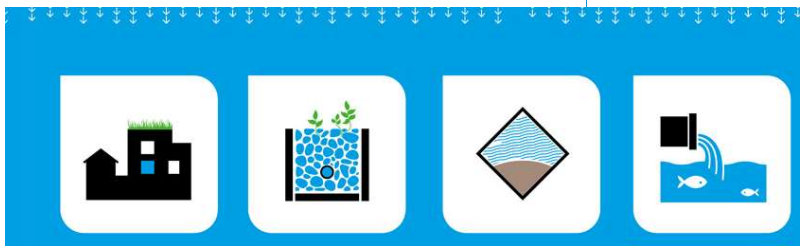
Sponge Cities

Moving from WSUD to Water Sensitive Urban Landscapes

Tim Fletcher



JB1
JB2

A"Sponge city" refers to a city where its urban underground water system operates like a sponge to absorb, store, leak and purify rainwater, and release it for reuse when necessary.

http://www.gochengdu.cn/news/Highlights/chengdu-plans-to-become-sponge-city--a1287.html

Slide 2

JB1 A bit picky, but perhaps I would removed the references on the side? It's hard to read and it spoils the great graphic!
Jeremie Bonneau, 1/11/2017

JB2 but I guess there are copyright issues...?
Jeremie Bonneau, 1/11/2017

The emperor's new clothes

LID

- Matches pre-development hydrology (*on-site* management of stormwater)
- Does not alter downstream and instream flow conditions
- Addresses stormwater quality and quantity issues

Green roof and permeable surfaces slow down and reduce rainfall runoff at a James Madison High School Agriscience Magnet Program building in San Antonio

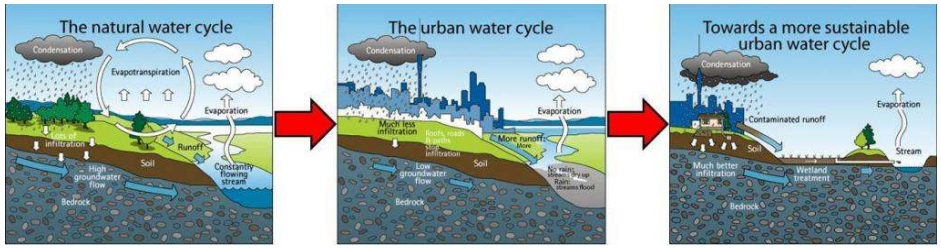
Rain garden and curb cuts capture, slow, and polish street runoff; may be paired with under drain to convey larger flows after polishing first-flush

5

https://image.slidesharecdn.com/lid-120913134837-phpapp02/95/low-impact-infill-development-applications-5-728.jpg?cb=1347544180

