

# This presentation premiered at WaterSmart Innovations

[watersmartinnovations.com](http://watersmartinnovations.com)



Dr Steve Cummings

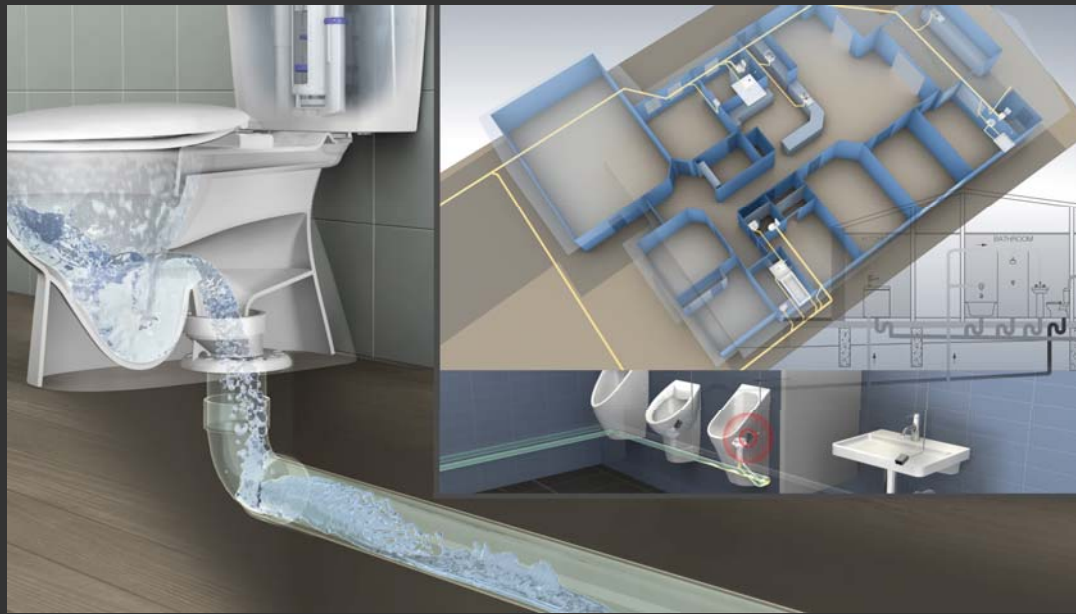
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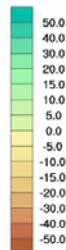
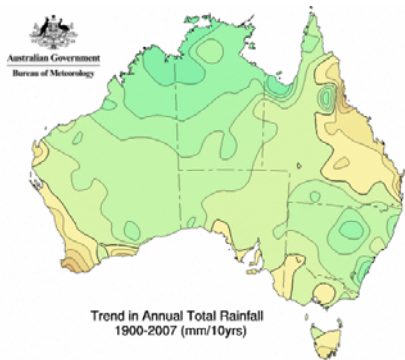
# FUTURE DIRECTIONS FOR WATER EFFICIENT FIXTURES AND DRAINAGE SYSTEMS IN AUSTRALIA



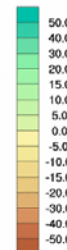
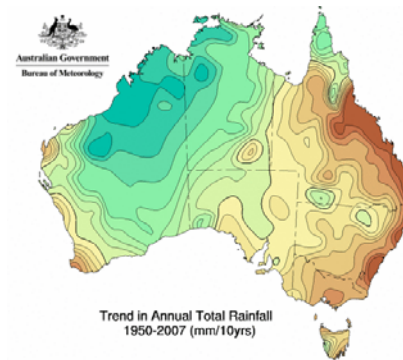
Dr Steve Cummings

## Critical need to conserve water in Australia

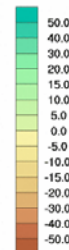
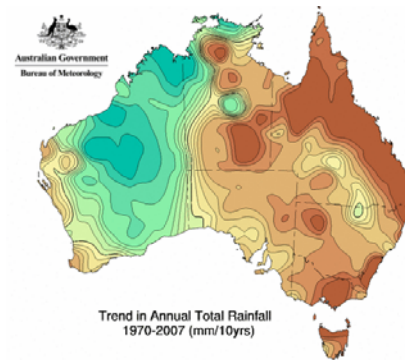
- Climate change in Australia has brought about prolonged periods of water shortages in high population urban areas situated in coastal environments.
- Climate change has had an impact on **rainfall/runoff** and increased temperature.
- Trend - worsening with future of water availability in Australia scientifically unknown.



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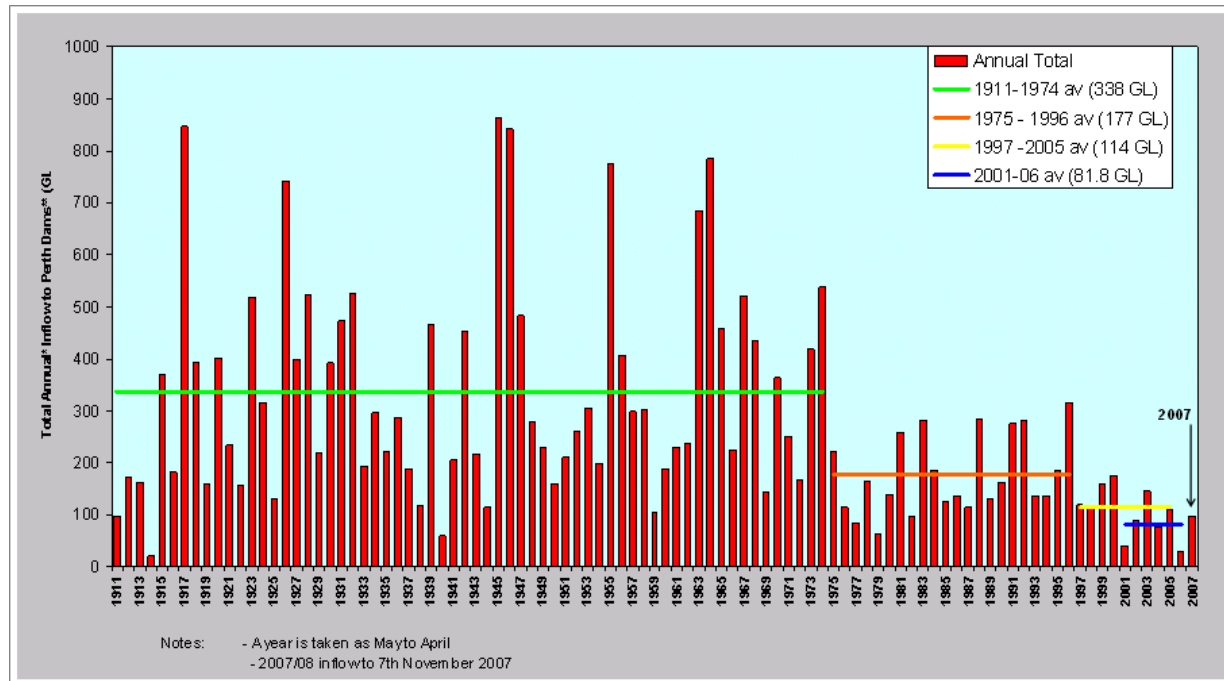


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Commonwealth of Australia 2008, Australian Bureau of Meteorology

# Critical need to conserve water in Australia

- Predictions are that run-off to Perth dams will eventually cease.



Water - Yearly inflows to Perth dams

Commonwealth of Australia 2008, Australian Bureau of Meteorology

1 Gigalitre (GL) = Approx 260 million gals



## New approaches – Governments guarantee urban water supply

- Community demand for water security
- Accelerated government / water utility focus on supply replenishment strategies to move away from dam based infrastructure.
- National desalination plants are an integral key part of supply replenishment strategies



