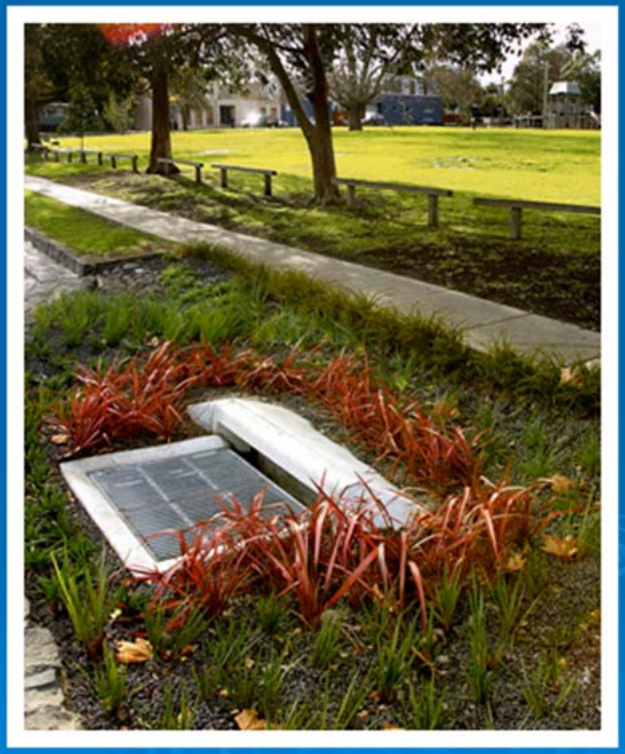
# Melbourne's Journey to Water Sensitive Urban Design



Andrew Marshall

# Outline

- Set the scene (Australia vs Canada)
- The development process in Victoria
- The origins of WSUD
- Implementation issues
- Lessons learned
- Solutions
- Innovation

# A tale of two countries

- Canada
  - 9 984 670 sq. km
  - 33 000 000
- Australia
  - 7 659 861 sq. km
  - 21 000 000


# A little perspective

- Ontario
  - 1 076 395 sq. km
- Victoria
  - 237 000 sq. km
- Toronto
  - 7 100 sq. km (gta)
  - 5 500 000
- Melbourne
  - 8 800 sq. km
  - 4 000 000



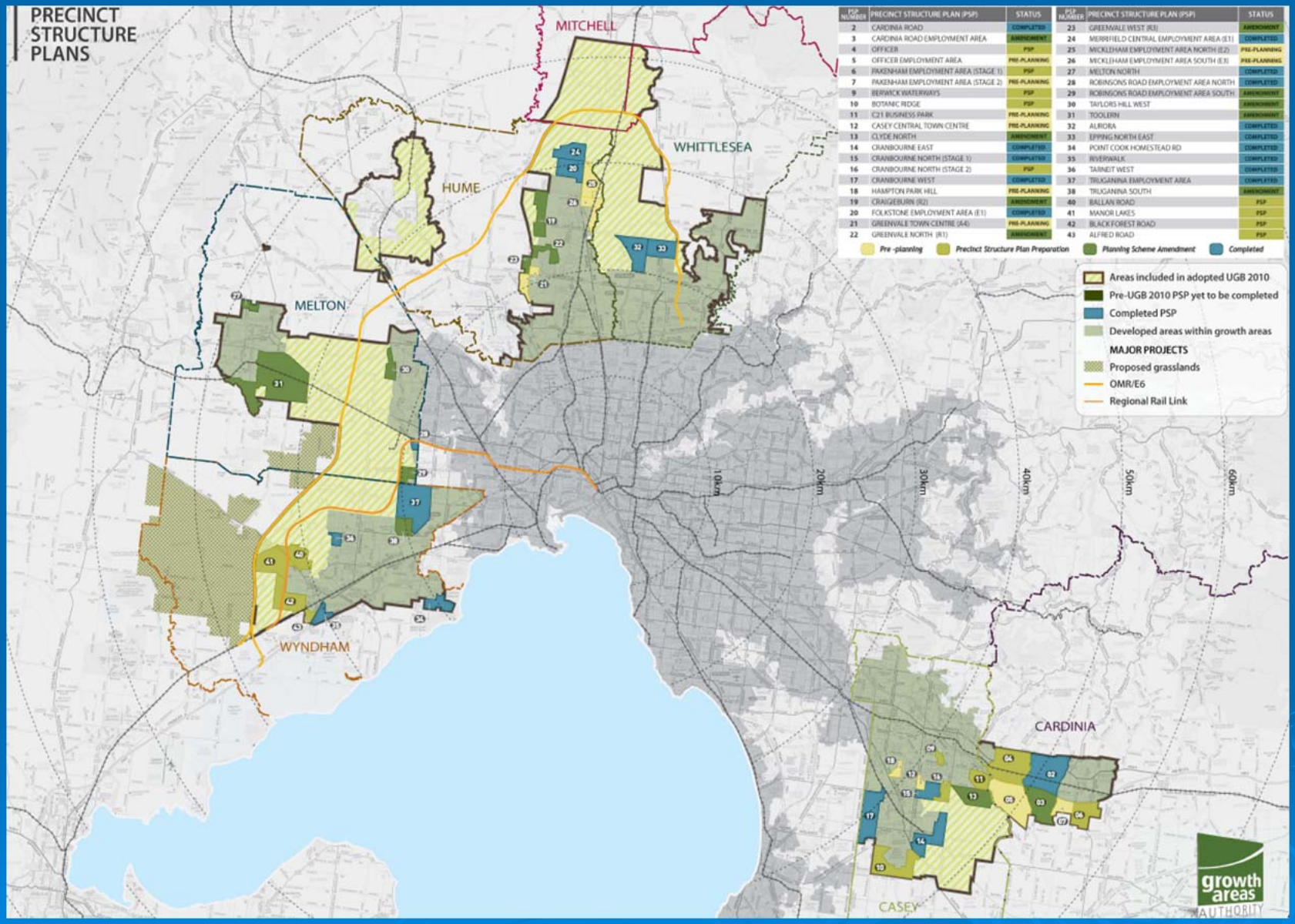
# An extreme climate

- Climate
  - Rainfall
  - Temperature extremes
- Black Saturday Fires
  - February 7, 2009
  - 46.4 degrees in Melbourne
  - Previous week had three straight days of 43 degrees or higher
  - 173 deaths
  - Worst natural disaster in Australian history
  - Threatened water supply reservoirs



# Development in Victoria

- State government
- Local (single tier)
- VPPs vs LPPs
- Planning Schemes
- Amendment process
- Role of GAA
  - UGB
- PSPs



