

Murphy Reserve Objectives

Sustainably manage water for the reserve

- ▶ Provide a reliable water supply
- ▶ Maximise access to sports fields
- ▶ Improve passive recreational areas
- ▶ Increase 'green space' and minimise infrastructure such as fencing
- ▶ Contribute towards the achievement of the City of Port Phillip's water management and stormwater pollutant reduction targets



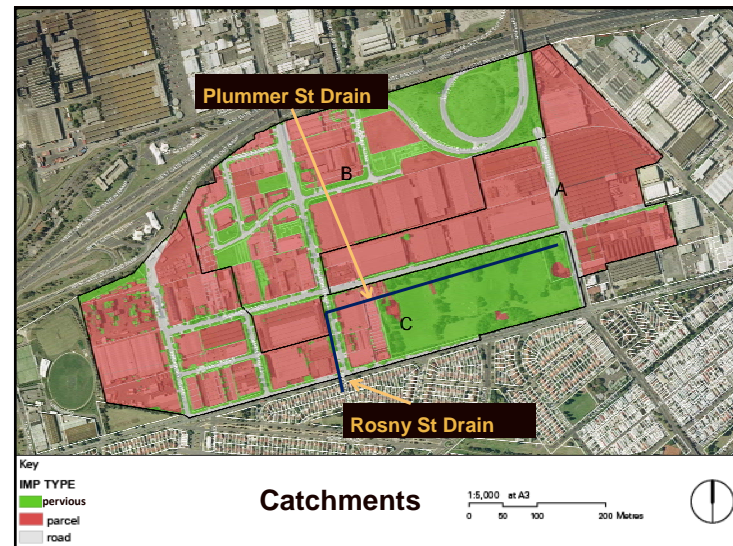
Murphy Reserve

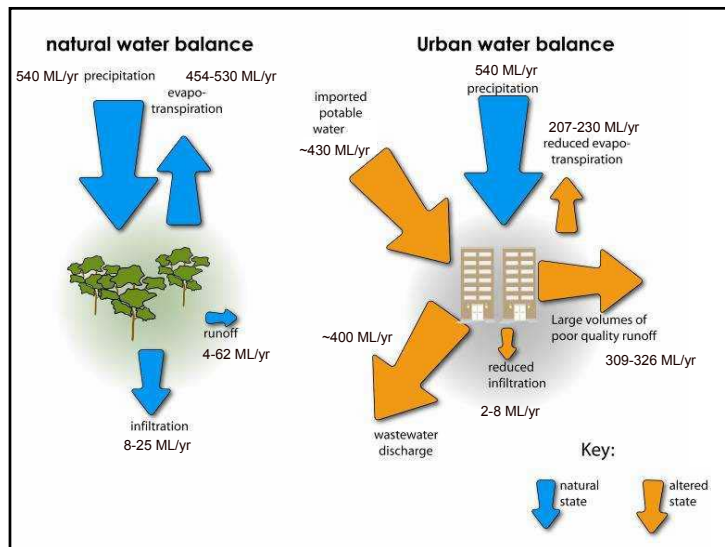


Irrigation water demand

- ▶ Irrigation is needed to maintain playing surfaces through summer
- ▶ All ovals planted with warm season grasses (Anderson recently planted with couch, conversion over next year or so)
- ▶ Water use estimated at 10 mm/week or 521 mm/year

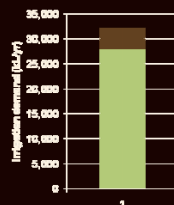
| Oval | Area (m ²) | Estimated irrigation demand (kL/yr) |
|---------------|------------------------|-------------------------------------|
| Anderson Oval | 16,900 | 8,800 |
| Williams Oval | 12,300 | 6,400 |
| Aanenson Oval | 11,900 | 6,200 |
| Woodruff Oval | 12,400 | 6,400 |
| Total | 53,500 | 27,900 |





Demand management

- ▶ Warm season grasses
 - » Replacement of rye grass with couch grass on Anderson oval has saved 4,400 kL/year
- ▶ Existing irrigation systems are reasonably efficient
 - Opportunity for further improvement limited**
- ▶ Potential to install climate monitoring to improve efficiency of system
- ▶ Sub-surface irrigation could reduce use, but may result in uneven playing surface



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Synthetic turf for Anderson training oval

Benefits

- ▶ More durable allowing greater use and increasing accessibility
- ▶ Reduces water use
- ▶ Lower maintenance

Disadvantages

- ▶ Significantly increased temperatures (hotter than asphalt)
- ▶ Requires significant watering for temperature control and cleaning
- ▶ Need to keep trees clear
- ▶ Lifespan of about 10 years – sustainability?

Cost would be about \$300,000-400,000 for Anderson training oval

Decision is mainly based around playing access and increased costs

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Groundwater bores – Port Phillip

- ▶ Groundwater aquifers, yields and qualities are variable
- ▶ Information for Port Phillip area indicates that
 - » Yields are relatively low in most areas (<1 L/s)
 - » Salinity levels are high 300-30,000 EC (uS/cm) with most >1,500-3,500 (irrigation should be less than 600-1000)
- ▶ High sodium and chloride levels can be harmful to turf growth
- ▶ High bicarbonate concentration results in increased water hardness which can impact irrigation systems
- ▶ At these levels groundwater use is considered unsustainable for irrigating turf without desalination or mixing with less saline water
- ▶ That is not to say that there is not accessible good quality water in some locations!