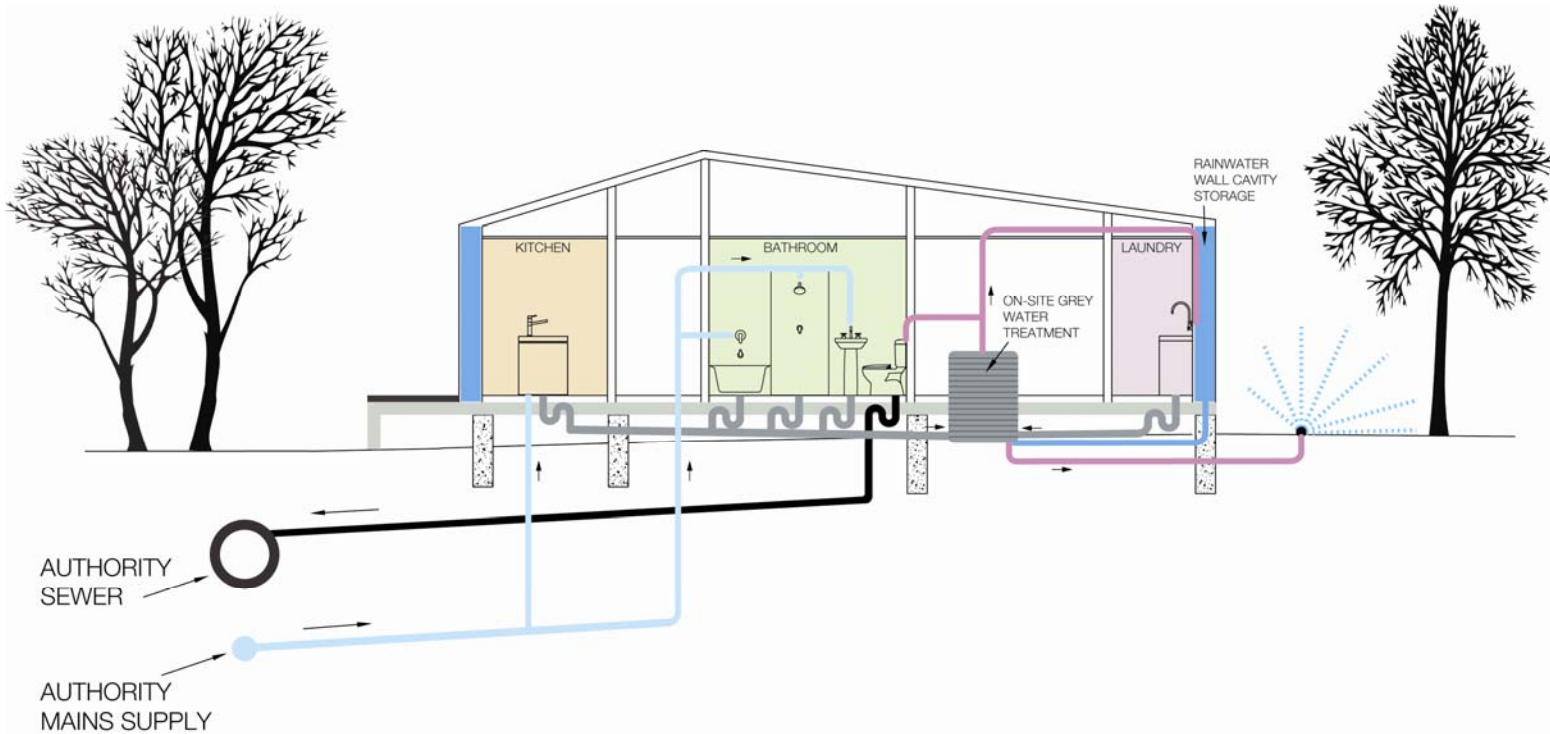
Sydney



Perth

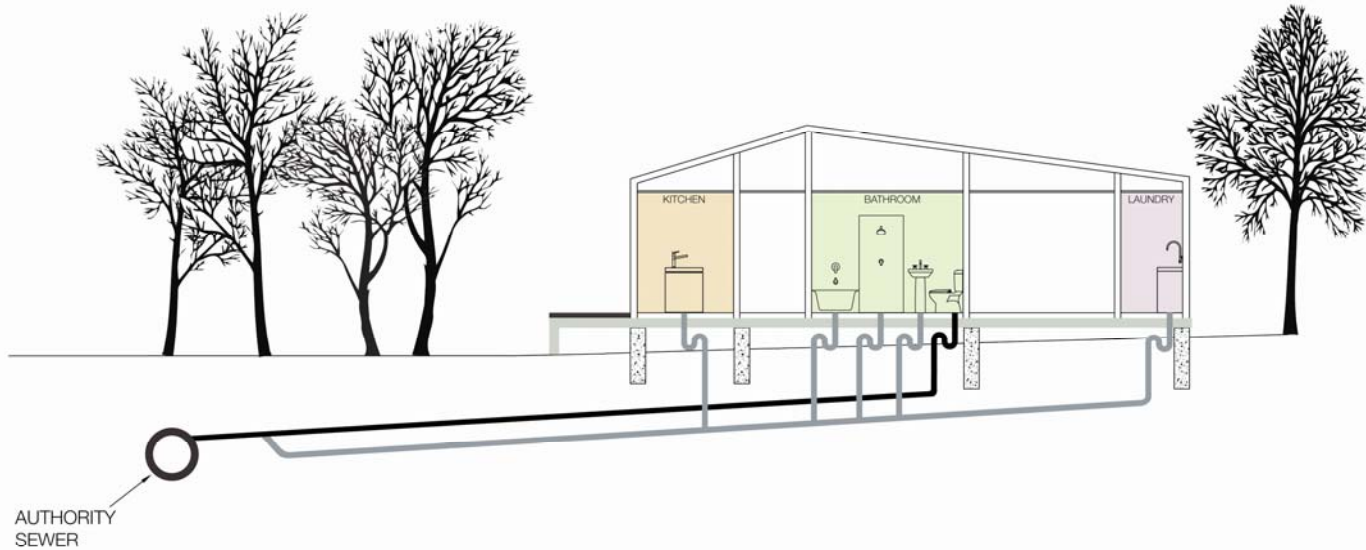
# New approaches for households to re use water

## Sustainable supplementary water/waste system



## New approaches – Western Australian Water Use in Houses Code Stage 2

Provide an alternative water supply use capacity in new homes



Sanitary Dual Drain Arrangement For Connection  
To the Sewer and Grey Water Treatment System



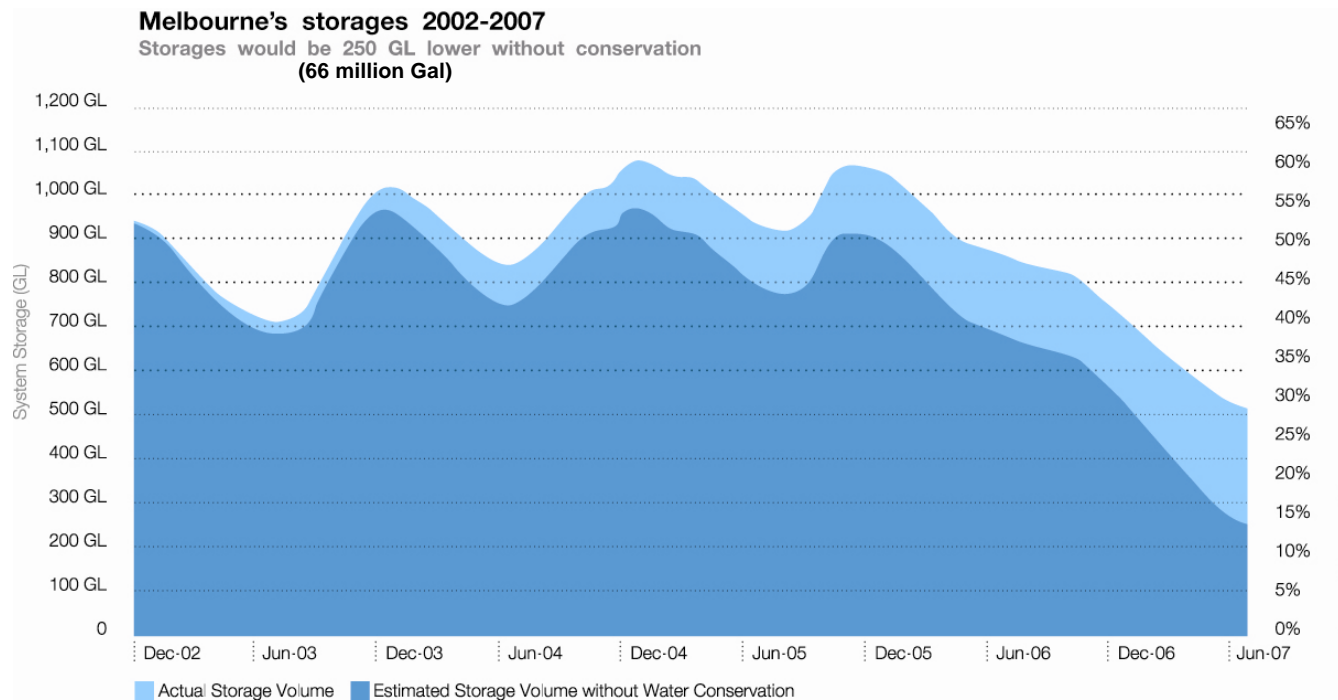
## New approaches – Western Australian Water Use in Houses Code Stage 2



Alternative water supply use capacity in new homes

## Demand management strategies

- Most cost effective option for governments to reduce water consumption.
- Increased focus for industry to produce products that use less water.