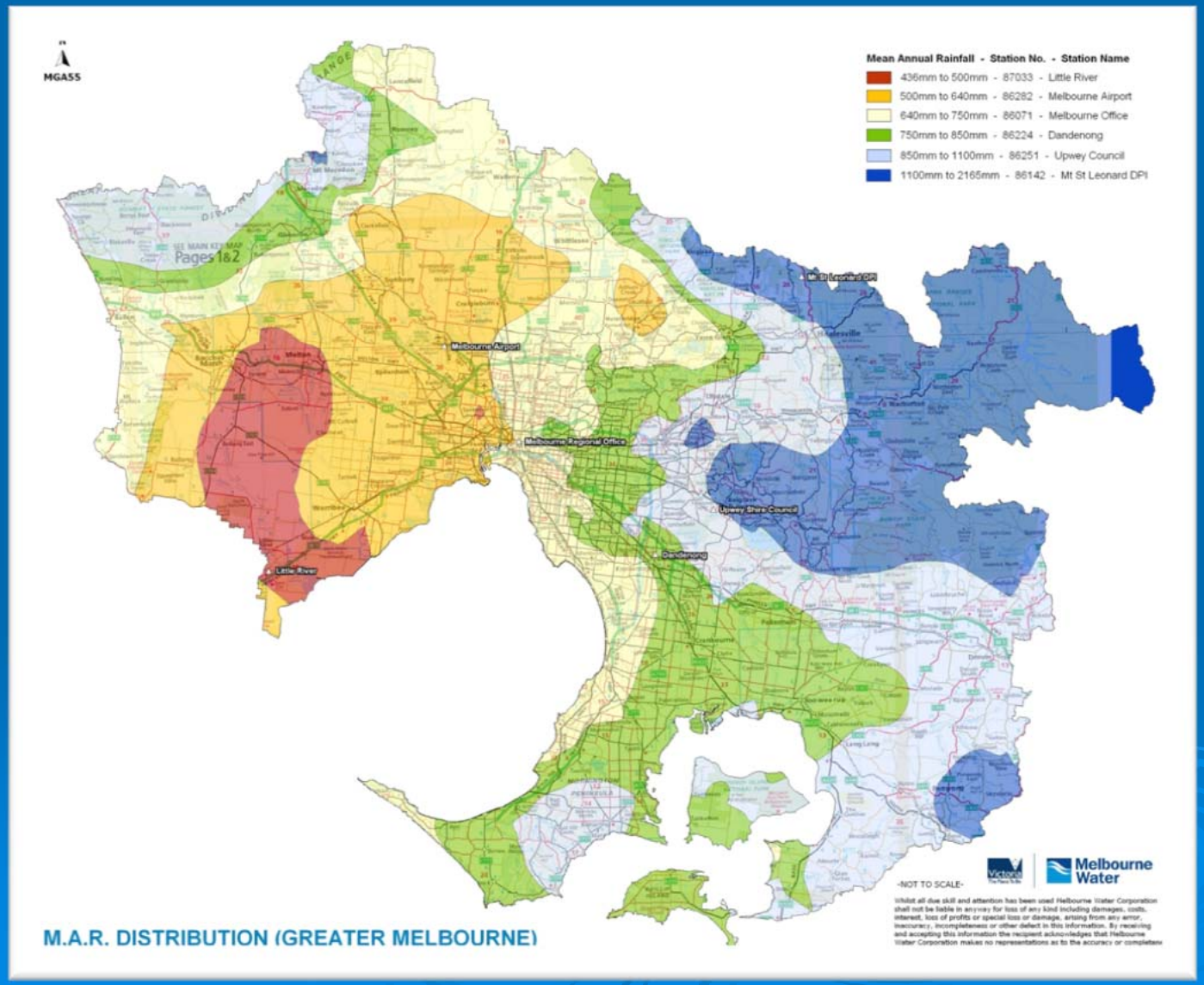

| PSP NUMBER | PRECINCT STRUCTURE PLAN (PSP) | STATUS |
|---|---|---|
| 2 | CARDINIA ROAD | COMPLETED |
| 3 | CARDINIA ROAD EMPLOYMENT AREA | AMENDMENT |
| 4 | OFFICER | PSP |
| 5 | OFFICER EMPLOYMENT AREA | PRE-PLANNING |
| 6 | PAKENHAM EMPLOYMENT AREA (STAGE 1) | PSP |
| 7 | PAKENHAM EMPLOYMENT AREA (STAGE 2) | PRE-PLANNING |
| 9 | BERWICK WATERWAYS | PSP |
| 10 | BOTANIC RIDGE | PSP |
| 11 | C21 BUSINESS PARK | PRE-PLANNING |
| 12 | CASEY CENTRAL TOWN CENTRE | PRE-PLANNING |
| 13 | CLYDE NORTH | AMENDMENT |
| 14 | CRANBOURNE EAST | COMPLETED |
| 15 | CRANBOURNE NORTH (STAGE 1) | COMPLETED |
| 16 | CRANBOURNE NORTH (STAGE 2) | PSP |
| 17 | CRANBOURNE WEST | COMPLETED |
| 18 | HAMPTON PARK HILL | PRE-PLANNING |
| 19 | CRAIGIEBURN (R2) | AMENDMENT |
| 20 | FOLKSTONE EMPLOYMENT AREA (E1) | COMPLETED |
| 21 | GREENVALE TOWN CENTRE (A4) | PRE-PLANNING |
| 22 | GREENVALE NORTH (R1) | AMENDMENT |

| PSP NUMBER | PRECINCT STRUCTURE PLAN (PSP) | STATUS |
|---|---|---|
| 23 | GREENVALE WEST (R3) | AMENDMENT |
| 24 | MERRIFIELD CENTRAL EMPLOYMENT AREA (E1) | COMPLETED |
| 25 | MICKLEHAM EMPLOYMENT AREA NORTH (E2) | PRE-PLANNING |
| 26 | MICKLEHAM EMPLOYMENT AREA SOUTH (E3) | PRE-PLANNING |
| 27 | MELTON NORTH | COMPLETED |
| 28 | ROBINSONS ROAD EMPLOYMENT AREA NORTH | COMPLETED |
| 29 | ROBINSONS ROAD EMPLOYMENT AREA SOUTH | AMENDMENT |
| 30 | TAYLORS HILL WEST | AMENDMENT |
| 31 | TOOLERN | AMENDMENT |
| 32 | AURORA | COMPLETED |
| 33 | EPPING NORTH EAST | COMPLETED |
| 34 | POINT COOK HOMESTEAD RD | COMPLETED |
| 35 | RIVERWALK | COMPLETED |
| 36 | TARNEIT WEST | COMPLETED |
| 37 | TRUGANINA EMPLOYMENT AREA | COMPLETED |
| 38 | TRUGANINA SOUTH | AMENDMENT |
| 40 | BALLAN ROAD | PSP |
| 41 | MANOR LAKES | PSP |
| 42 | BLACK FOREST ROAD | PSP |
| 43 | ALFRED ROAD | PSP |