Key principles

Water balance & flow regime

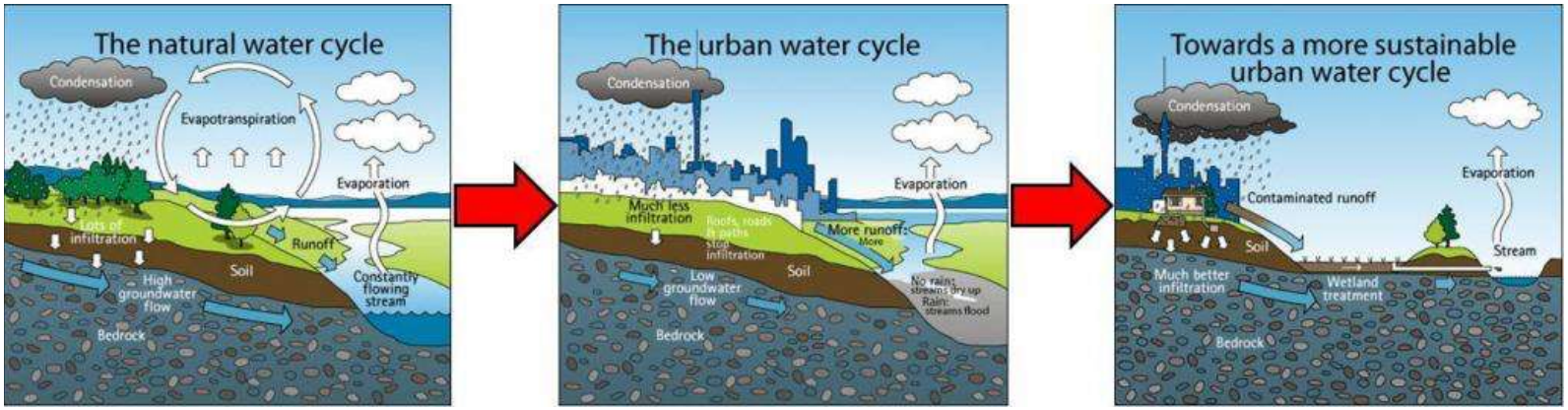


Water quality

Enhance urban landscape

JB3

Maintain site water balance



Slide 5

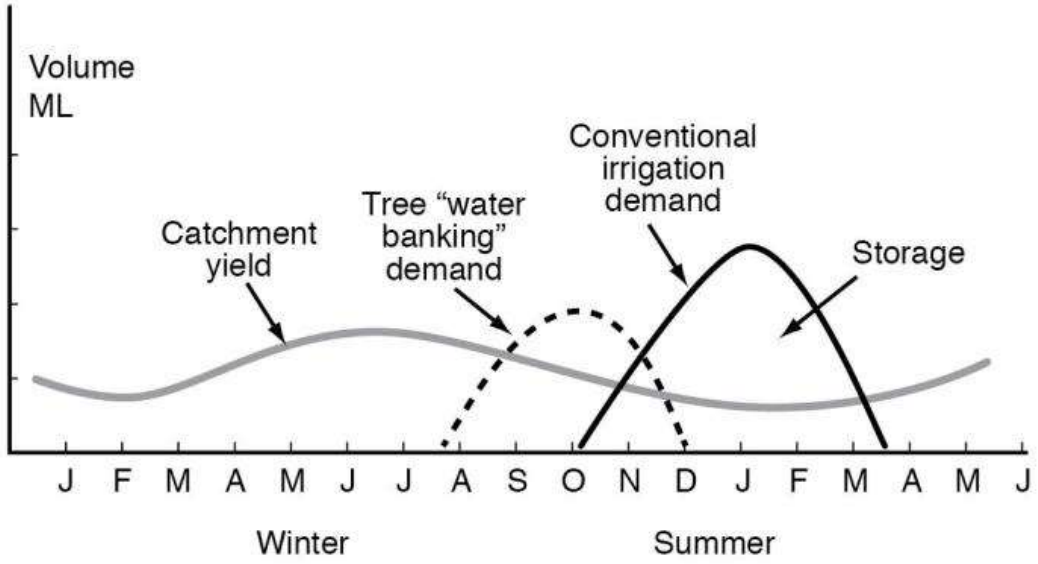
JB3 Is it possible to make the image a bit larger? I find it hard to read (pour les malvoyants comme moi...)

Jeremie Bonneau, 1/11/2017


Pump capacities:
A and B: 5L/s
C: max 30L/s (operation at 15-20L/s)
D: 55L/s
YARRA RIVER
ALEXANDRA AVENUE
MORELL BRIDGE
Lych Gate
G Gate
H Gate
CITY
NORTH
Underground pipe
Wetlands
Circulation pumps
Floating island wetlands
Gross pollutant traps
LONG ISLAND LAGOON
ORNAMENTAL LAKE
A
B
C
D
A Gate
B Gate
C Gate
D Gate
E Gate
F Gate
O Gate
17.77ha catchment
ANDERSON STREET
CENTRAL LAKE
Visitor Centre
Observatory Café
The Gardens Shop
The Ian Potter Foundation Children's Garden
National Herbarium of Victoria
BIRDWOOD AVENUE
Gravity-fed through Fern Gully Creek to Central Lake
Water storage tanks
Lake water pump
Pump to irrigation
Water treatment building (filter & UV)
DALLAS BROOKS DRIVE
Tropical Glasshouse
NYMPHAEA LILY LAKE
GUILFOYLE'S VOLCANO
TAN TRACK
DOMAIN ROAD
3.26ha catchment

Optimising Stormwater Storage

Subsoil Moisture Storage and Recovery (SMSR)