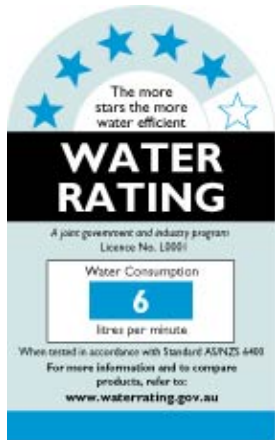
The Source 2008, Melbourne Water  
[www.thesource.melbournewater.com.au](http://www.thesource.melbournewater.com.au)

1 **Gigalitre** (GL) = Approx 260 million gal



## WELS - demand management strategy

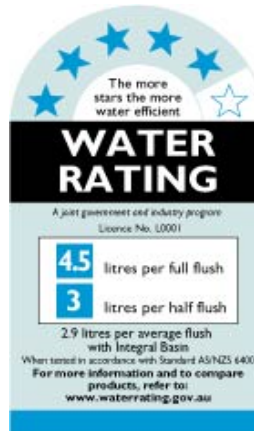
- WELS **mandatory** labeling requirement for products – shower heads, toilets, faucets, clothes washers, dishwashers that accounts for **80%** of in-house usage.



Facets



Shower heads



Toilets

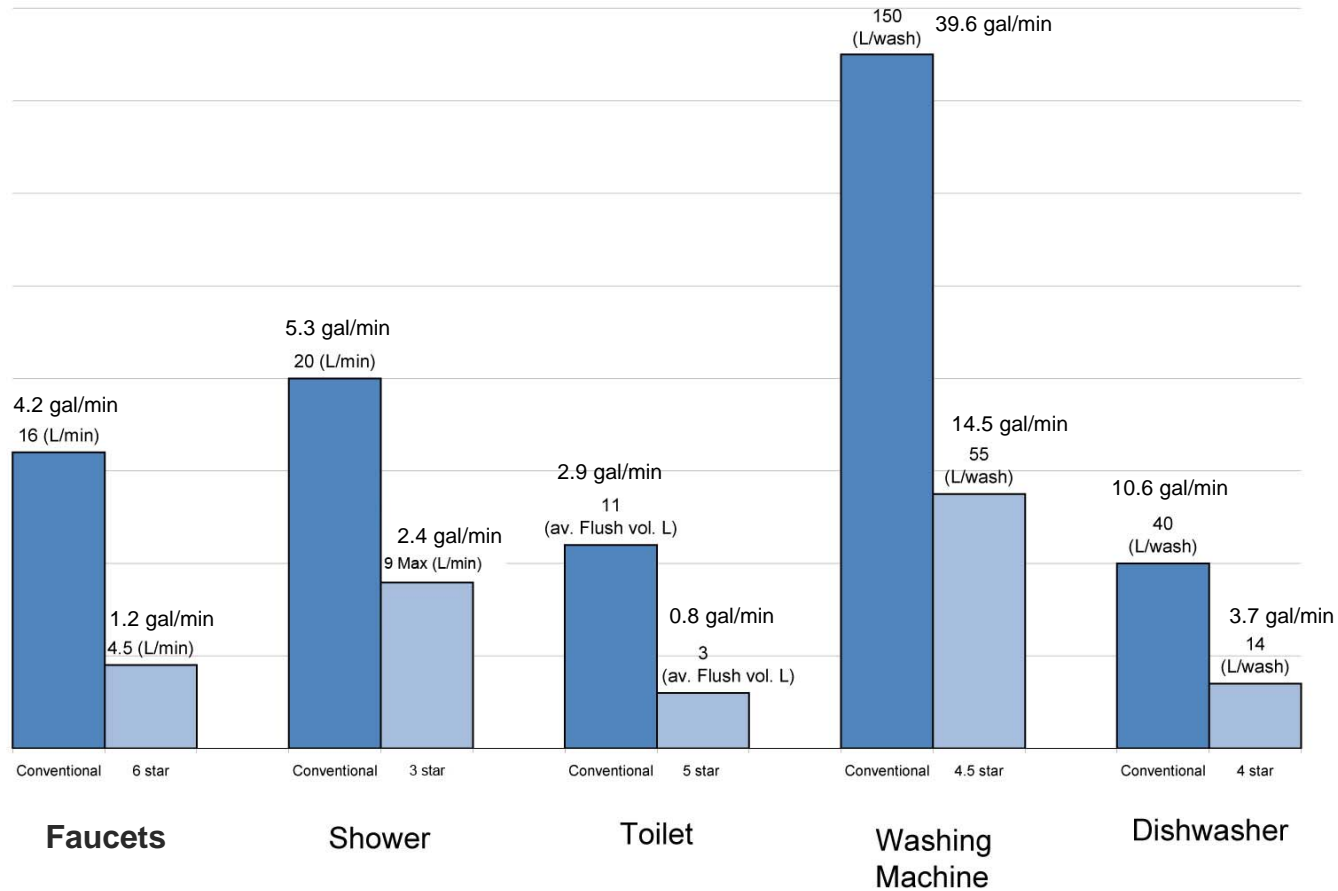


Washing  
Machines



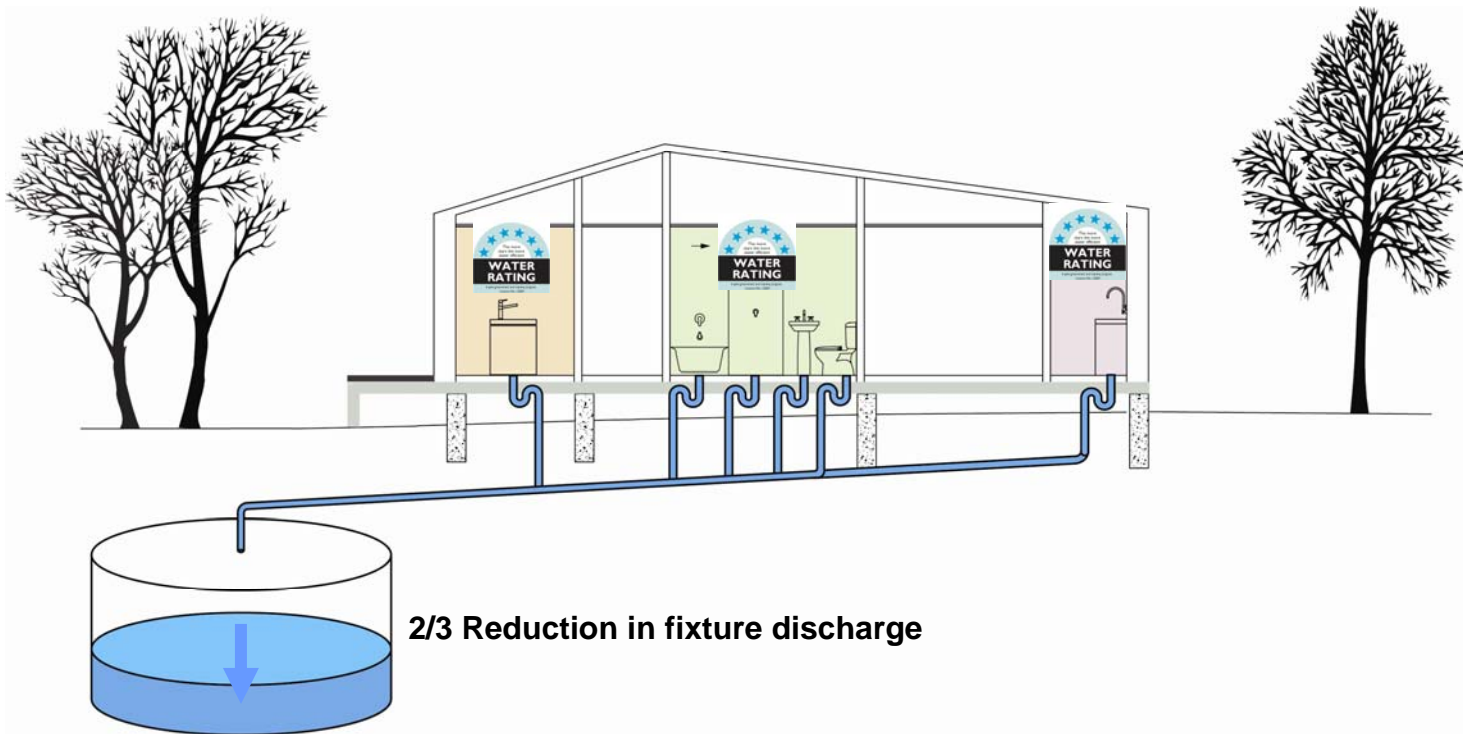
Dishwashers

## Strategies have significantly reduced drainline flows

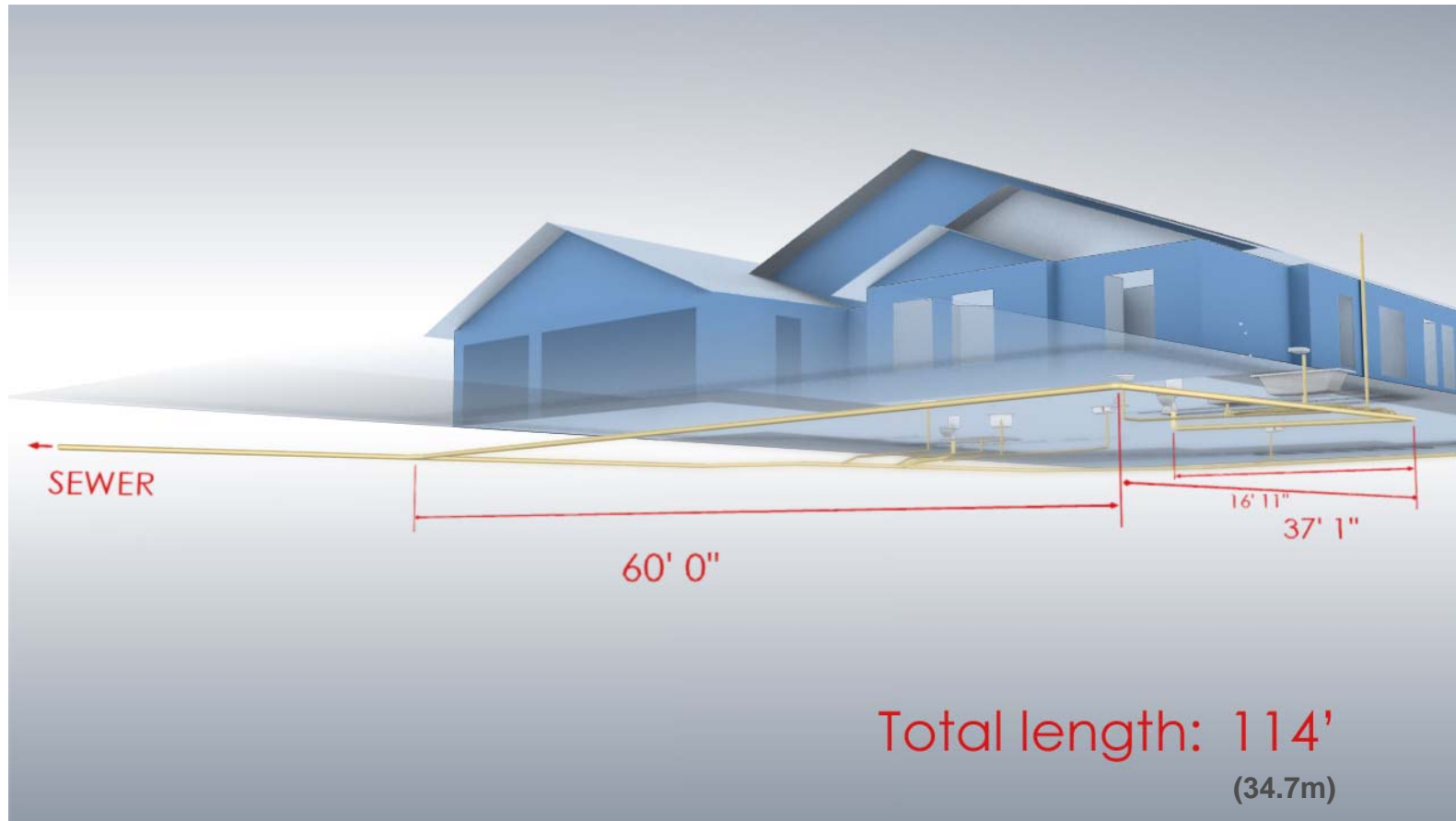


## Strategies have significantly reduced drainline flows

- Waste water flows within a household drainage system are critical to ensure that solid waste is transported effectively into the network utility operators sewer system.