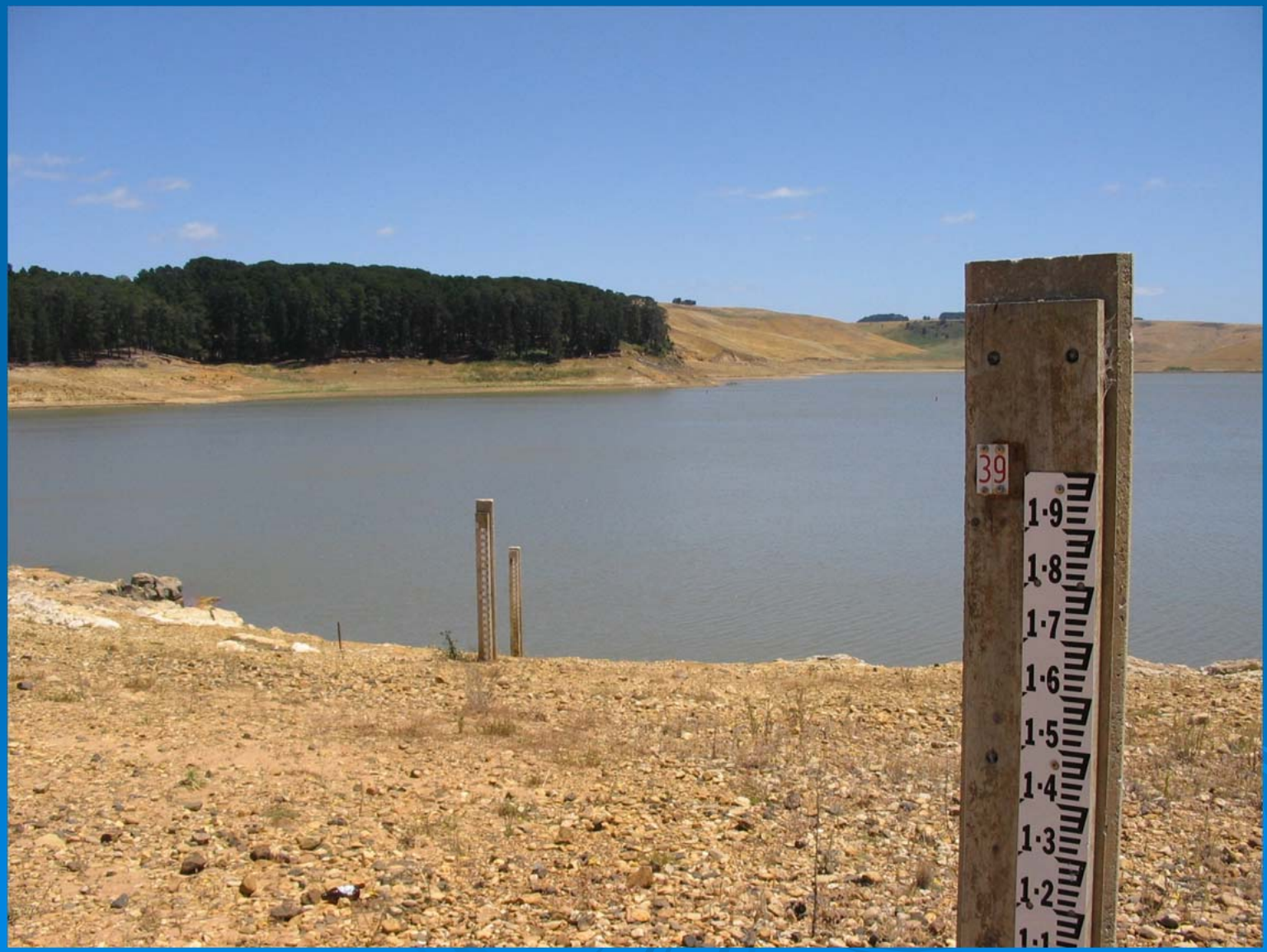
# Water Management

- MW
  - MW provision sewage & drinking water
  - Responsible for waterway health
  - Wholesale
  - Retail (YVW etc)
  - Flooding
- SRW
  - Irrigation
- DSE

# Rainfall


MGA55
Mean Annual Rainfall - Station No. - Station Name
436mm to 500mm - 87033 - Little River
500mm to 640mm - 86282 - Melbourne Airport
640mm to 750mm - 86071 - Melbourne Office
750mm to 850mm - 86224 - Dandenong
850mm to 1100mm - 86251 - Upwey Council
1100mm to 2165mm - 86142 - Mt St Leonard DPI
Pages 1&2
Melbourne Airport
Melbourne Regional Office
Upwey Shire Council
Dandenong
Little River
Melbourne Water
-NOT TO SCALE-
M.A.R. DISTRIBUTION (GREATER MELBOURNE)