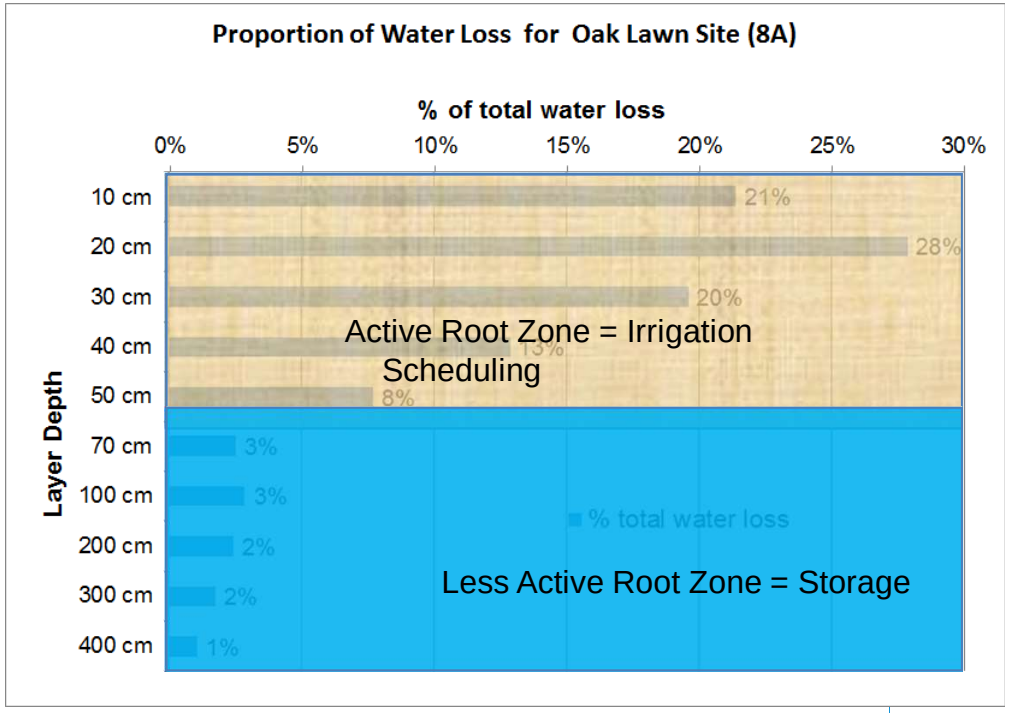


Source: Connellan G and Symes P (2013) *Managing soil water to optimise landscape performance and stormwater supplies.* 2013 Stormwater NSW Conference, 16-19 September, Leura, NSW.

JB14
JB15

Subsoil Moisture Storage and Recovery

Proportion of Daily Water Use by Trees



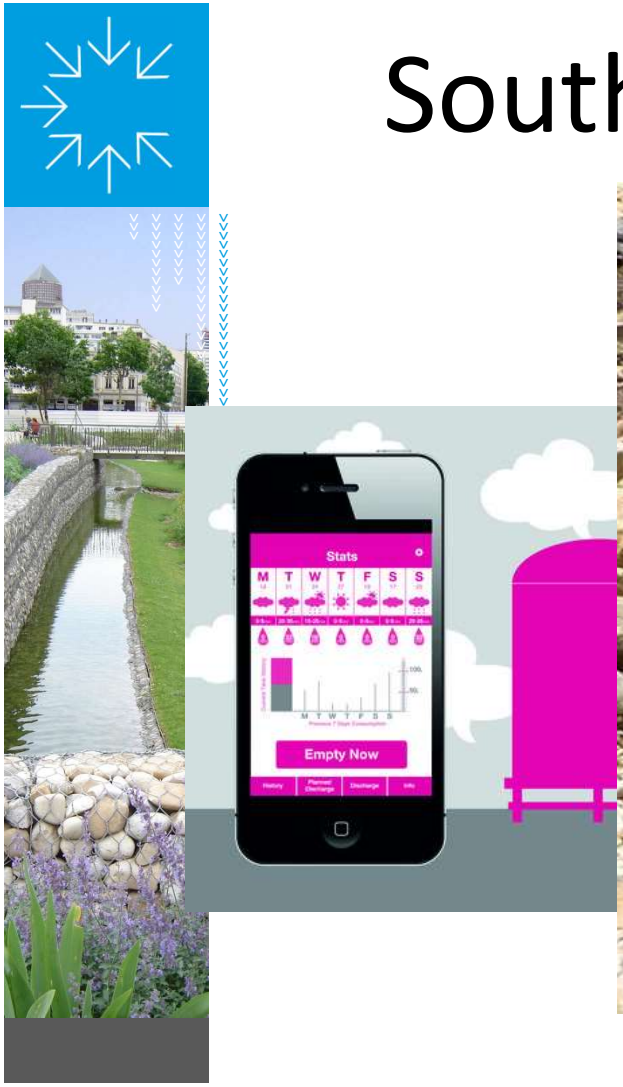
Proximate Trees: Quercus pyrenaica, Q. cerris, Q. coccifera

