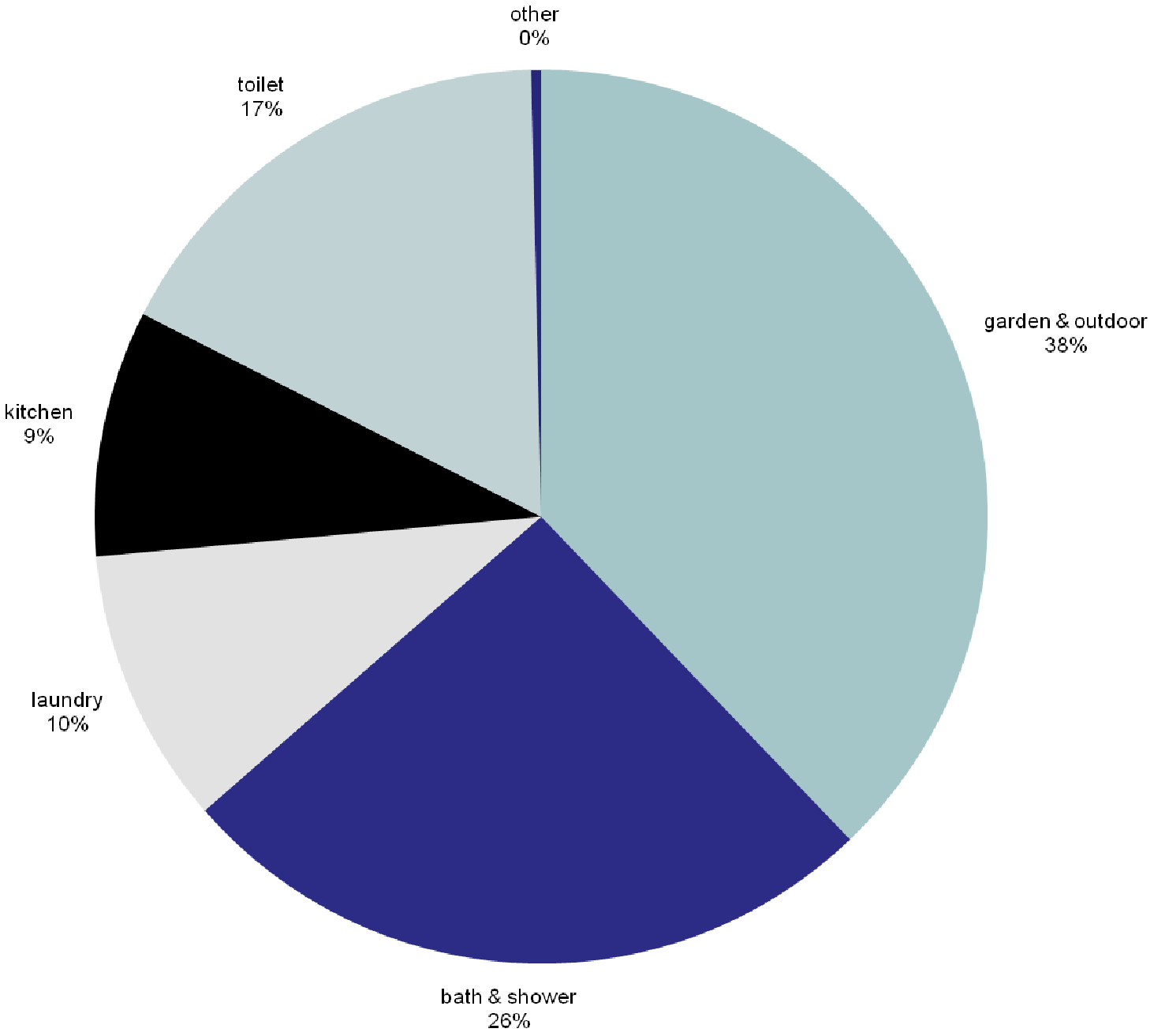
We <u>can</u> manage our own water use

Water quantities - Adelaide

INFLOWS to the Supply System	**Average year (GL)**	**Dry year (GL)**
River Murray	80	171
Adelaide Hills	121	30
Groundwater	9	9
Rainwater tanks	1	1
Stormwater reuse and recycled wastewater	5	5
Total	**216**	**216**
OUTFLOWS		
Stormwater (including hills face runoff)	160	50
Treated effluent from coastal wastewater treatment plants	70	70
Total	**230**	**120**


litres/person/day
300
250
200
150
100
50
0
Average SA 2006/07
Target 140
Our house
House occupant A
House occupant B

Proposed water use breakdown Target 140



Target 140 rationale

garden & outdoor	53	42 square metres of premier sports turf
bath & shower	36	based on 4 minute shower at 9 lpm
laundry	14	based on 60 litre wash cycle (say 6.5kg) every 5 days plus 10 litre other use
kitchen	12.5	based on dishwasher used every 2 days (15 l/cycle) and 5 lpd other use
toilet	24	based on four half flushes and 2 full flushes with 6/3 cistern
other	0.5	estimate

Water efficiency

- Garden design, mulch and watering systems
- Low flow showerheads, frequency
- Compost toilets, 4.5/3 flush, cistern weights
- Front loading washing machines
- Dishwashing
- Taps and leaks
- Pressure reduction
- Hot water systems

Dishwasher

ASKO

- Eco 14 litres, 0.2kWh
- Heavy 20 litres, 1.7kWh

Embodied water

- 1,000L of fresh water to produce 1L of milk
- 3,000L of fresh water to produce 1kg of rice, and
- 16,000L of fresh water to produce 1kg of beef

Source: www.waterfootprint.org

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Rainwater Systems

Reasons for installing:

- Environmental
- Water quality
- Self-sufficiency
- Bushfire
- Save money

Water pricing

2009/10:

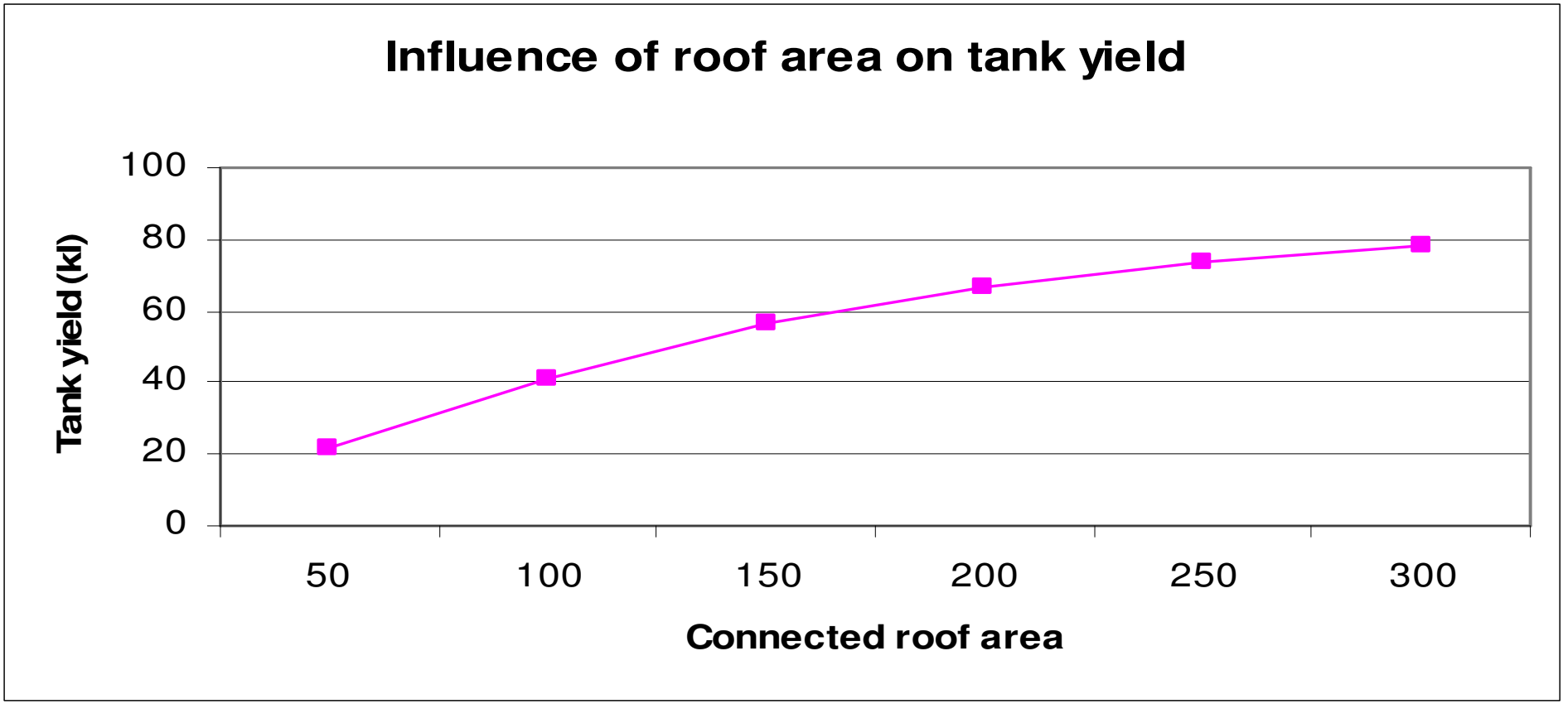
- 0-30kl/quarter $0.97
- 30-130kl/quarter $1.88
- >130kl/quarter $2.26

Future???

Maximising yield

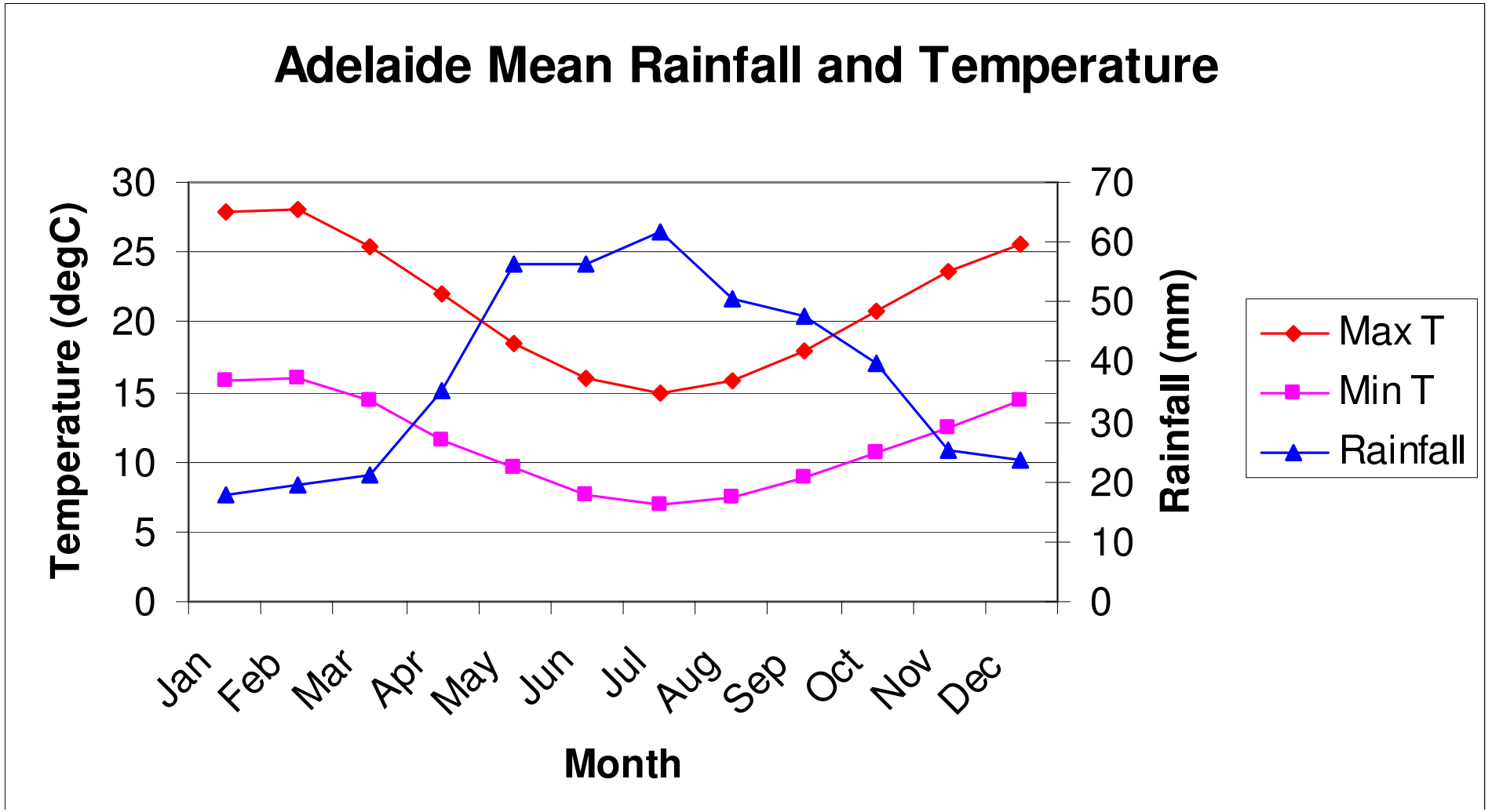
- Tank size is one of the least important variables in system design
- Connected roof area and usage patterns are generally more significant
- Base case: 150 sqm of connected roof area, 5000 litre tank, all household use (275 litres/day indoors), Adelaide Airport data, 15% loss