# The Big Dry



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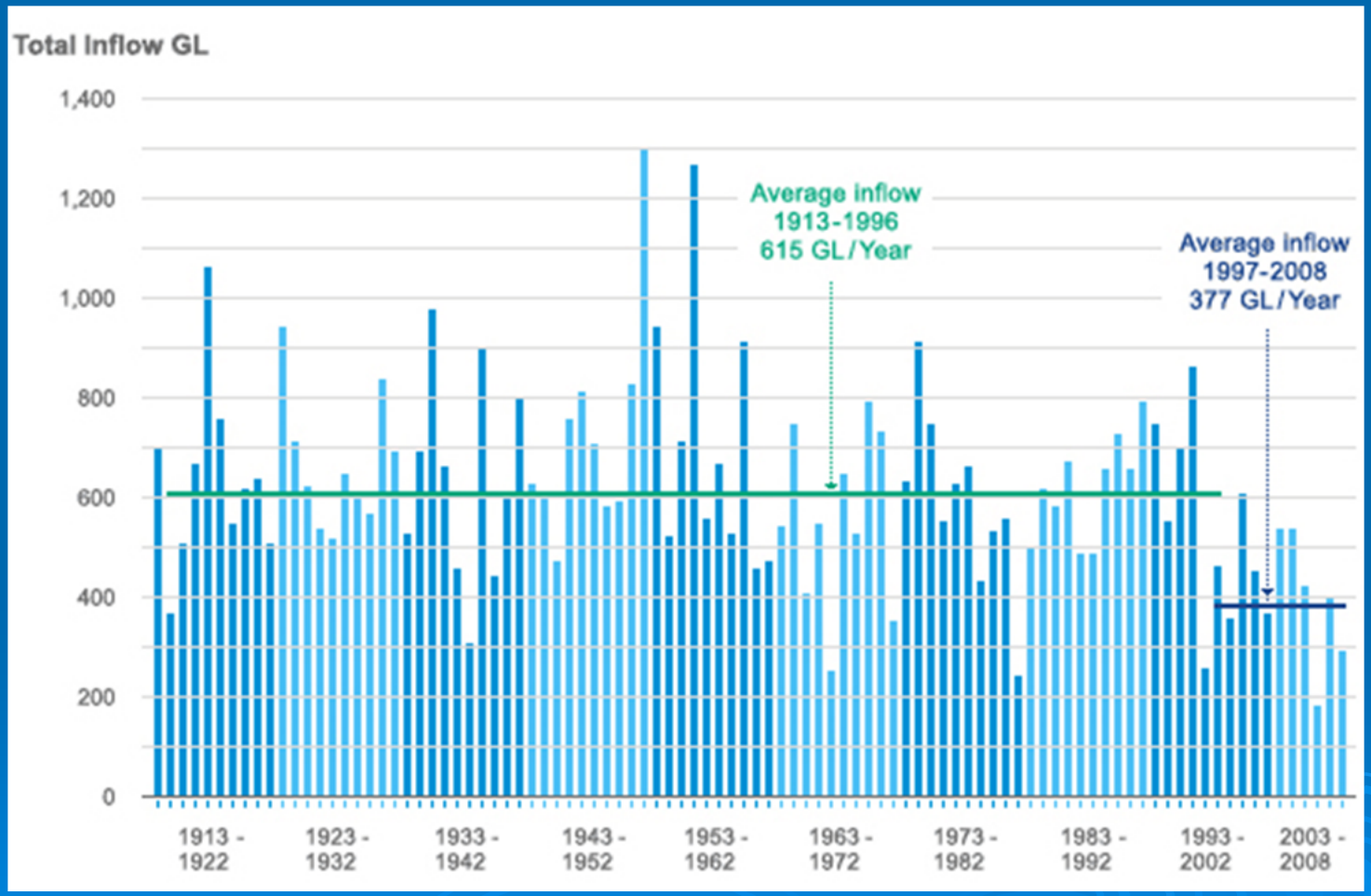
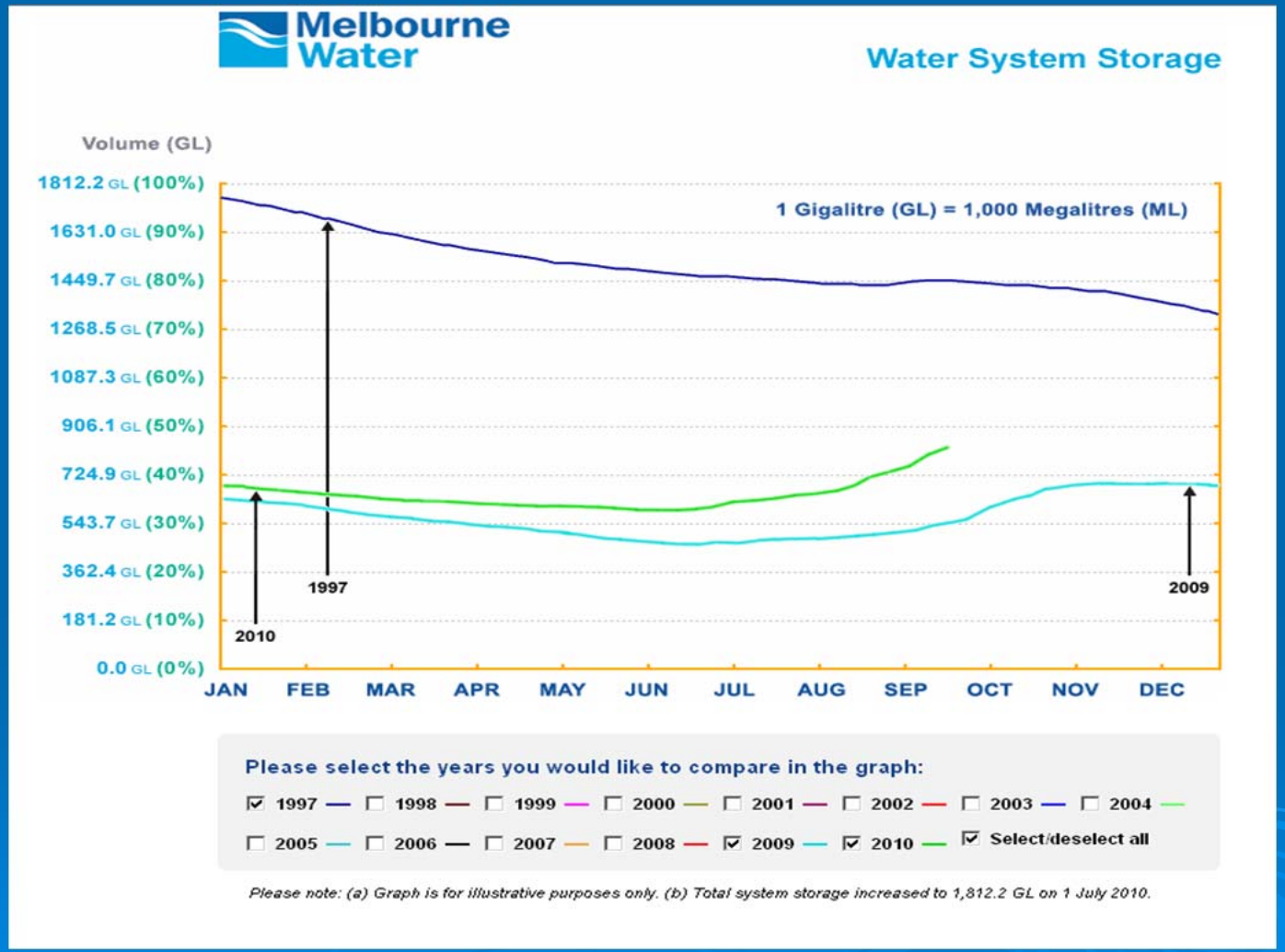

Total Inflow GL
1,400
1,200
1,000
800
600
400
200
0
Average Inflow
1913-1996
615 GL/Year
Average Inflow
1997-2008
377 GL/Year
1913 - 1922
1923 - 1932
1933 - 1942
1943 - 1952
1953 - 1962
1963 - 1972
1973 - 1982
1983 - 1992
1993 - 2002
2003 - 2008

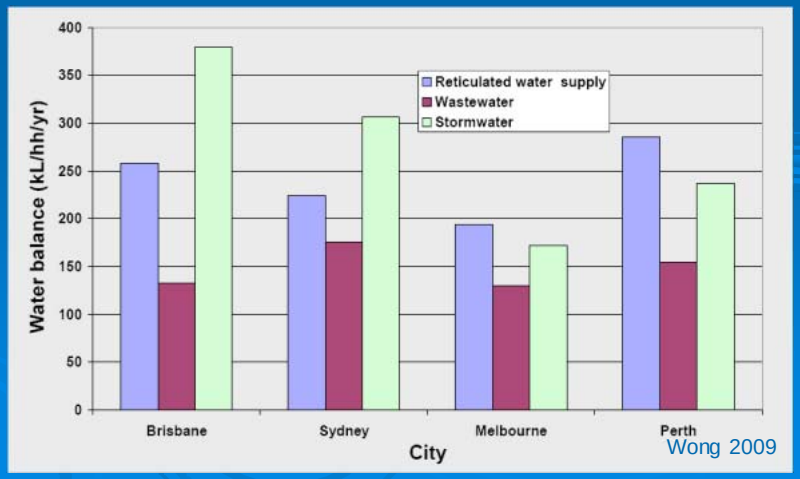
# The Big Dry


Melbourne Water
Water System Storage
Volume (GL)
1812.2 GL (100%)
1631.0 GL (90%)
1449.7 GL (80%)
1268.5 GL (70%)
1087.3 GL (60%)
906.1 GL (50%)
724.9 GL (40%)
543.7 GL (30%)
362.4 GL (20%)
181.2 GL (10%)
0.0 GL (0%)
1 Gigalitre (GL) = 1,000 Megalitres (ML)
1997
2010
2009
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
Please select the years you would like to compare in the graph:
1997 1998 1999 2000 2001 2002 2003 2004
2005 2006 2007 2008 2009 2010 Select/deselect all
Please note: (a) Graph is for illustrative purposes only. (b) Total system storage increased to 1,812.2 GL on 1 July 2010.