Slide 9

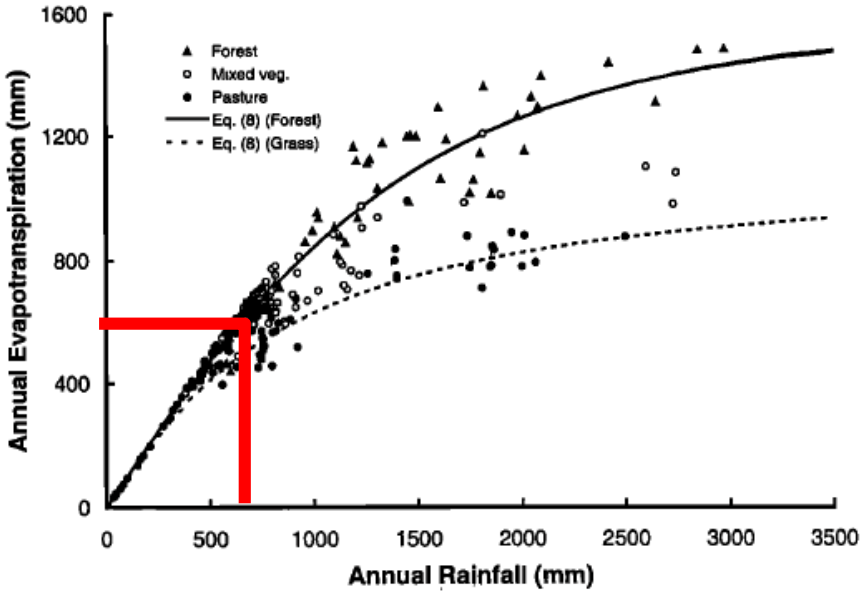
JB14 I am guessing your talk will explain everything, but by just looking at the graph, I am not sure exactly what it is telling me
Jeremie Bonneau, 1/11/2017

JB15 shallow roots use more water than deep roots?
Jeremie Bonneau, 1/11/2017

South East Water tank talk



Go hard or go home!



Zhang et al. (2001)

The 80% ET needs to be "re-lost"!!

20% needs to be "put back" into the soil

Slide 11

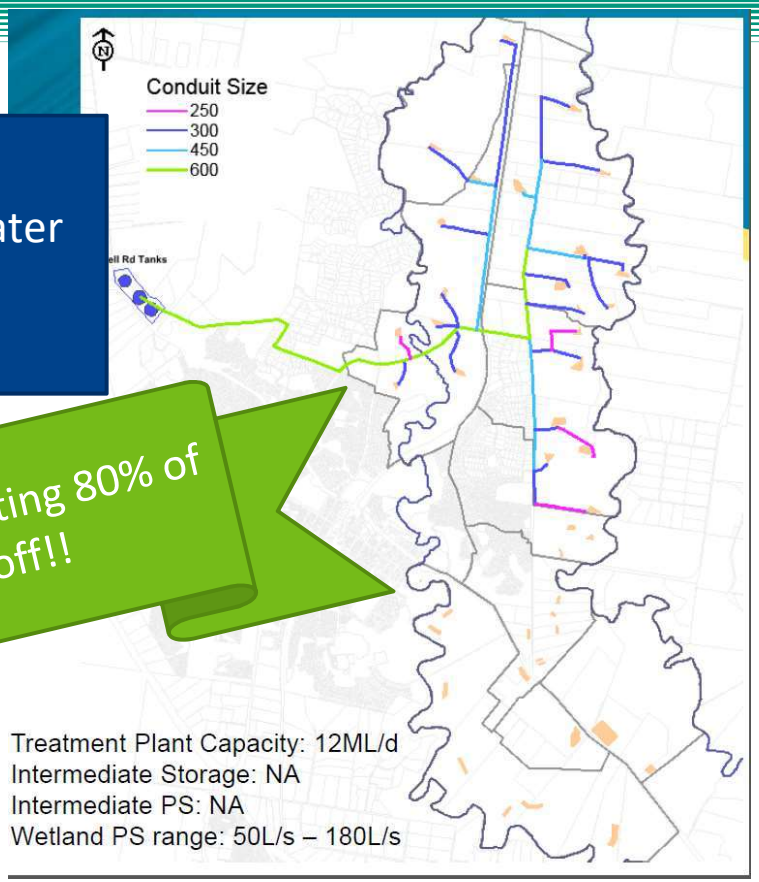
JB5 great graph!
Jeremie Bonneau, 1/11/2017