## Reduced drainline flows compounded with long waste carry distances



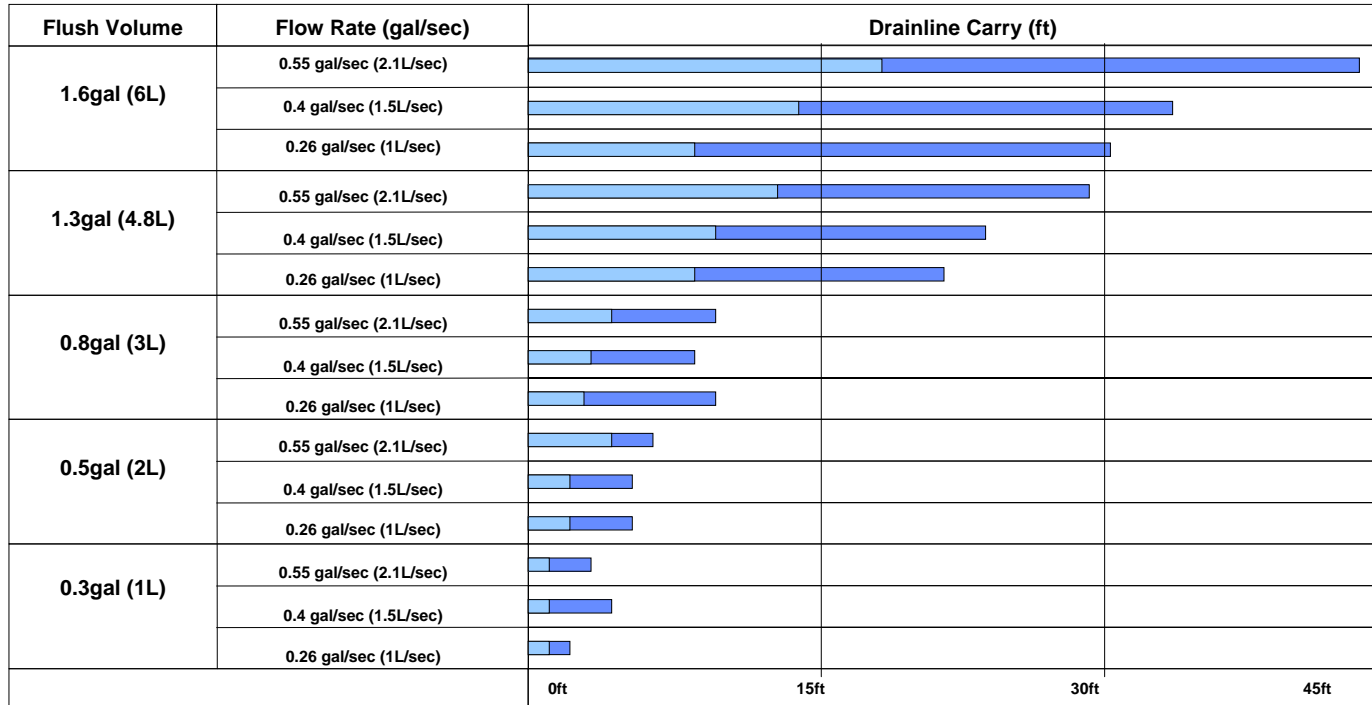
**Performance incomparability** - system is **stressed** with potential of a drainline design complying to AS/NZS 3500 and a toilet complying AS1172 to not operate effectively.

## Drainline carry implications of reductions in wc flush volumes



# Drainline carry implications of reductions in wc flush volumes

- Reductions in flush volume – **exponential reduction** in solid waste drainline carry performance



Australian Test Media



US MaP Test Media (latex covered)



US MaP Test Media (Uncased)



US MaP Test Media (Modified Case)

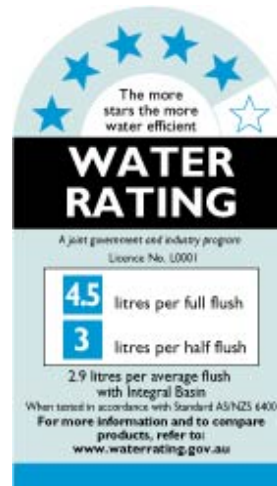




## Further reductions in fixture flows – *ASFlow* committee

- Government - WELS direction to **further** reduce fixture water usage
- Significant concern by national plumbing regulators and industry on the impact of reduced flows on the drainline system and utility infrastructure.