# The Big Dry

- Drought proofing strategies
  - Desalination
  - Third pipe
  - Stormwater harvesting
- Even with the drought Melbourne almost generates enough stormwater runoff to meet its needs






Wong 2009

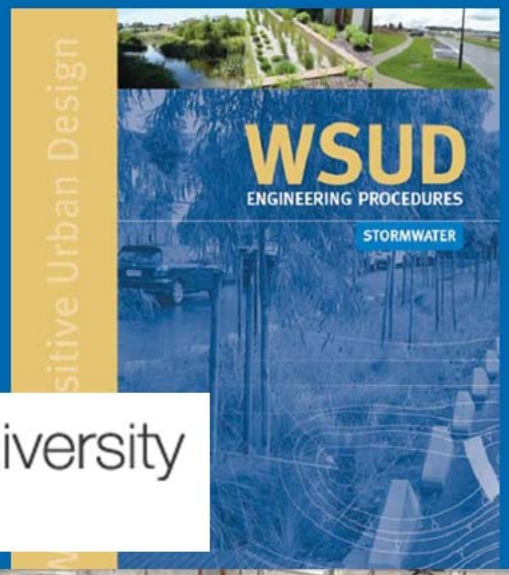
# Stormwater, friend and foe

- Initially concerned only about flooding
- Concern about water quality in the Bay
- Led people to question the way stormwater is managed


# Problems and Solutions

- CSIRO study

- Advent of WSUD
  - Clause 56.07
  - Hot bed of WSUD technology
  - Culture of stormwater ‘thinkers’

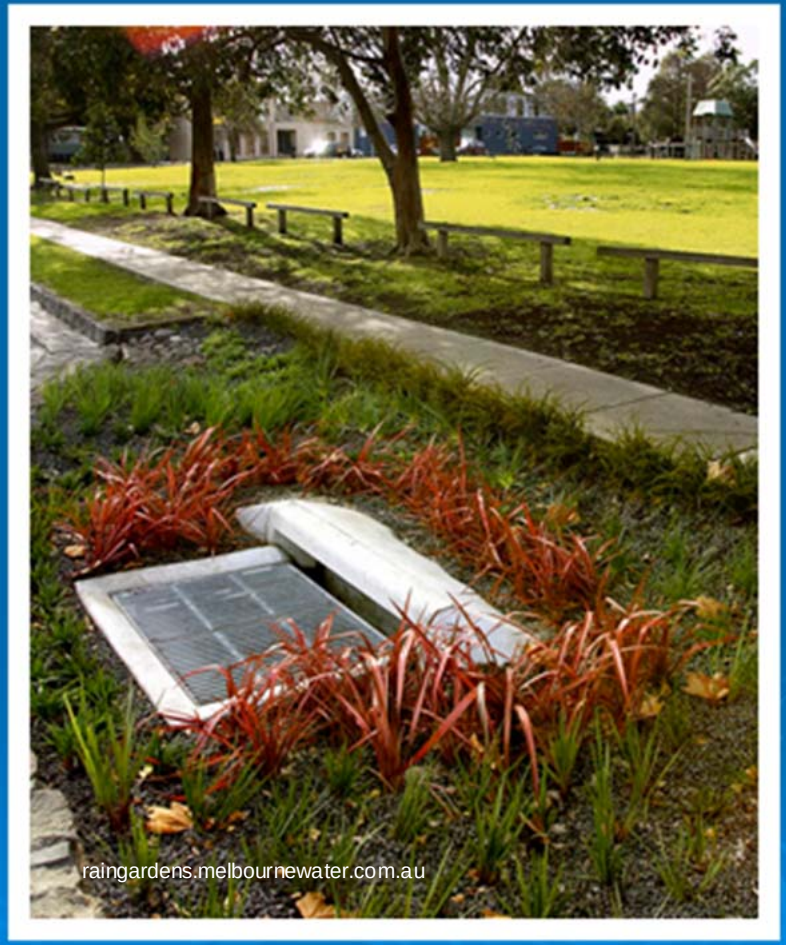



# Clause 56 and the new way of doing things

- Clause 56.07
- Integrated Water Management for Residential Subdivision
- Introduced October 9 2006
- Applies to all new vacant lots in:
  - Residential Zones
  - Mixed Use Zones

# Clause 56.07 continued…

- Four objectives and standards
  - Drinking Water Supply
  - Fundamentally unchanged
- Reused and Recycled Water
  - Dual pipe infrastructure provided to lots where required by retail water authorities
- Wastewater Management
  - Fundamentally unchanged
- **Stormwater Management**
  - **The major changes!**



# Clause 56.07 continued…

- Key change:
- Need to meet Urban Stormwater Best Practice Environmental Management (USBEPM) Guidelines:
  - 80% reduction in TSS
  - 45% reduction in TP
  - 45% reduction in TN
  - 70% reduction in Gross Pollutants (litter)
  - Maintain flow discharges at pre-development levels (1.5-year ARI)
- Requires on-site treatment through WSUD

# The roll out

- Consultation sessions were conducted prior to policy introduction
- Jan 2007 - Melbourne Water funded Clearwater's Senior Stormwater Policy Advisor role to assist councils with the implementation
  - Information sessions with most of the 38 councils in MW area
  - Assistance with WSUD technology and modelling
  - Assistance with policy application