Roof area

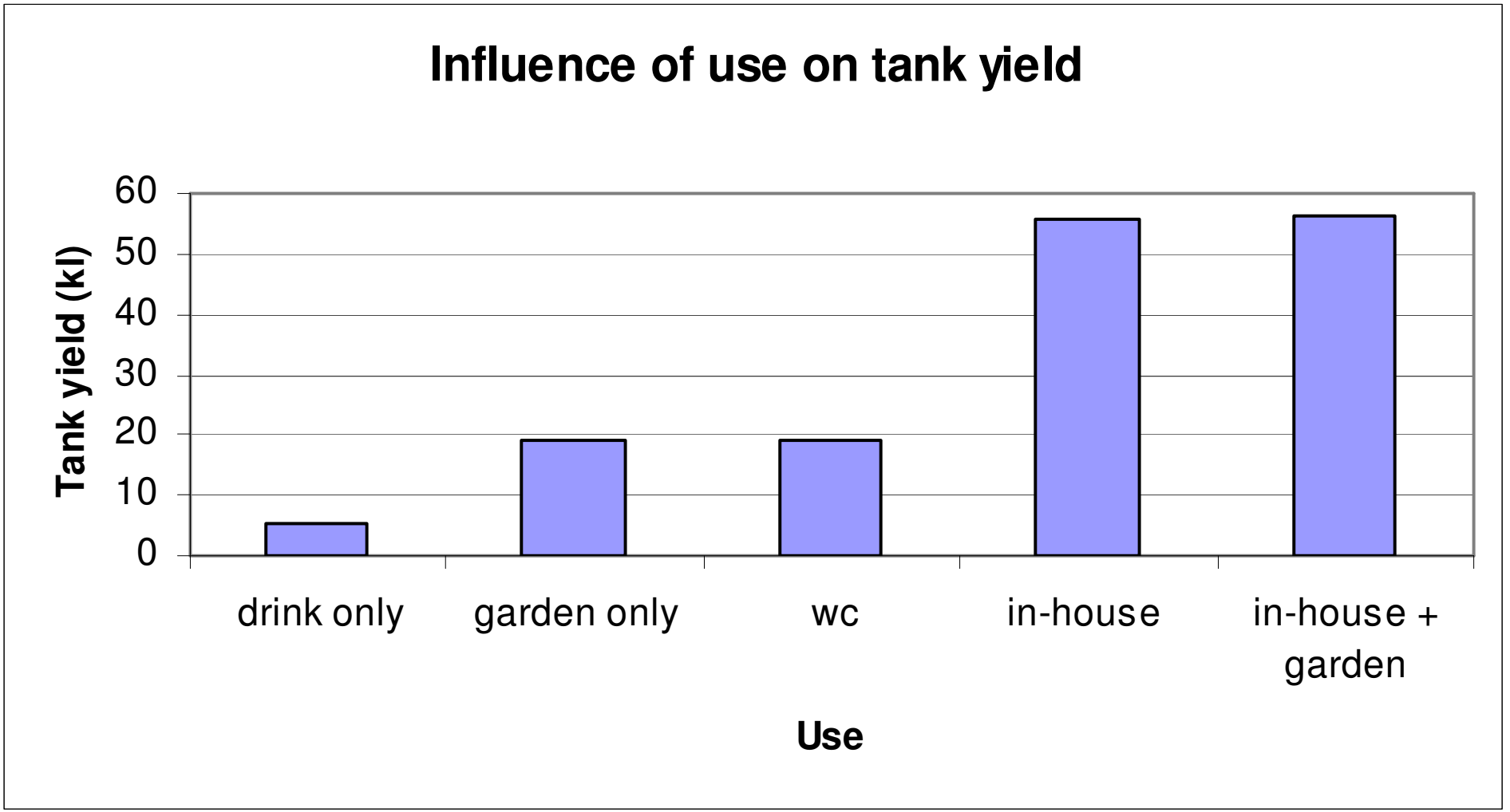


This graph is calculated to a 5kl tank

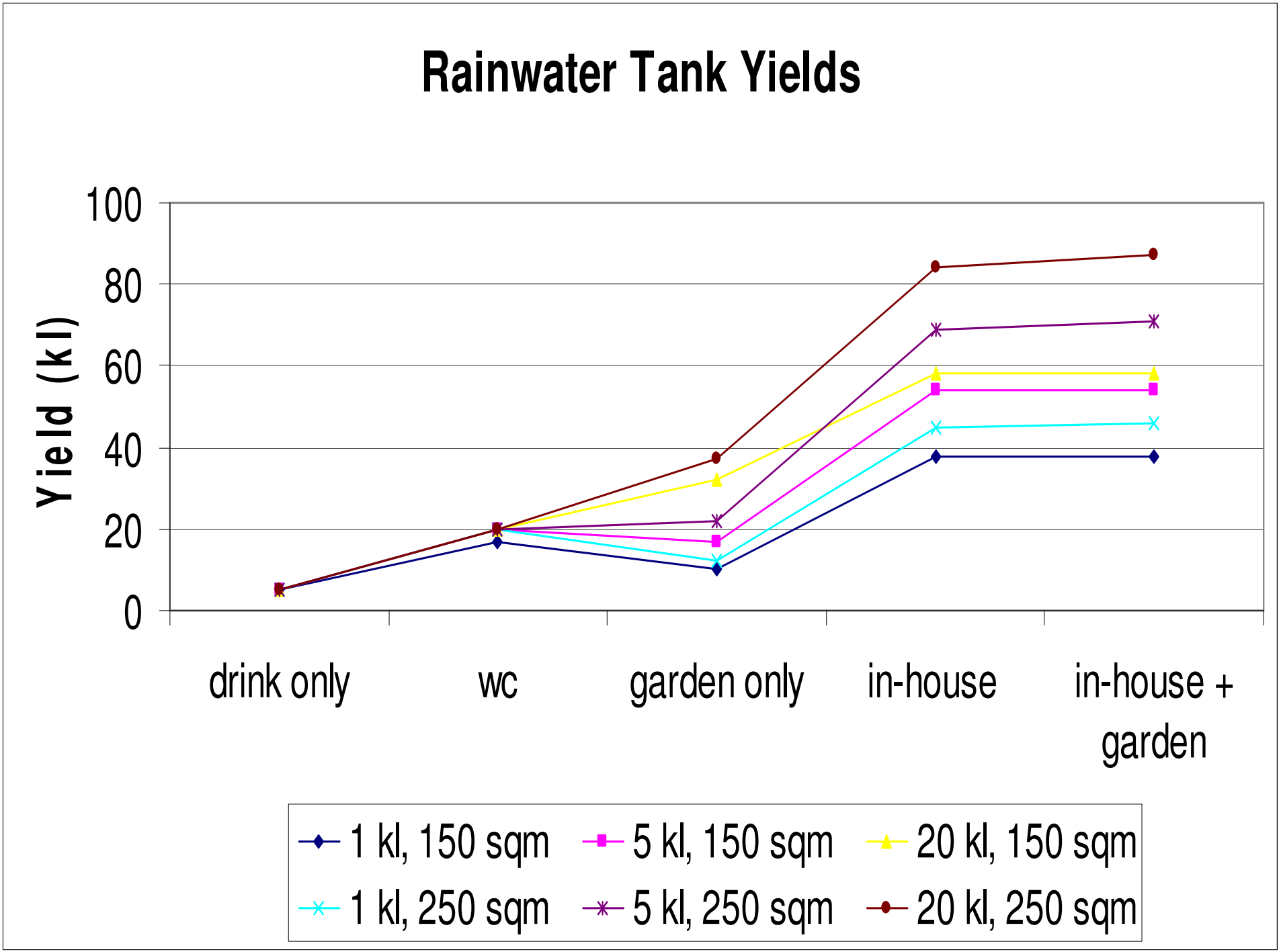
Adelaide climate data



Use



This graph is calculated to a 5kl tank


Rainwater Tank Yields
Yield (kl)
100
80
60
40
20
0
drink only
wc
garden only
in-house
in-house + garden
1 kl, 150 sqm
5 kl, 150 sqm
20 kl, 150 sqm
1 kl, 250 sqm
5 kl, 250 sqm
20 kl, 250 sqm

Tank types

- Galvanised
- Aquaplate

- Can build on site

Plastic – High Density Polyethylene (HDPE)

Concrete

Other tank types

- Bladders
- Walls
- Pickle barrels
- Swimming pools

The larger the volume to surface area ratio the better

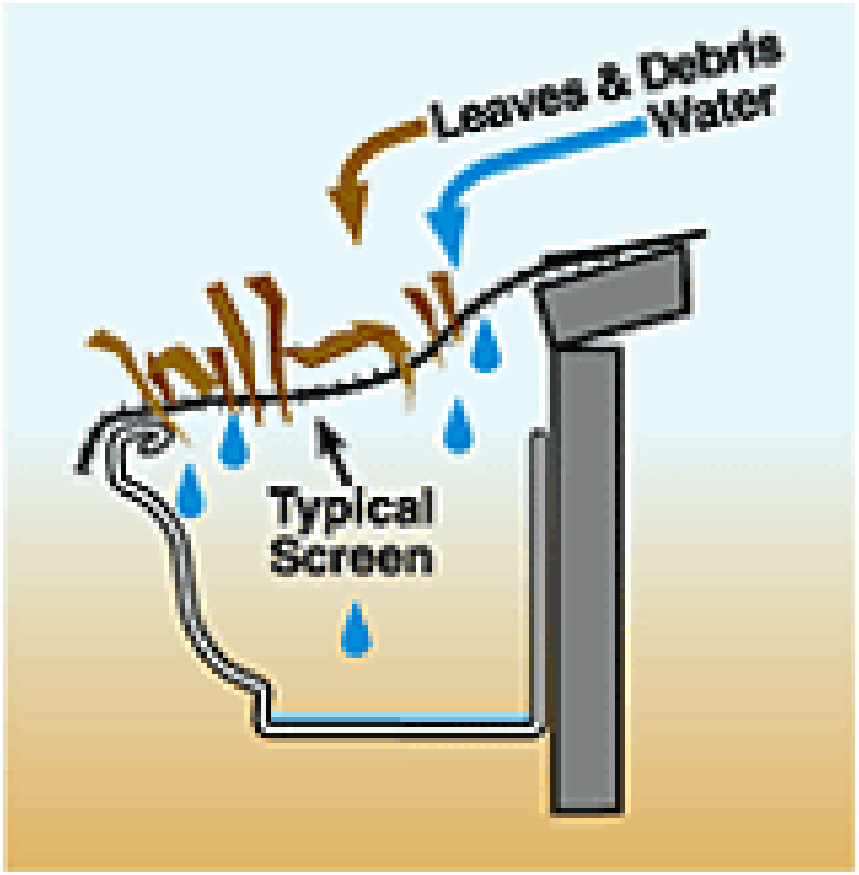
Water quality

- ‘Providing the rainwater is clear, has little taste or smell and is from a well-maintained system it is probably safe and unlikely to cause any illness for most users’ DH