***ASFlow*** committee formed to study the implications of flow reductions in sanitary plumbing and drainage systems



Toilets

## Investigation into reductions in fixture flows – *ASFlow* committee

### National Plumbing Regulation Forum – *ASFlow* Committee

- two studies that have already resulted in code changes

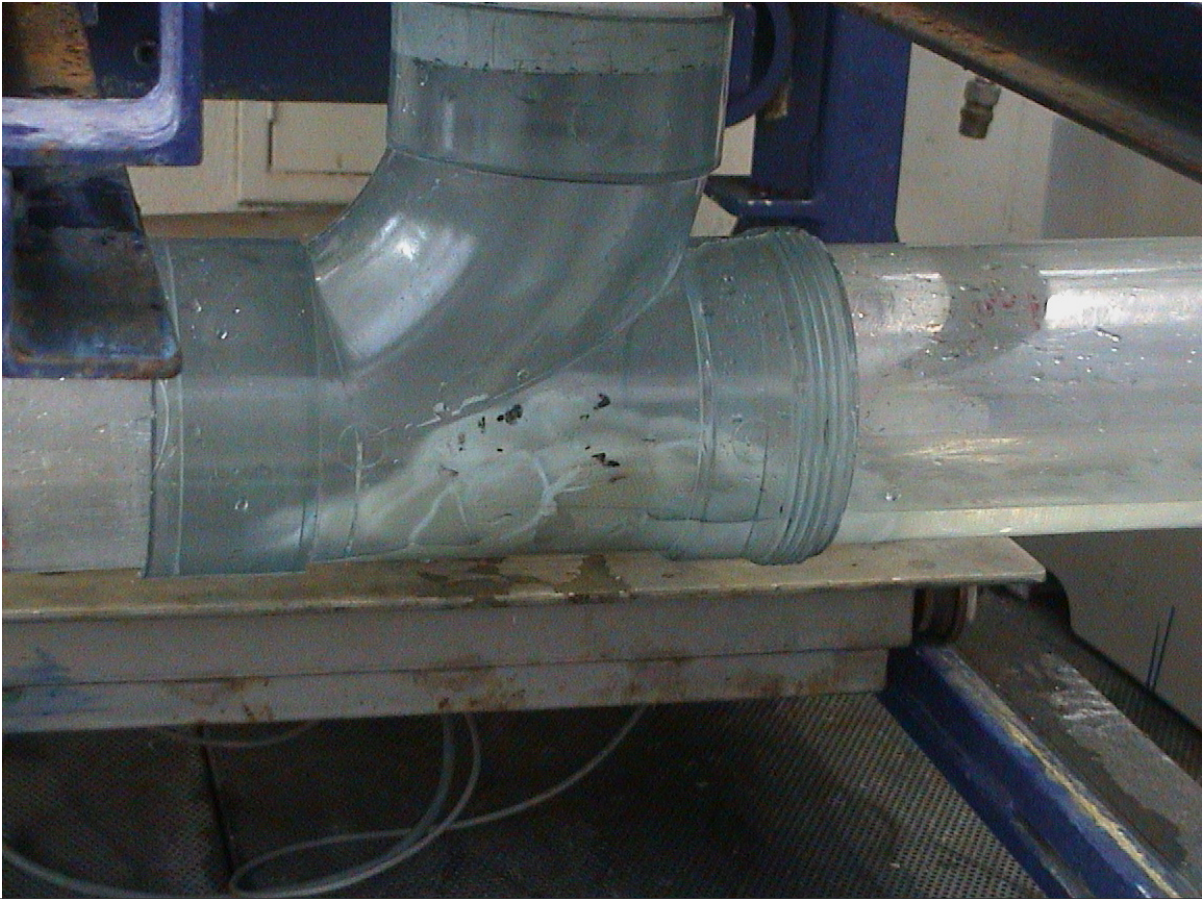
1. 90 degree sweep junction evaluation
2. Non water using urinals