# Change ain’t easy

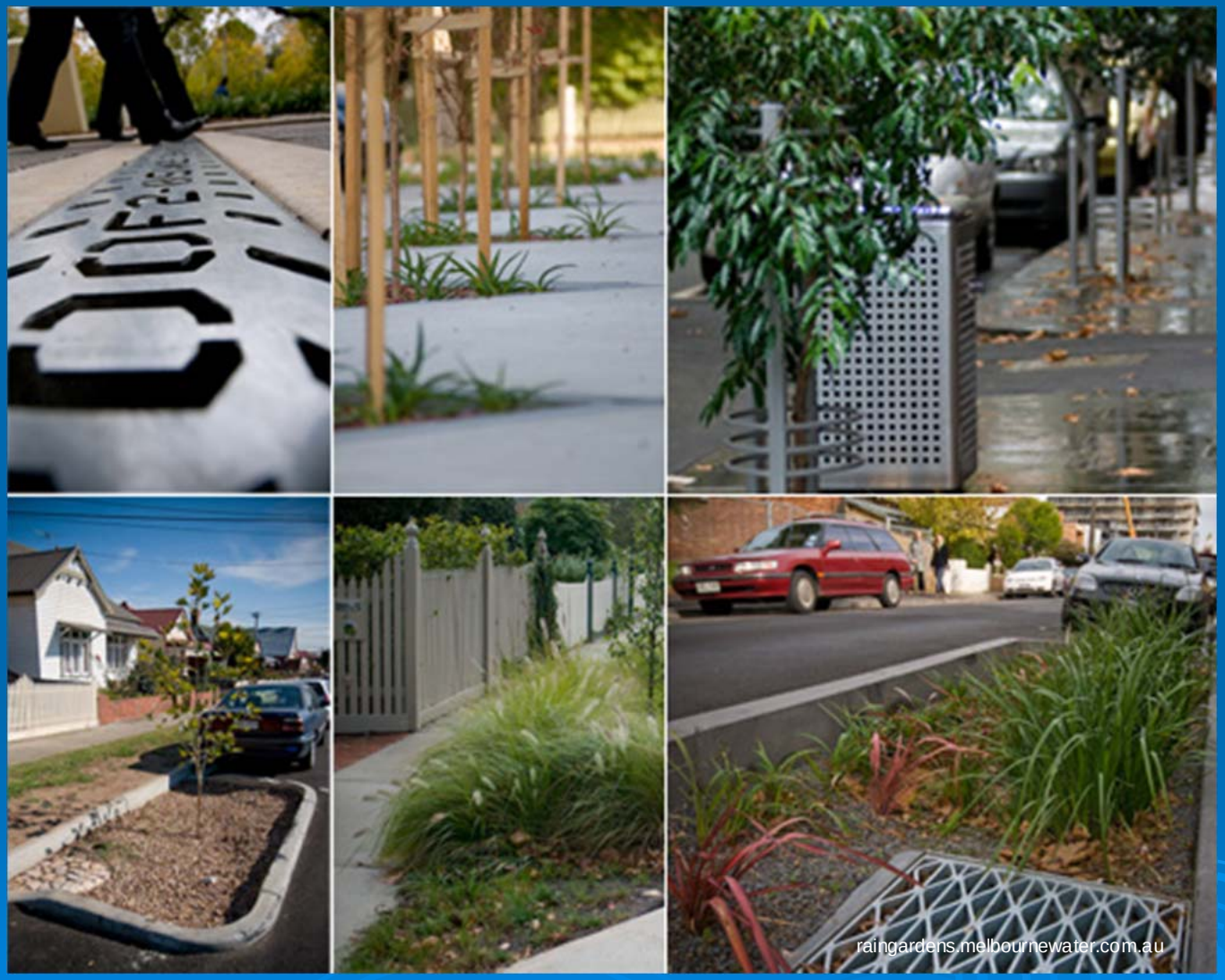
- Fundamental shift in the way stormwater is managed
- Turned nearly 80 years of engineering practice on its head
- Went from hard treatments (pipes, concrete channels) to soft ones (swales, wetlands, raingardens)
- Cultural resistance to change
- Perception of cost-shifting

# Issues

- What the heck is WSUD?
- Councils' inability to influence type of WSUD inherited
- Concerns over councils' ability to maintain WSUD systems
- Lack of interdepartmental communication
  - Is it a garden or infrastructure?
- Inconsistency between individual council employees (knowledge, practical experience)
- Loopholes in policy (land use, infill)
- Lack of relevance to inner city councils

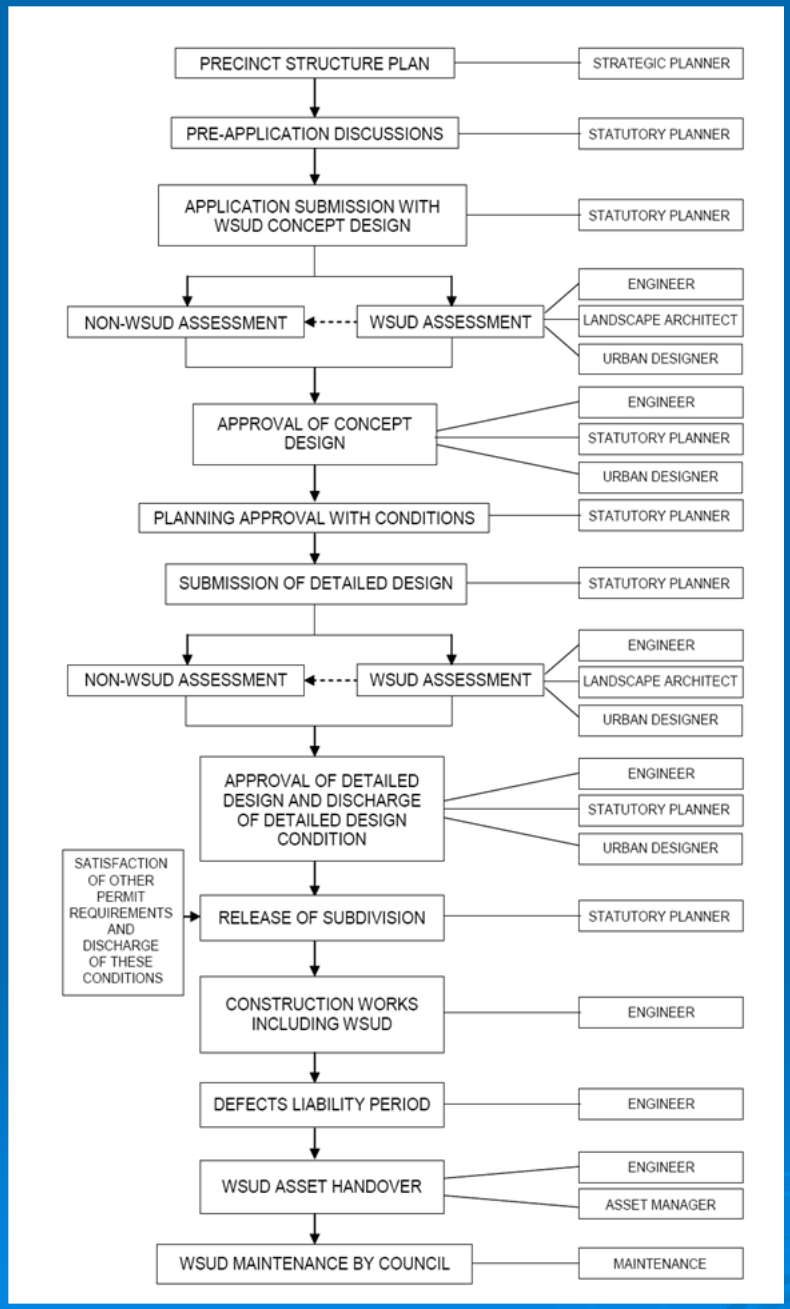
# Responding to the challenge

- Clearwater
  - Support
- Stormwater team
  - Living Rivers
    - Funding
    - Projects such as
    - Street tree pits in urban areas
    - RG in suburbs
    - Learn through experience



raingardens.melbournewater.com.au

# Responding to the challenge

- Regional Stormwater projects
  - Capacity Building
  - Tools
  - Big wetlands
- Leadership/Liaison