Stringybark Bvd


Hereford Rd

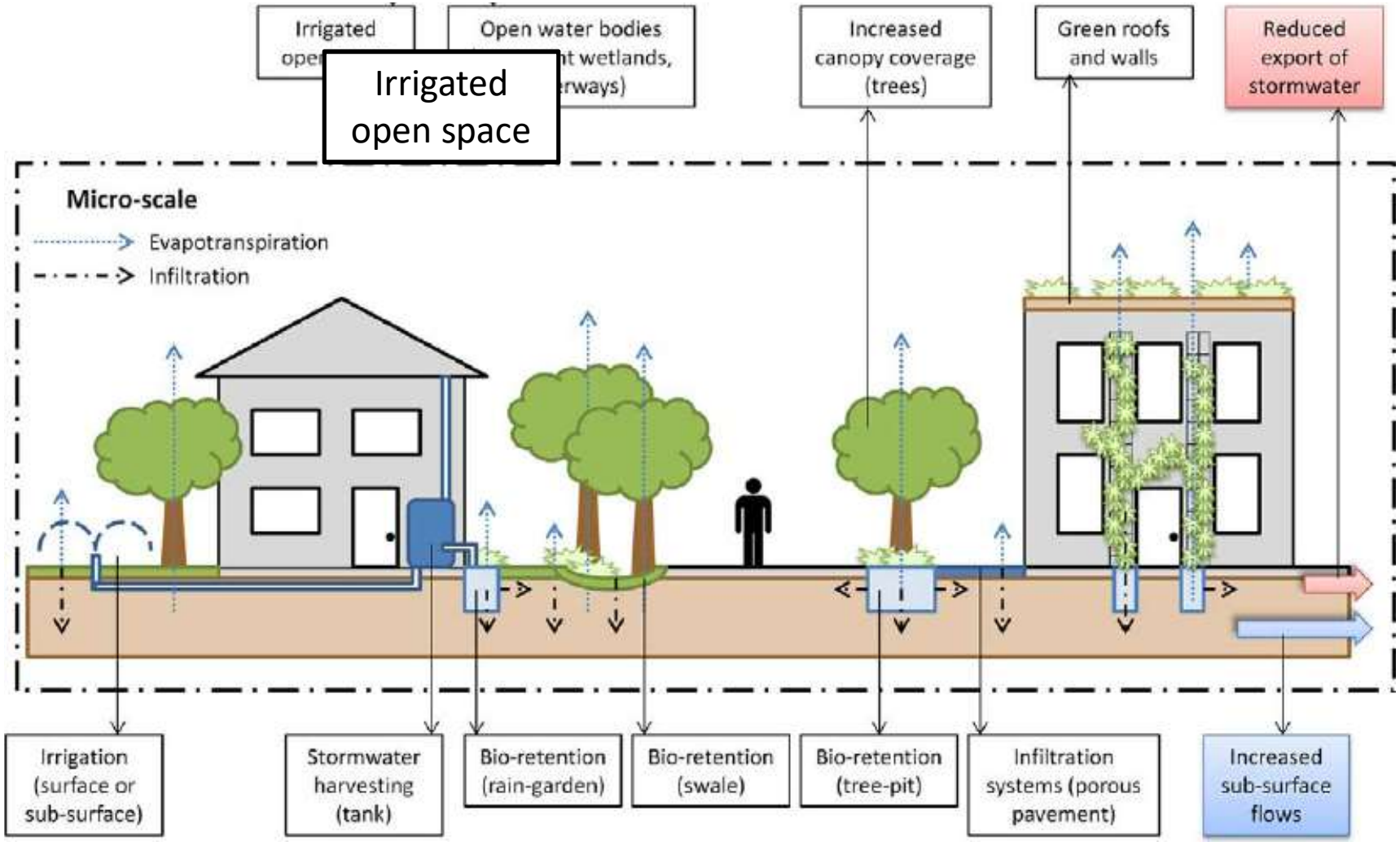
Sunbury IWM Overview

Regional scale stormwater harvesting system



Source: Sarah Watkins (Melbourne Water)