# Study 1 – 90° sweep junctions evaluation

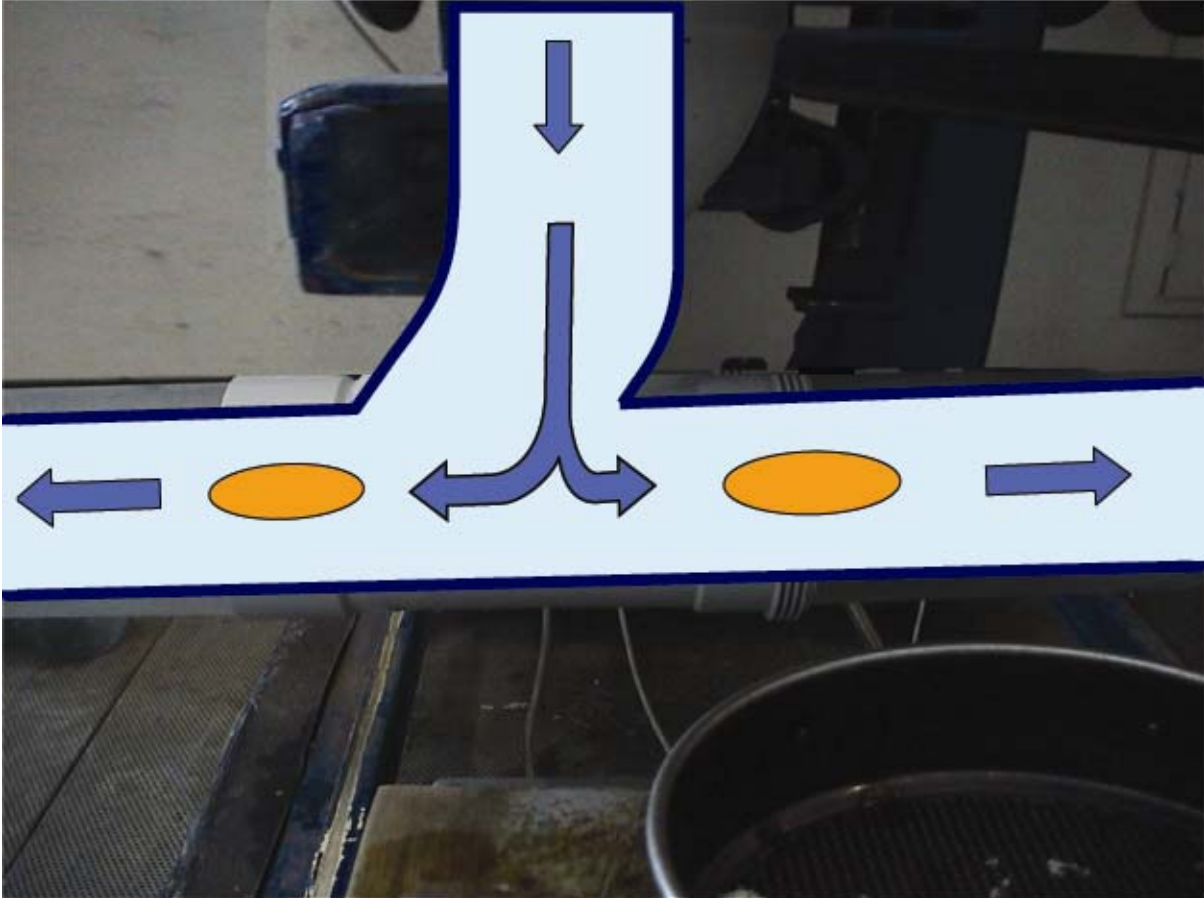


Problem building drainline installation

# Study 1 – 90° sweep junctions evaluation



# Study 1 – 90° sweep junctions evaluation



## Study 1 – 90° sweep junctions evaluation



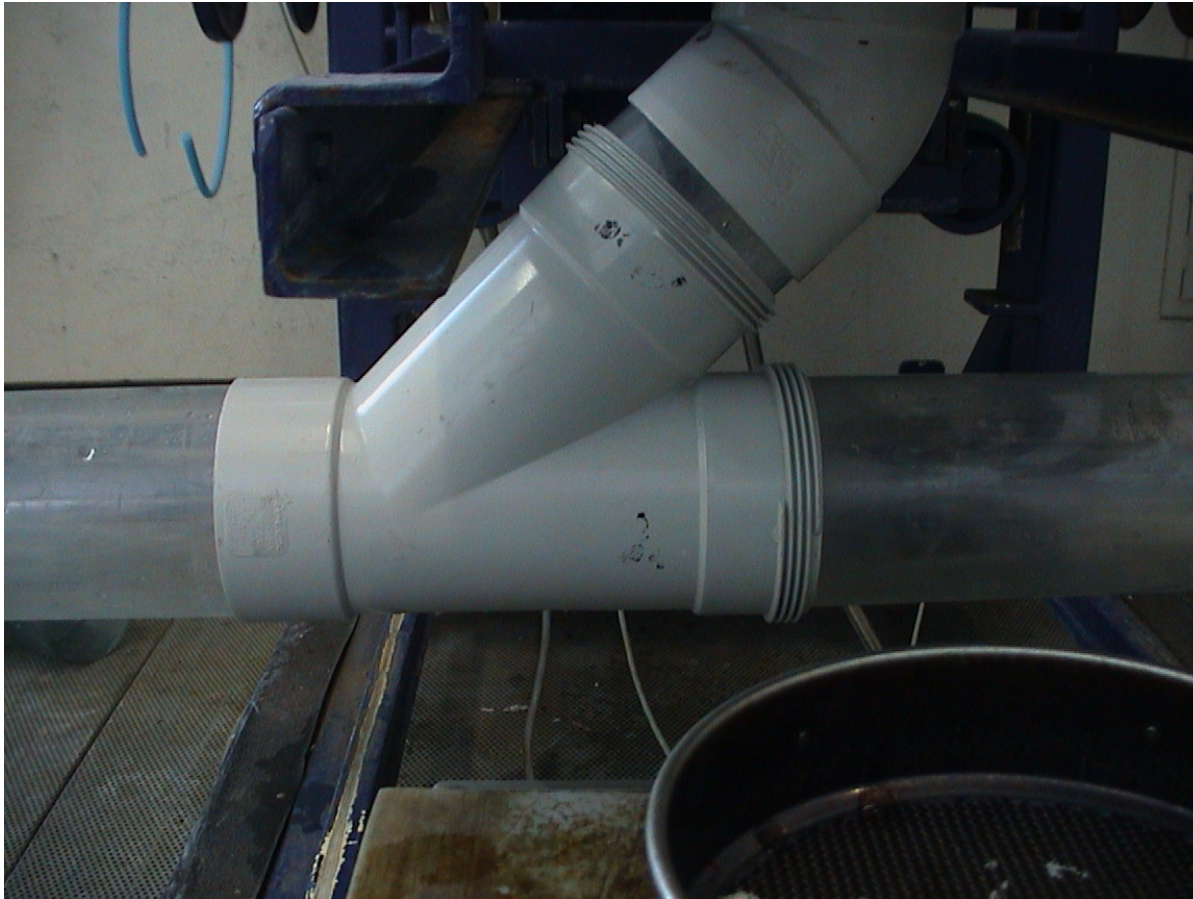
90° Sweep Junctions – 1<sup>st</sup> Flush

## Study 1 – 90° sweep junctions evaluation



90° Sweep Junctions – 2<sup>nd</sup> Flush

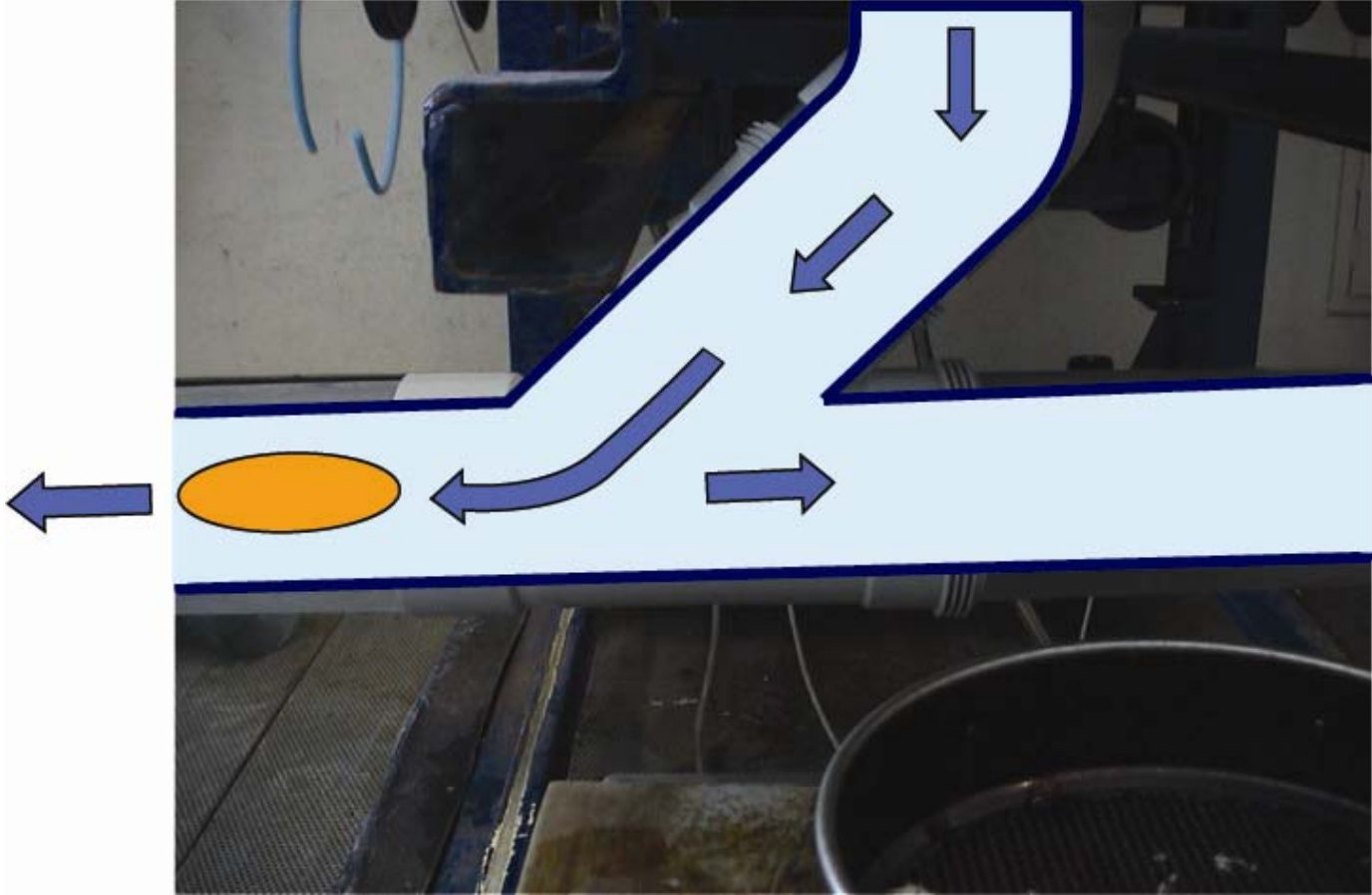
## Study 1 – 90° sweep junctions evaluation



45° Junction



# Study 1 – 90° sweep junctions evaluation



45° Junction

## Study 1 – 90° sweep junctions evaluation



45° Junction

## Study 1 – 90° sweep junctions evaluation – significant rectification costs



Rectification with 45° junctions

## Study 1 – 90° sweep junctions AS/NZS 3500.2 Amendment

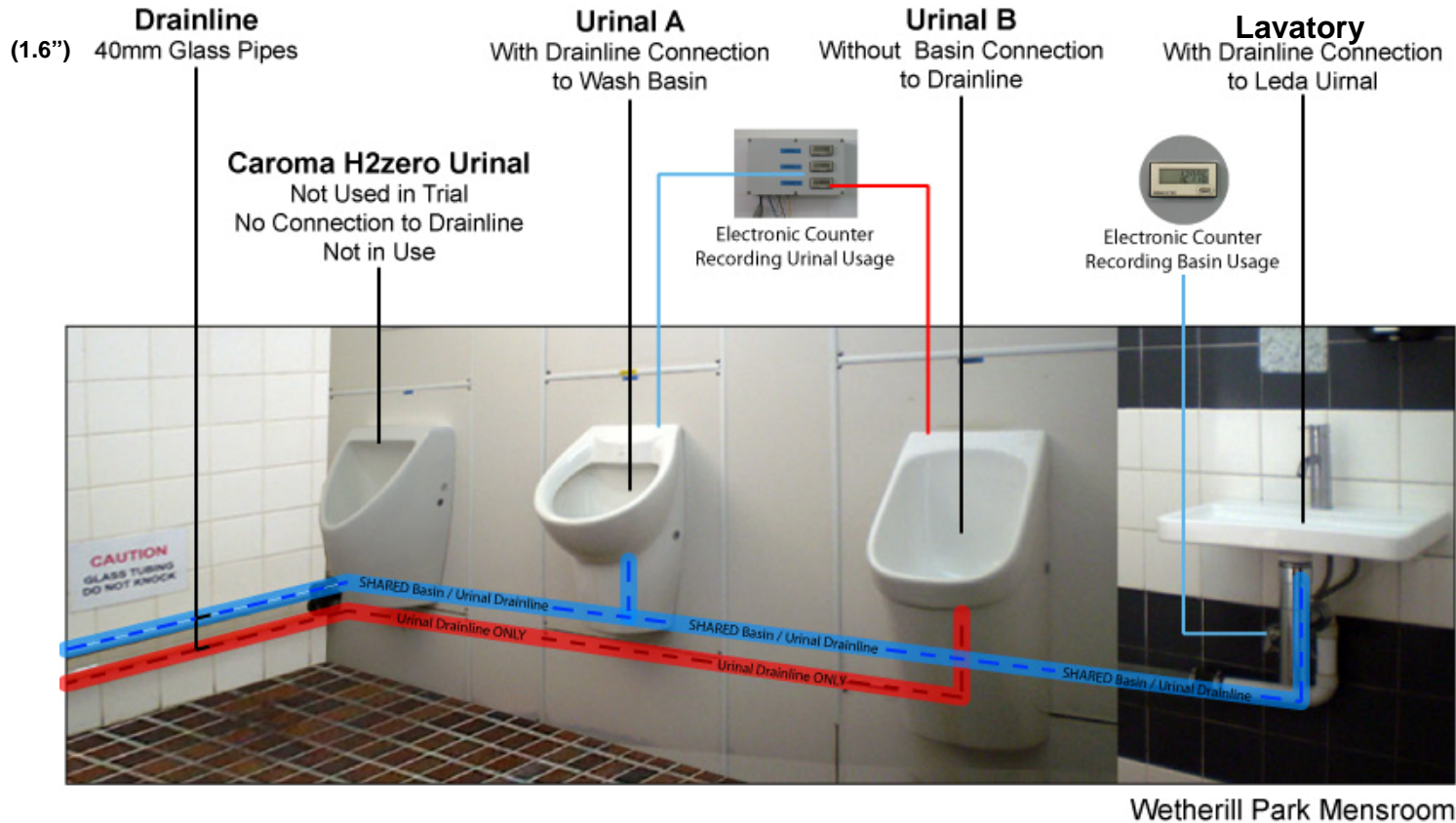
### Plumbing and drainage Part 2: Junctions installed on a vertical line - amendment