- Few known cases of illness from drinking rainwater despite the poor maintenance of many systems
- Chemical contamination from lead flashings.
- Excellent water quality results – Sustainable House. Rainwater testing

Filtration

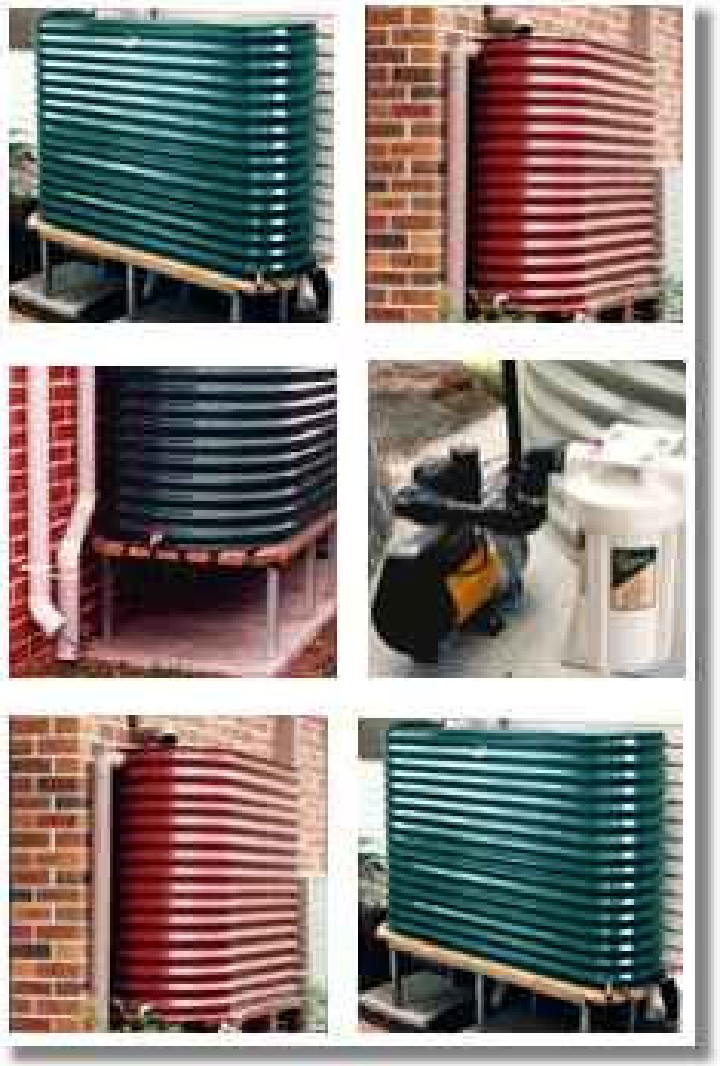
Maintenance

- Clean gutters regularly
- Remove overhanging branches
- Alternative gutters – round profile
- Leaf screens
- First flush diversion
- Tank cleaning



System design considerations

- Existing rainwater tank
- Existing house
- New house



Existing rainwater tank(s)

- What condition are your tank, downpipes, guttering and roof in?
- Is a significant proportion of your roof area connected to the tank?
- Most importantly – how can you make best use of the water in the tank?