JB6


Irrigated open space
Micro-scale
Evapotranspiration
Infiltration
Irrigated
Open water bodies
Increased canopy coverage (trees)
Green roofs and walls
Reduced export of stormwater
Irrigation (surface or sub-surface)
Stormwater harvesting (tank)
Bio-retention (rain-garden)
Bio-retention (swale)
Bio-retention (tree-pit)
Infiltration systems (porous pavement)
Increased sub-surface flows

Slide 14

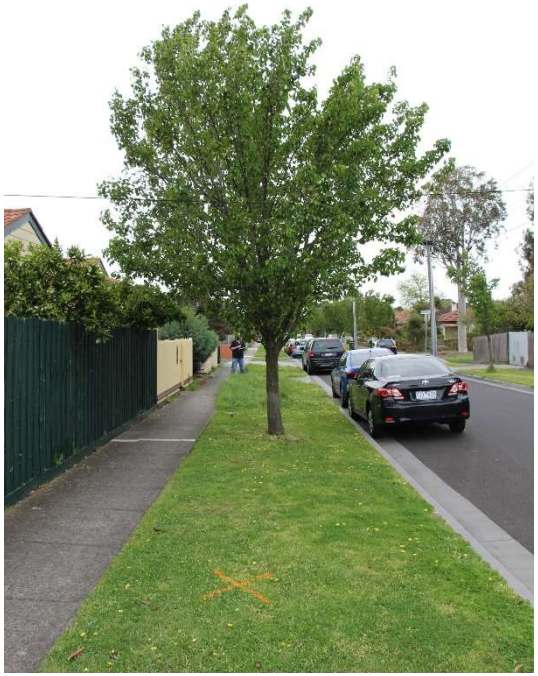
JB6 I really like the Figure but I find it blurry (especiallly the text). Perhaps the text could be bigger? (see example Irrigated open space)
Jeremie Bonneau, 1/11/2017

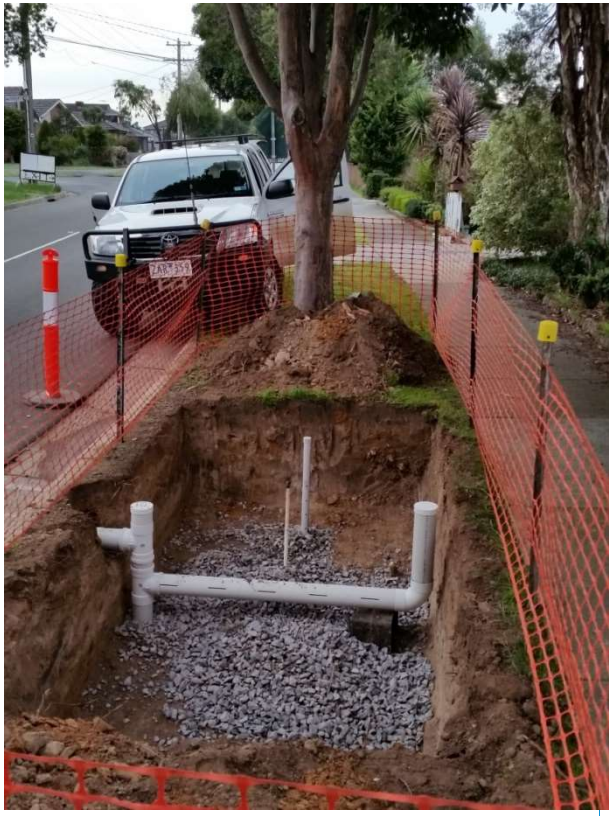
Water sensitive “landscapes”

Not just isolated

“water sensitive technologies”