#### 4.9.3 Junction installed on a vertical line (part 2)

Junctions installed in a vertical plane shall not be used for connection of stacks. Sweep and 45° junctions may be laid in the vertical plane for the connection of a single discharge pipe or a drain, provided:

- a) A 45° junction shall only be used for the connection of a water closet pan.

## Study 2 – non water using urinal drainline evaluation 37 months



Installation layout

## Study 2 – non water using urinal drainline evaluation



## Study 2 – non water using urinal drainline evaluation

Drain-line Evaluation – Discharge Comparison Table

	URINAL A	LAVATORY	URINAL B
<b>Ave Daily Usage</b>	11	49	26
<b>Estimated Daily Discharge Volume (Gallons)*</b>	<b>8 ½ gal / day (32L)</b>		<b>0 gal</b>

\*Based on an average hand wash of 1.4 pint (650mL) over 12 seconds.

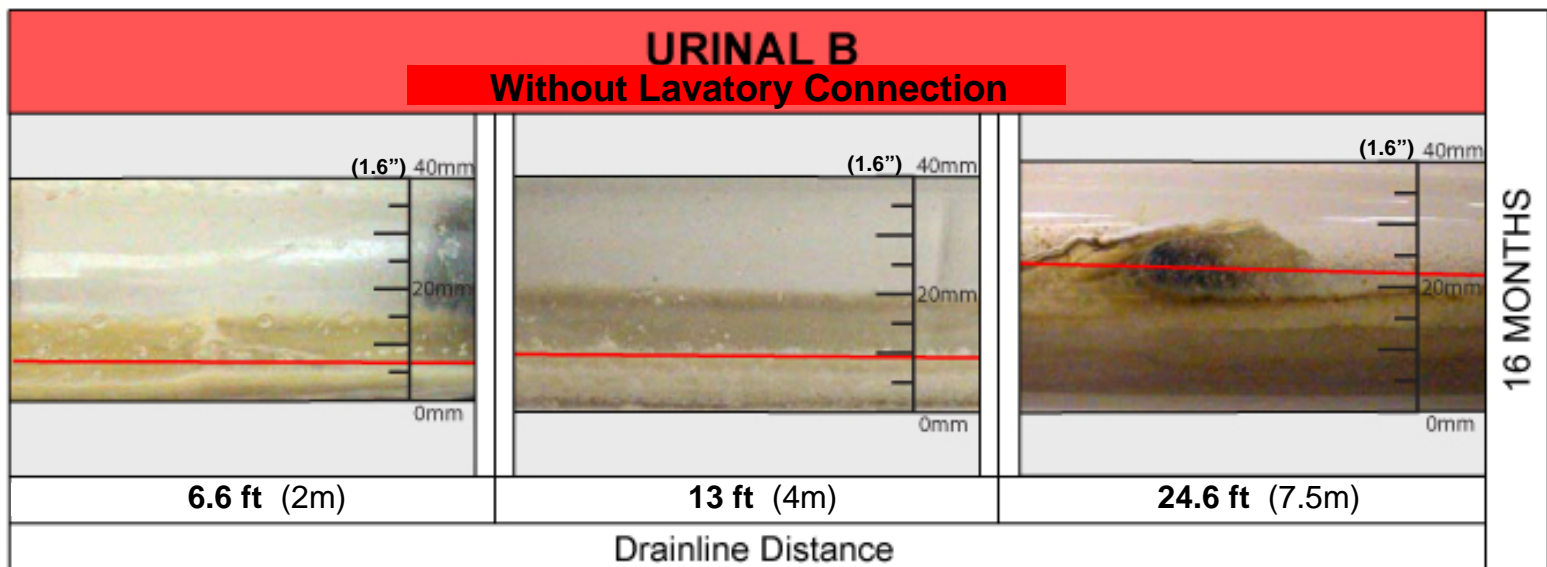
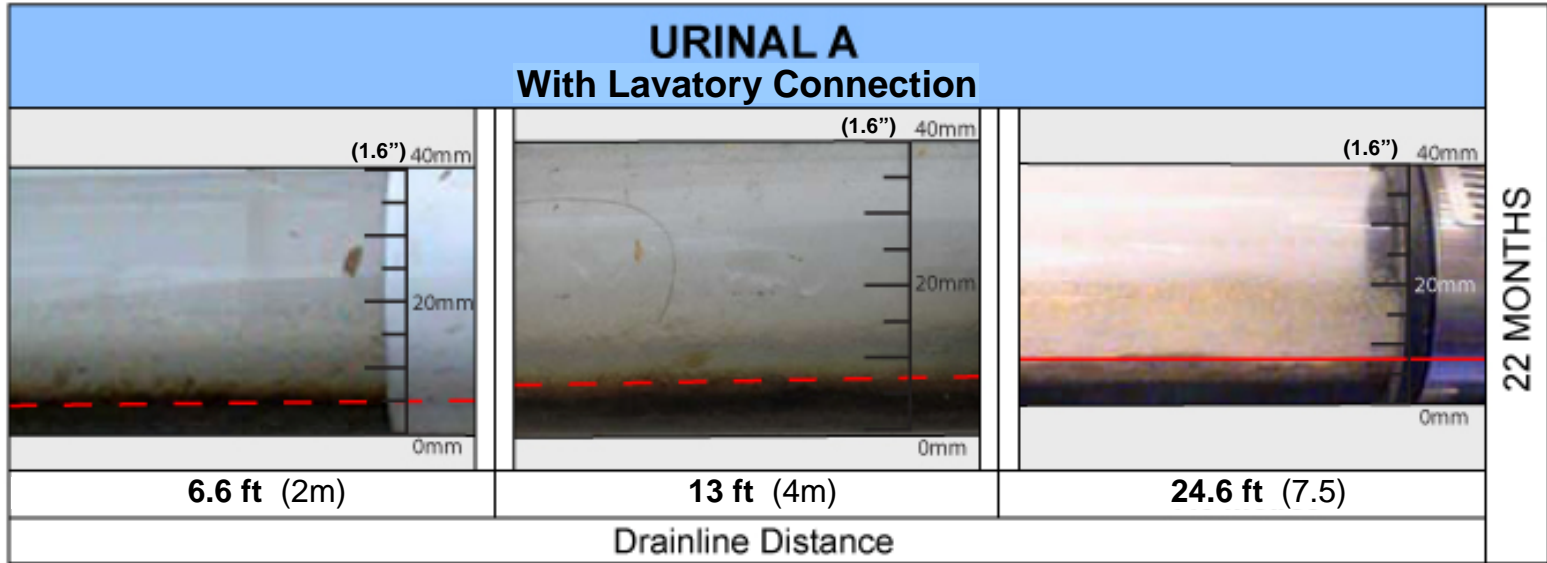
## Study 2 – non water using urinal drainline evaluation