Rusted tank

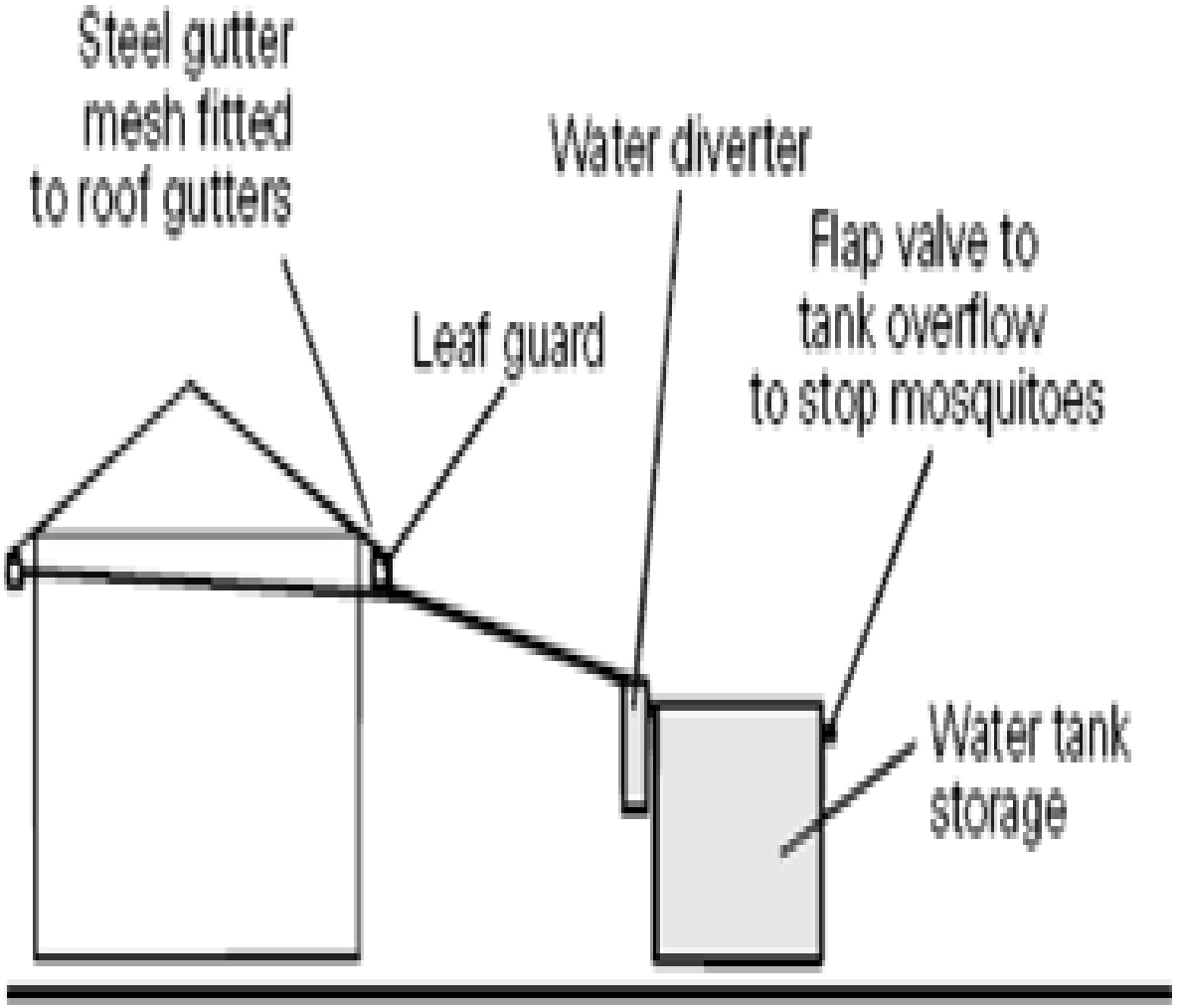
Melted tank

Installing a rainwater system

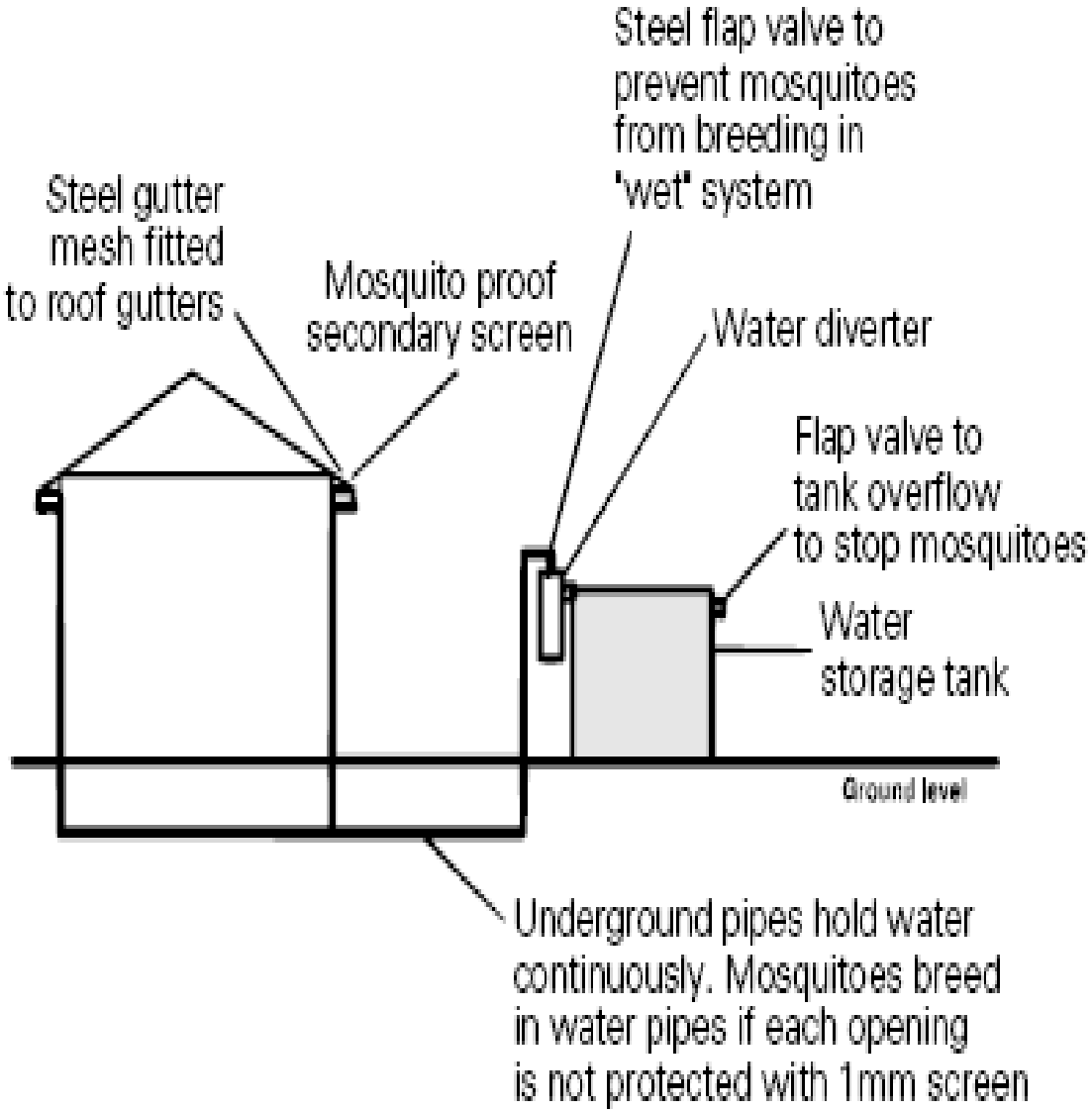
- Rare for all the rainwater to be directed to one location
- Compromise between aesthetics, connected roof area, proximity to water usage and access to mains power
- Rainwater tank systems can be attractive