JB16

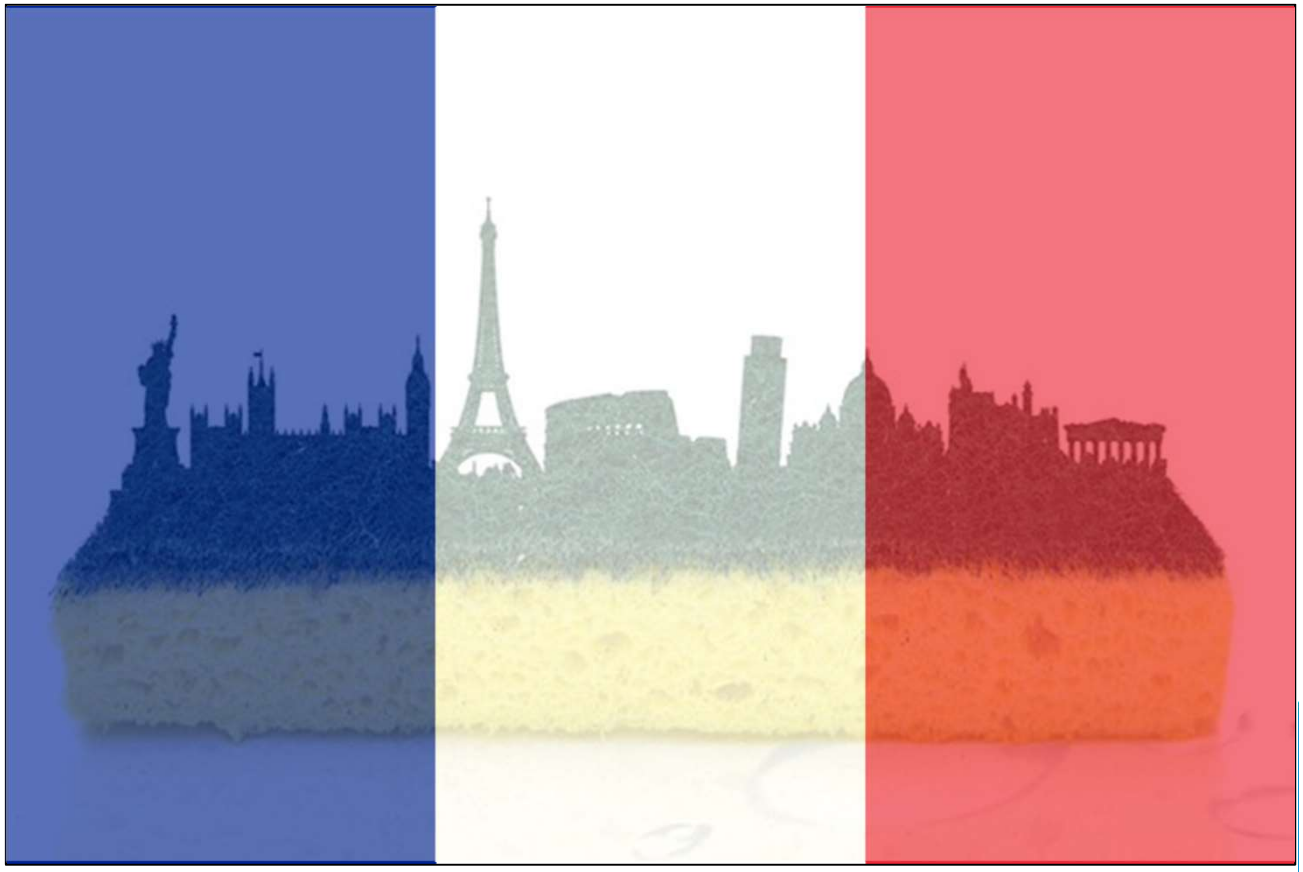




Slide 16

JB16 these pictures are really great! they say a lot!
Jeremie Bonneau, 1/11/2017

JB7



Slide 17

JB7 my favourite slide!
Jeremie Bonneau, 1/11/2017

l'eau dans la ville Urban Water

Nova Tech Lyon 2016 28 JUN › 1 JUL

INSA graie

Les Trophées Novatech

The Novatech Awards

JB8
JB9

Saint Martin d'Hères – La place Lucie Aubrac, un archipel de jardins de pluie

Saint Martin d'Hères – Lucie Aubrac Place, an archipelago of rain gardens

Emmanuel Jalbert, Yann Chabod, Rémy Tranchant, Thierry Luppé, Nicolas Martin, Christophe Sabatier

Slide 19

JB8 Funny enough - I lived 3km from there for 2 years!
Jeremie Bonneau, 1/11/2017

JB9 (very helpful comment for the presentation)
Jeremie Bonneau, 1/11/2017


Collège E. VAILLANT

JB10

Conclusion

Slide 22

JB10 I removed the outline of the arrow.
Jeremie Bonneau, 1/11/2017