PRECINCT STRUCTURE PLAN
STRATEGIC PLANNER
PRE-APPLICATION DISCUSSIONS
STATUTORY PLANNER
APPLICATION SUBMISSION WITH WSUD CONCEPT DESIGN
STATUTORY PLANNER
NON-WSUD ASSESSMENT
WSUD ASSESSMENT
ENGINEER
LANDSCAPE ARCHITECT
URBAN DESIGNER
APPROVAL OF CONCEPT DESIGN
ENGINEER
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URBAN DESIGNER
PLANNING APPROVAL WITH CONDITIONS
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WSUD ASSESSMENT
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URBAN DESIGNER
APPROVAL OF DETAILED DESIGN AND DISCHARGE OF DETAILED DESIGN CONDITION
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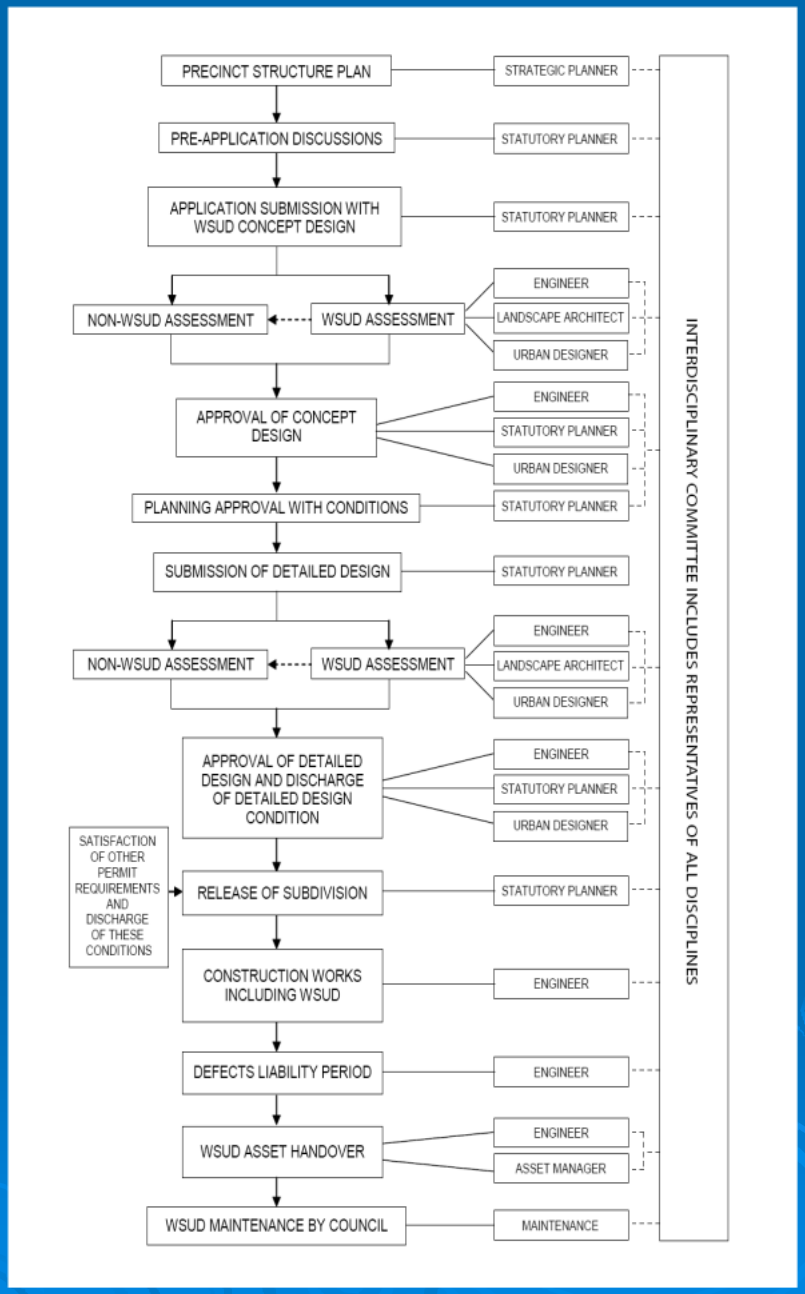
STATUTORY PLANNER
URBAN DESIGNER
SATISFACTION OF OTHER PERMIT REQUIREMENTS AND DISCHARGE OF THESE CONDITIONS
RELEASE OF SUBDIVISION
STATUTORY PLANNER
CONSTRUCTION WORKS INCLUDING WSUD
ENGINEER
DEFECTS LIABILITY PERIOD
ENGINEER
WSUD ASSET HANDOVER
ENGINEER
ASSET MANAGER
WSUD MAINTENANCE BY COUNCIL
MAINTENANCE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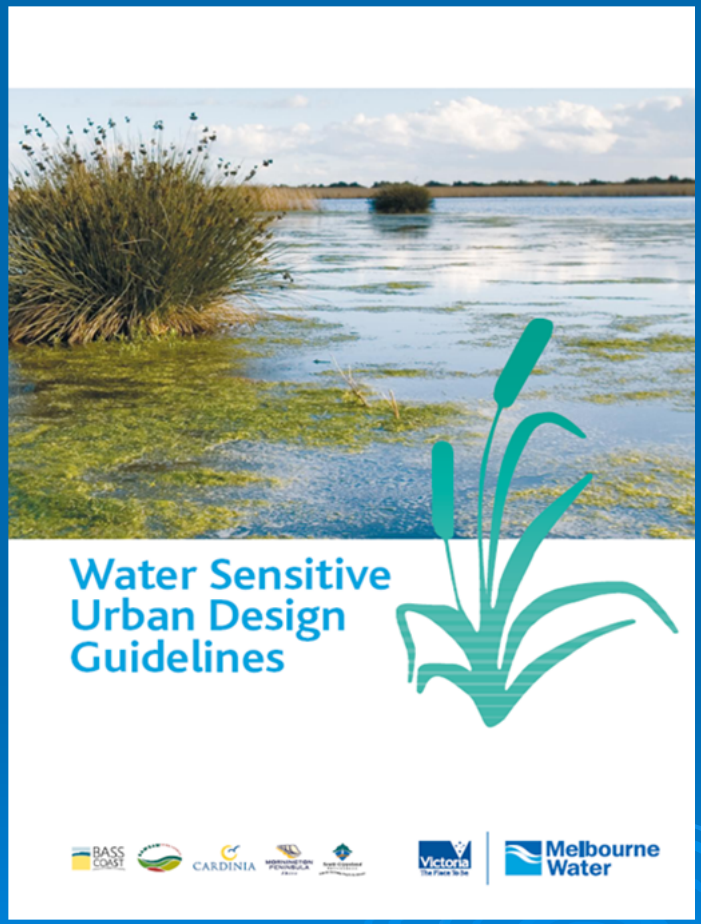
ENGINEER
WSUD ASSET HANDOVER
ENGINEER
ASSET MANAGER
WSUD MAINTENANCE BY COUNCIL
MAINTENANCE
INTERDISCIPLINARY COMMITTEE INCLUDES REPRESENTATIVES OF ALL DISCIPLINES

# Empowering local councils

- Growth Area Guidelines
  - Regional areas
  - Parent document / local council specific
  - Empowering for councils
  - Greater control and certainty over what is built
  - Certainty up-front for developers
- Have been rolled out in the 2 largest growth areas around Melbourne



# Empower and Equip

- Regional networks
  - Councils work best when they learn from each other
  - Regional networks to work on common issues
  - Inter-disciplinary
    - Maintenance
    - Directors
- Seminars & presentations
  - Engineering Institute
  - Surveyors Institute
  - Councils
- Work with state government
  - GAA
  - DPCD
  - PLANET