Tank location

Dry systems


Steel gutter
mesh fitted
to roof gutters
Water diverter
Flap valve to
tank overflow
to stop mosquitoes
Leaf guard
Water tank
storage

Wet systems


Steel flap valve to prevent mosquitoes from breeding in 'wet' system
Steel gutter mesh fitted to roof gutters
Mosquito proof secondary screen
Water diverter
Flap valve to tank overflow to stop mosquitoes
Water storage tank
Ground level
Underground pipes hold water continuously. Mosquitoes breed in water pipes if each opening is not protected with 1mm screen

Designing a dry system

- Run downpipes around house walls
- Satellite tanks
- Weirs
- Underground tanks

How to plumb in whole house

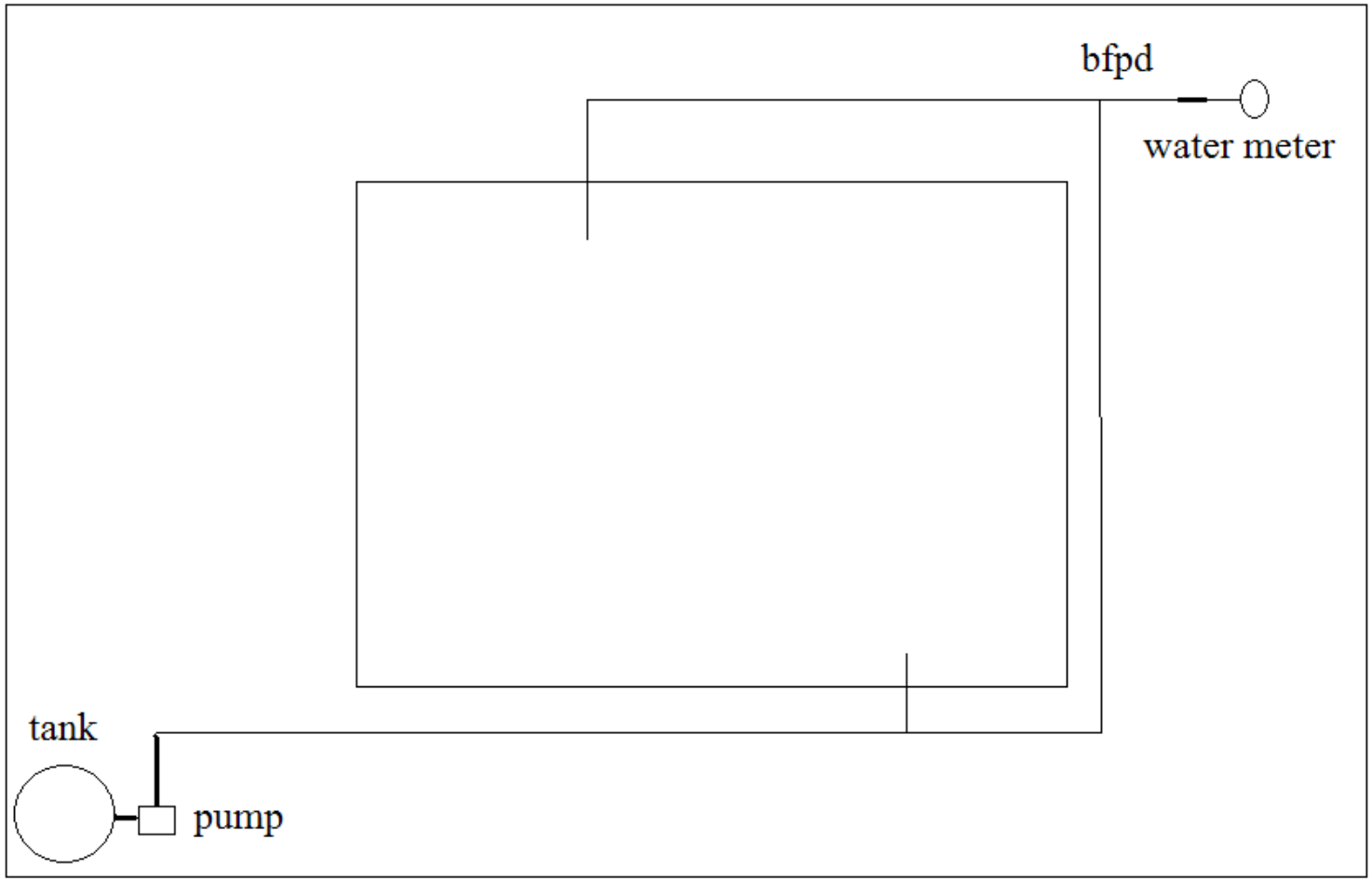
- Mains water feed into the wet areas is very uncertain.
- Connect from the pressure pump into the nearest ¾” mains line.