Inspection

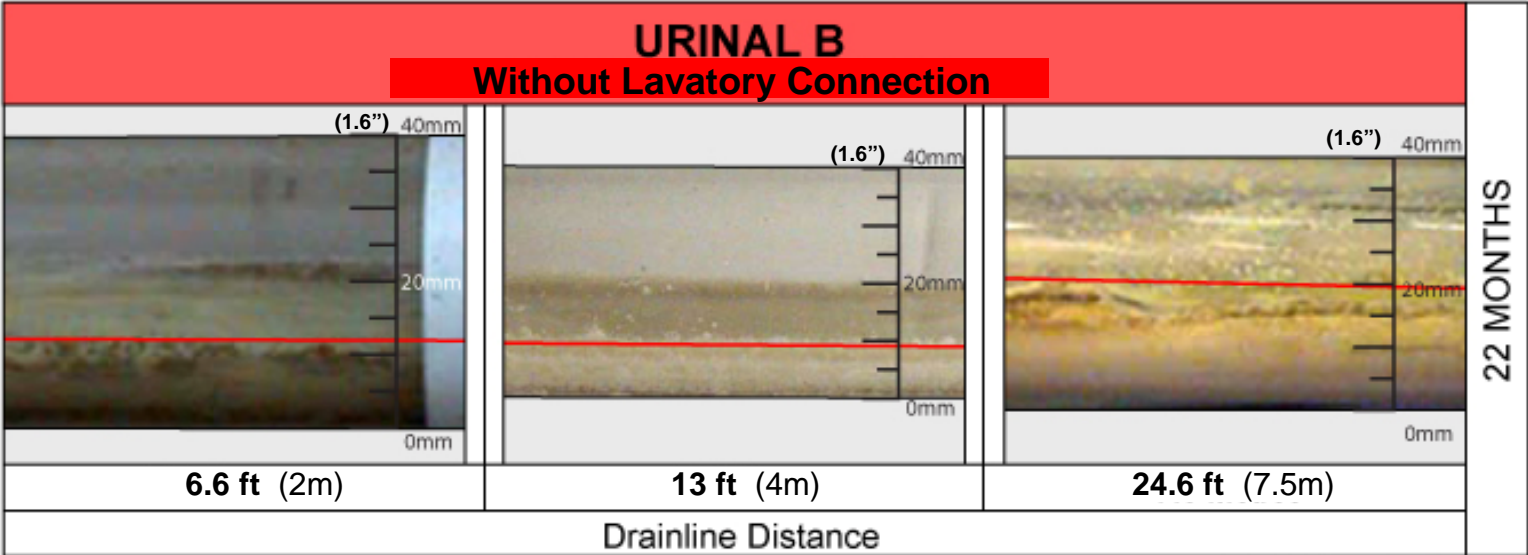
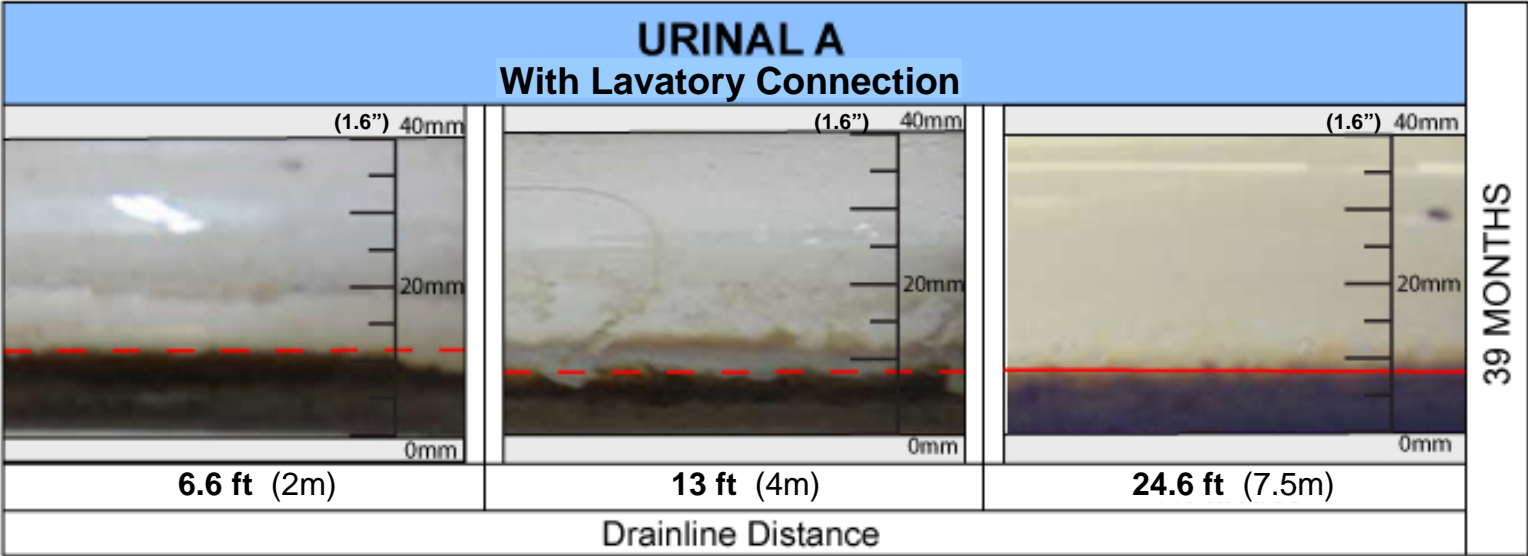


# Study 2 – Comparative urinal drainline evaluation 6000 uses



URIC-SCALE BUILD-UP —————  
 MINOR URIC-SCALE BUILD-UP - - - - -

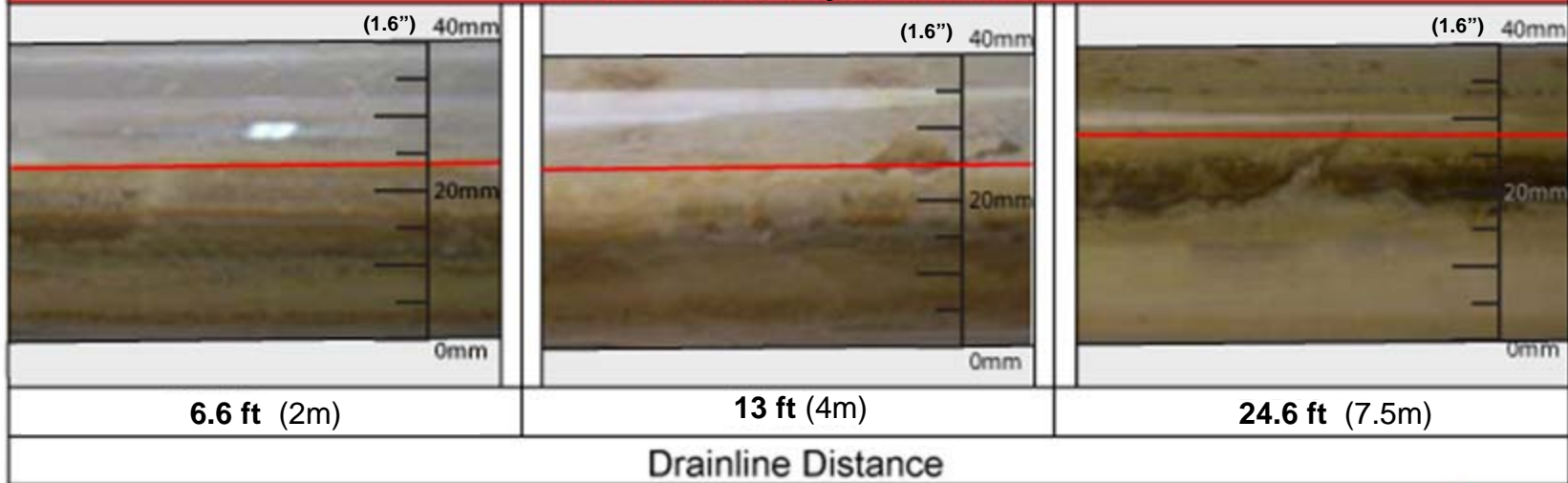
# Study 2 – Comparative urinal drainline evaluation 10000 uses



URIC-SCALE BUILD-UP ———  
 MINOR URIC-SCALE / SOAP DEPOSIT BUILD-UP - - - -

## Study 2 – Urinal drainline evaluation 37 months use

### URINAL B - 20834 USES Without Lavatory Connection



URIC-SCALE BUILD-UP ———  
MINOR URIC-SCALE BUILD-UP - - -

## Study 2 – non water using urinal AS/NZS 3500.2 Amendment

### Plumbing and drainage Part 2: Sanitary plumbing and drainage - amendment

#### 11.24.2.3 Non-flushing (waterless) wall-hung urinals

A waterless urinal shall be installed only where at least **2 fixtures**, excluding a cleaners sink, are connected upstream of the connection of the waterless urinal to the discharge pipe.

## Future directions - Hybrid wc approaches

Maximise bathroom water efficiency with a minimal impact on the drainline system



## Future directions

- Fundamental that the fixture standards and **plumbing codes** are fully performance compatible in order for effective water savings to be successfully achieved.



Thank you