# Lessons learned over time

- Importance of E&S C
- Multidisciplinary teams
- Get WSUD recognized EARLY in planning process (PSP)
- Regular contact within each council (committee)
- Continuous improvement
- Sustained capacity building
- Freedom for creativity and innovation


# If you build it…

- 50 regional wetlands since program inception
- Together they remove 100 tonnes of TN per year

- Dandenong Valley Wetland
  - 2009
  - 48ha
  - 5000T TSS
  - 9T TP
  - 28T TN

# Blazing the trail

- Lynbrook
  - Construction commenced in July 1999
  - 1700 lots
  - Combination of WSUD & traditional
  - 271 lots are solely WSUD
  - Area of WSUD drainage is 55ha
  - Swales
  - Then wetland
- Won the President's Award from UDIA

# Innovation is now mainstream

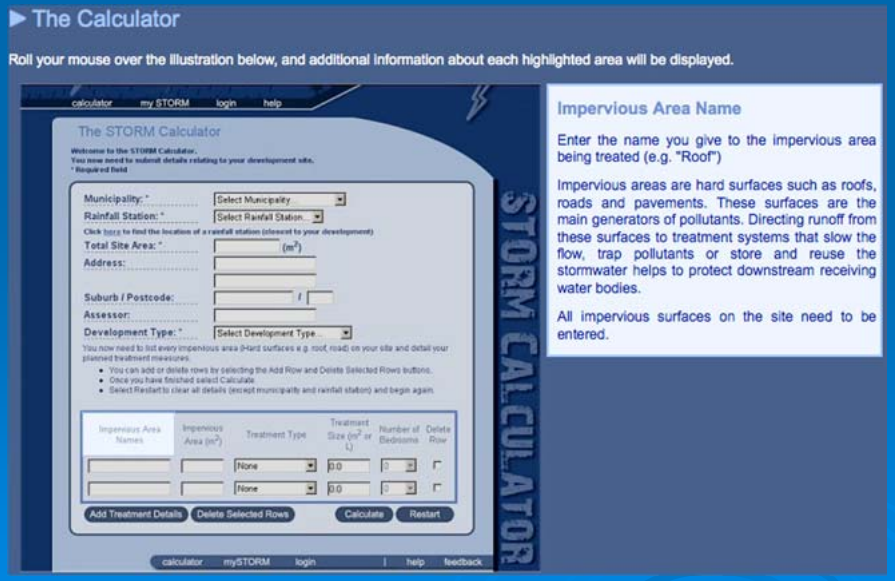
- Mernda
  - 277 lots
  - 40 raingardens
  - Regional wetland
- University Hill
  - Mixed use
  - Wetlands

# Greenfields are easy…what about a retrofit?

- Royal Park Wetlands

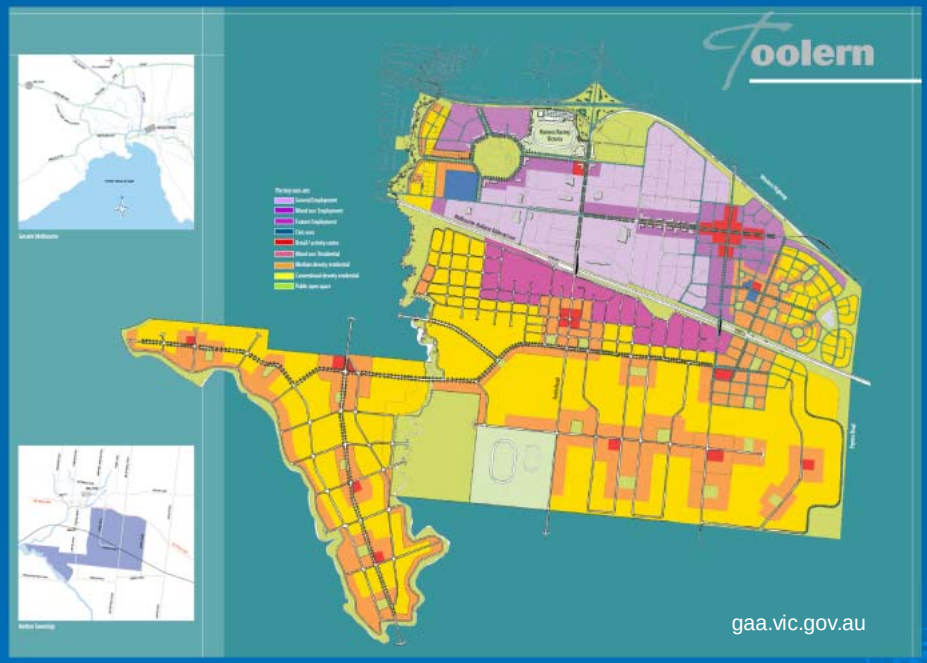
# Greenfields are easy…what about a retrofit?

- Raingardens
- Tanks on existing lots
- Storm calculator




# Pushing the boundaries

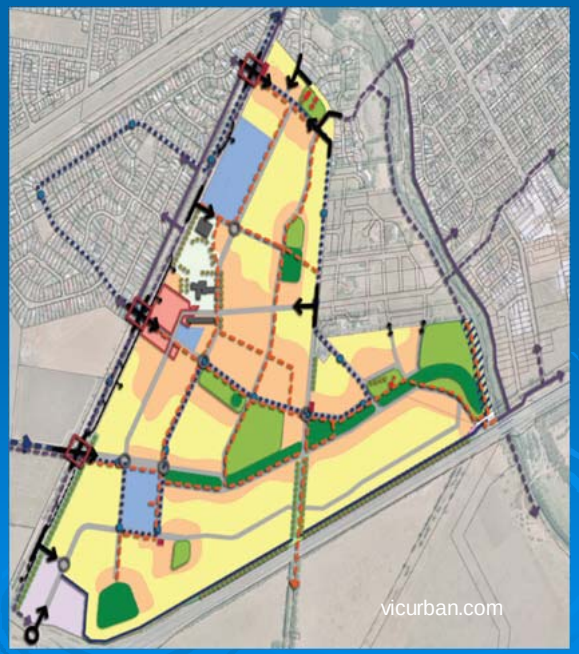
- Toolern
  - Green field
  - 60,000 people
  - 2300 ha
  - Mixed use
  - 1800 ha residential




- Innovation is possible
  - Australia's first Water Neutral suburb (August 24, 2011)

# Pushing the boundaries

- Kalkallo
  - Industrial stormwater harvest and reuse
  - Treating to potable standards
- Werribee ASR
  - Riverwalk dev't
  - 198 ha
  - Raingardens
  - Tanks
  - Online wetlands
  - Potential to send to Werribee ASR site, then supply back to residents
- Western Plains 'Big Roofs'

# Key points

- WSUD (LID) is a useful method to treat stormwater quality & quantity
- Change takes time and needs resources
- Sustained support
- No ‘one size fits all’ solution
- Can enable stormwater to be used as a resource
- Once you have the foundations anything is possible

# Useful Links

- melbournewater.com.au
- clearwater.asn.au
- watersensitivecities.org.au
- www.ewater.com.au/
- www.storm.melbournewater.com.au/
- www.urbanstreams.unimelb.edu.au/cwalsh