Switching between Mains and rain water

- Switch over to rainwater: turn the mains off at the water meter and the rainwater on

- Pump pressurises the mains line to the backflow prevention device

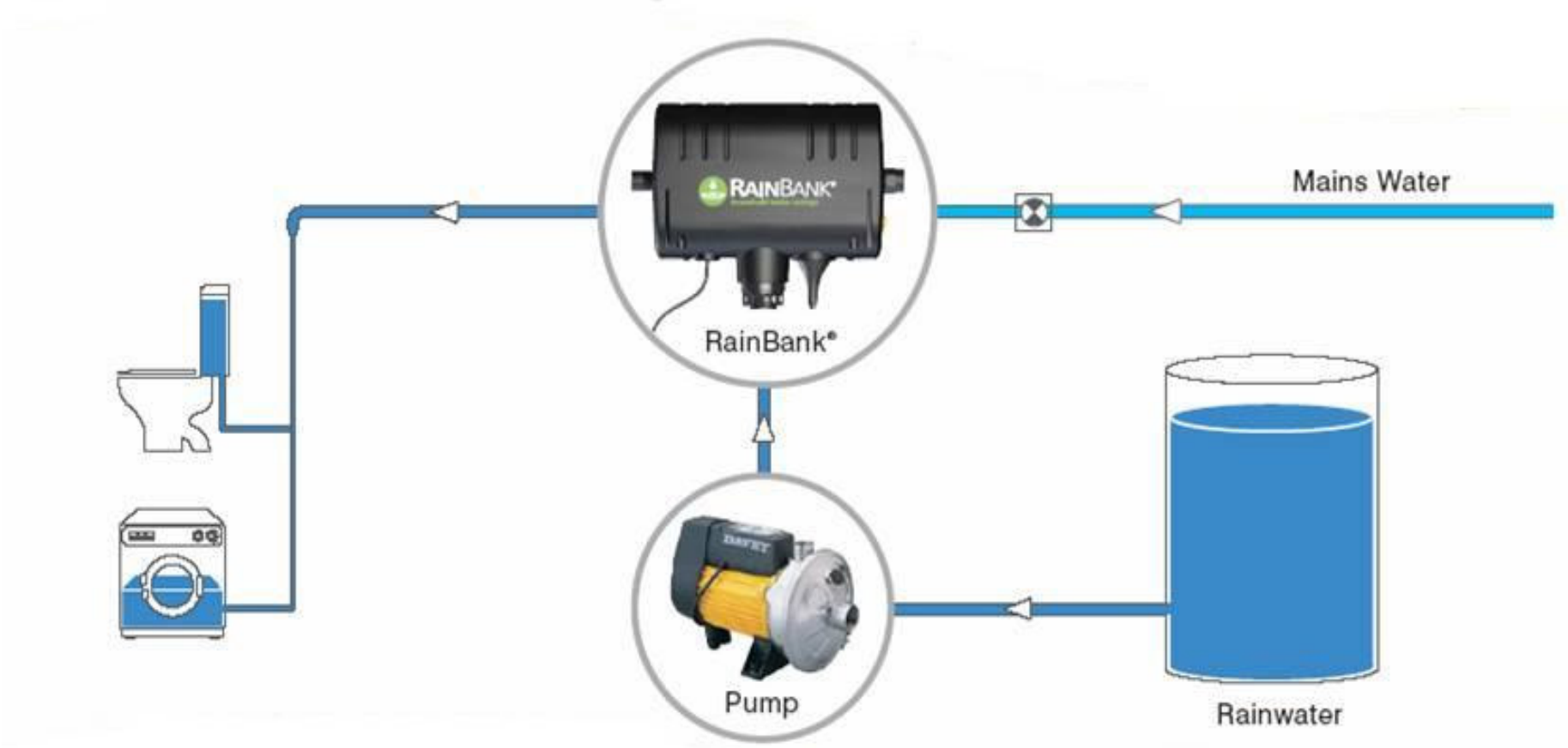
How to plumb in whole house



Pumps

- Location near tank, power
- Flow control
- Variable speed
- Expansion vessel

Automatic switching
RainBank or Rainsaver



Tank top-up systems

- Use a float valve (like a toilet cistern) to partially top up the rainwater tank when the water level gets too low
- Cheaper to install but increase pumping energy use and requires backflow prevention device

Gravity feed

New homes/renovations

- If you are building or undertaking extensive renovations there are some excellent opportunities that are difficult to realise in existing buildings.

- At a minimum integrate the rainwater system into the building design from the very beginning.

New homes/renovations

- Tank location? Above ground or below?
- Can the roofline be simplified? Cheaper to build
- Co-location of tank, hot water system and wet areas? Saves energy, water and construction costs
- Can a gravity feed system be used for some household water requirements?

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SA rebate

- Up to $1,000 maximum
- Covers new, existing and additional tanks >1,000 litres
- Must be plumbed in
- Administered by SA Water

Legislation

- Mandatory for new dwellings and extensions > 50 sqm
- Tank size >=1kl
- Connected roof area >=50 sqm
- Plumbed into at least the toilet OR laundry OR hot water service
- Mosquito control, backflow prevention

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Federal rebates

- Up to $500 maximum
- For rainwater tanks plumbed in (or greywater systems)
- Department of Environment
- Green Loans program – home sustainability assessment & reduced cost loans to $10,000

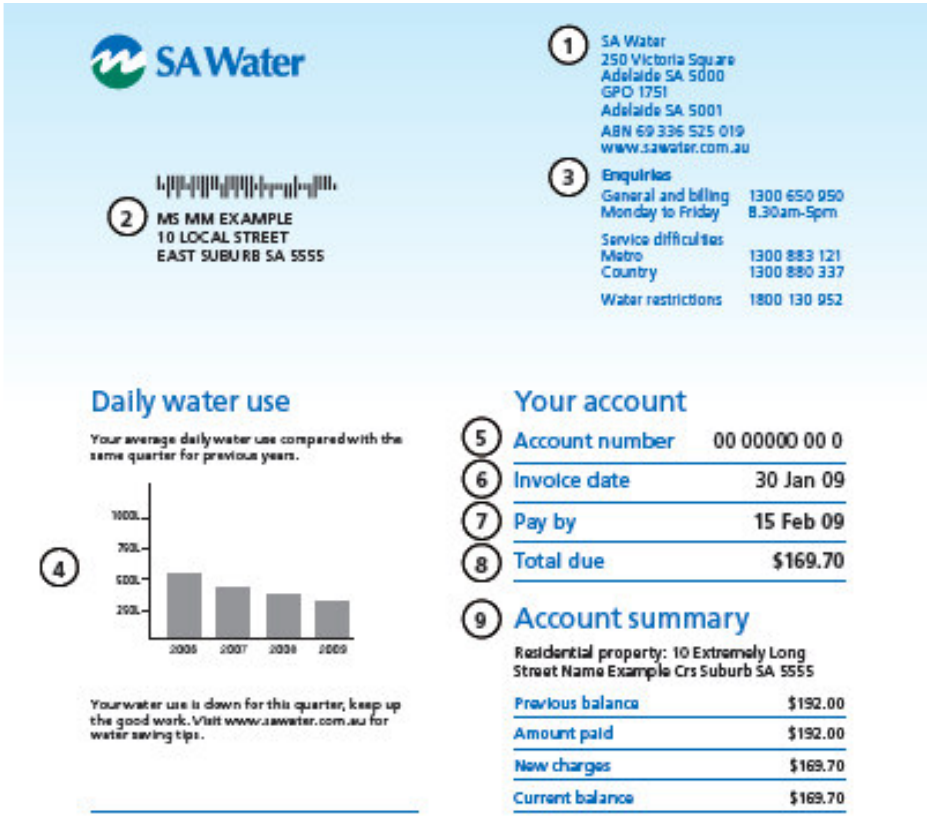
Council approval

Council approval required if:

- Tank area > 10 sqm (ie diameter >3.5 m)
- Tank higher than 4 metres
- Historic Conservation or Hills Face Zone
- Tank and /or pump located underground

Planning & Building Department on 8366 4244

SA Water new look account



SA Water

1 SA Water
250 Victoria Square
Adelaide SA 5000
GPO 1751
Adelaide SA 5001
ABN 69 336 525 019
www.sawater.com.au

2 MS MM EXAMPLE
10 LOCAL STREET
EAST SUBURB SA 5555

3 Enquiries
General and billing 1300 650 950
Monday to Friday 8.30am-5pm
Service difficulties
Metro 1300 883 121
Country 1300 880 337
Water restrictions 1800 130 952

Daily water use

Your average daily water use compared with the same quarter for previous years.

4

Your water use is down for this quarter, keep up the good work. Visit www.sawater.com.au for water saving tips.

Your account

5	Account number	00 00000 00 0
6	Invoice date	30 Jan 09
7	Pay by	15 Feb 09
8	Total due	$169.70

9 Account summary

Residential property: 10 Extremely Long Street Name Example Crs Suburb SA 5555

Previous balance	$192.00
Amount paid	$192.00
New charges	$169.70
Current balance	$169.70

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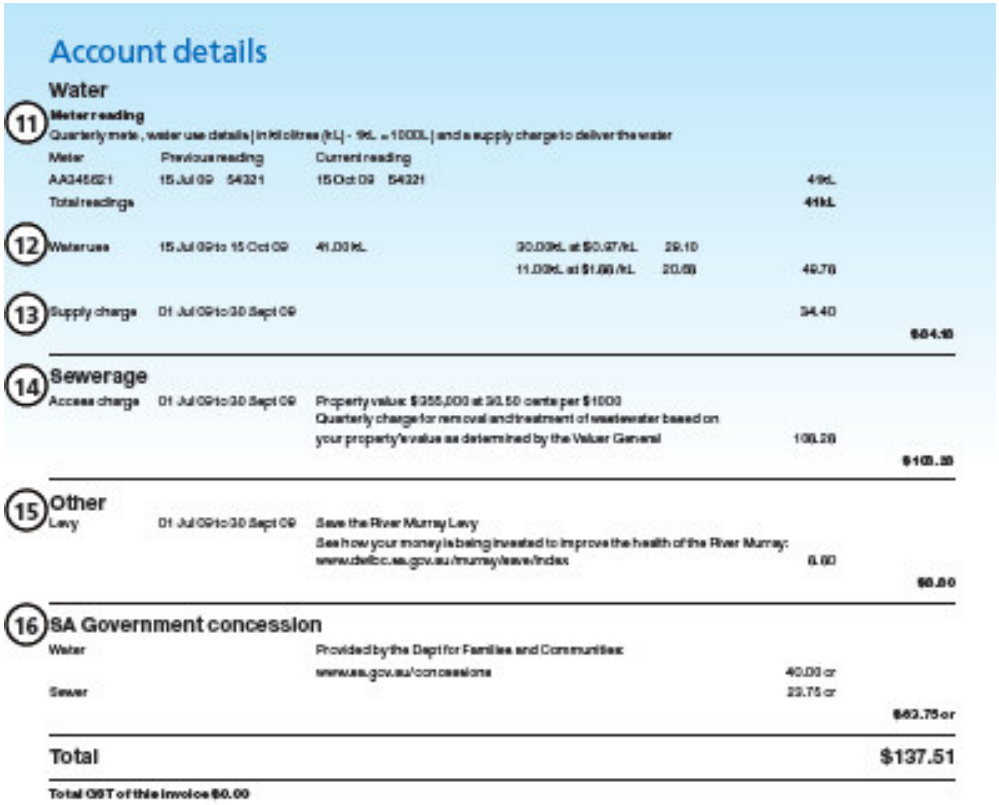

Account details

Water

11 Meter reading
Quarterly meter, water use details in kilolitres (kL) - 1kL = 1000L and a supply charge to deliver the water

Meter	Previous reading	Current reading	
AA345621	15 Jul 09 54321	15 Oct 09 54321	41kL
Total readings			41kL

12 Water use	15 Jul 09 to 15 Oct 09	41.00 kL	30.00kL at $0.97/kL	29.10	
			11.00kL at $1.69/kL	20.66	49.76
13 Supply charge	01 Jul 09 to 30 Sept 09				34.40
					$84.16

14 Sewerage

Access charge	01 Jul 09 to 30 Sept 09	Property value $355,000 at 30.50 cents per $1000 Quarterly charge for removal and treatment of wastewater based on your property's value as determined by the Valuer General	108.28
			$108.28

15 Other

Levy	01 Jul 09 to 30 Sept 09	Save the River Murray Levy See how your money is being invested to improve the health of the River Murray: www.delwc.sa.gov.au/murray/save/index	0.00
			$0.00

16 SA Government concession

Water	Provided by the Dept for Families and Communities: www.sa.gov.au/concessions	40.00 cr
Sewer		22.75 cr
		$62.75 cr

Total	$137.51

Total GST of this invoice $0.00

Page 2

Water meter


100
10
90
THE
DOBBIE DIC
METER CO.
L.
80
20
KILOLITRES
70
30
1 0 5
60
40
50

Greywater

- Comes after efficiency and rainwater in hierarchy
- Straight-forward greywater diversion is now legal (bucketing, washing machine hose etc)

Greywater approval

- Eastern Health Authority

Phone 8132 3600 www.eha.sa.gov.au

- SA Health (Department of Health) Wastewater Management Branch

Phone 8226 7100 www.health.sa.gov.au

- SA Water www.sawater.com.au

System types

- Diversion
  - Simple
  - Treatment occurs in the garden
- Treatment
  - Expensive
  - High energy consumption
  - System failures

Greywater management

- Do not store greywater
- Avoid salts – liquids are preferable to hard soaps and powders
- Avoid complexity
- If building a new dwelling separate the grey and blackwater to allow for future reuse

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Thank you