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Groundwater – sustainable yields

- ▶ City of Port Phillip is committed to sustainable use of groundwater
- ▶ Sustainable yields should be (considerably) less than recharge rates or less than potential yields from artificial recharge
- ▶ The Garden City area has an aquifer with fairly good water quality
- ▶ Present recharge for catchment around Murphy Reserve is ~2-8 ML/year (a third of what would occur naturally)
- ▶ This is only 30% of Murphy Reserve demand (28 ML/year)
- ▶ An average house might use 50-100 kL/year (20-160 houses)
- ▶ The number already accessing water is unknown
- ▶ Drawing down the aquifer is likely to result in saline intrusion

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Wastewater recycling

- ▶ Barry Brothers extract stormwater from pits around the city
- ▶ The water is brought to Murphy Reserve depot and treated to Class C in their treatment plant
- ▶ Water is stored in 430 kL of council tanks for irrigation use for Williams Oval
- ▶ It is estimated that the actual supply may be around 2,000-4,000 kL/year, depending on contracts and rainfall
- ▶ Can supply just a small part of the demand and not reliable



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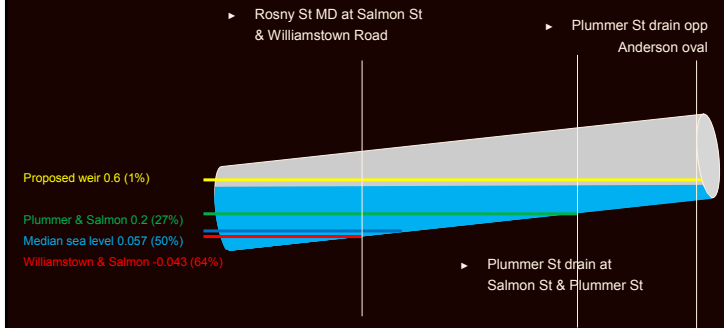
Catchment areas

| Catchment | Description | Area (ha) | Impervious Fraction | Mean annual flow (ML/yr) |
|-----------|---|-----------|---------------------|--------------------------|
| A | Plummer St Drain to Salmon St | 25.89 | 95% | 103 |
| B | Rosny St Drain at Plummer St and Salmon St | 40.64 | 66% | 113 |
| C | Rosny St Drain at Williamstown Road and Salmon St | 38.30 | 58% | 94 |
| Total | - | 104.84 | 70% | 310 |



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Which diversion location? Drain invert and tidal levels to AHD



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Diversion points

Plummer St Drain (Plummer & Salmon)

- Benefits
 - » Higher invert level reduces tidal effects
 - » Comparable yields
 - » Proximity to reserve
 - » Flood mitigation in reserve
- Disadvantages
 - » Busy road
 - » Limited supply

Rosny St Drain (Williamstown & Salmon)

- Benefits
 - » Potentially greater yields
 - » Quiet road – easier access
- Disadvantages
 - » Greater tidal effects – larger weir required
 - » Longer route
 - » Higher likelihood of salinity issues
 - » Flood mitigation difficult

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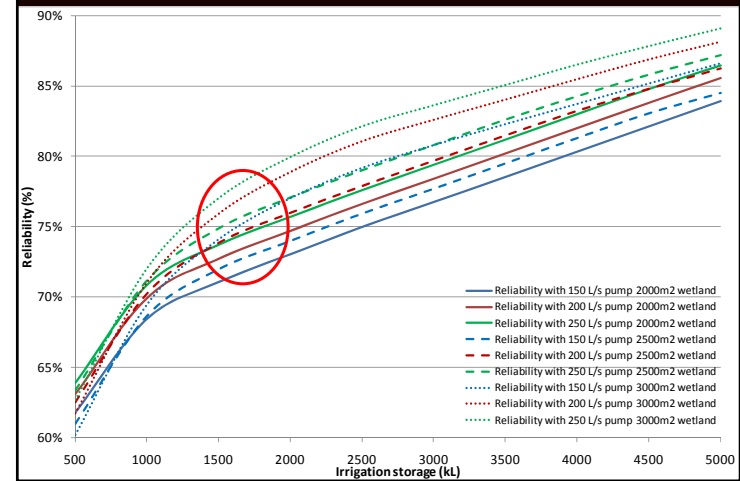
Locations



A stormwater harvesting scheme



Size and reliability



Stormwater harvesting

Pump ~250 L/s



Wetland ~2,500m²



Irrigation storage ~1,750 kL

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Stormwater Harvesting

- Benefits
 - » Stormwater supply of ~ 21 ML/year
 - » Reliability of 75%
 - » Allows full irrigation of all sports fields at stage 3a restrictions
 - » Council target for alternative sources of 78 ML/yr by 2020
 - » 21 ML/yr (~27% of 2020 target achieved)
 - » Council target for reduction in potable use of 70% (360 ML/yr)
 - » 21 ML/yr (~6% of 2020 target achieved)
 - » Pollutant load reductions
 - » 20% of the target for the year for total suspended solids
 - » 58% of the target for the year for total nitrogen

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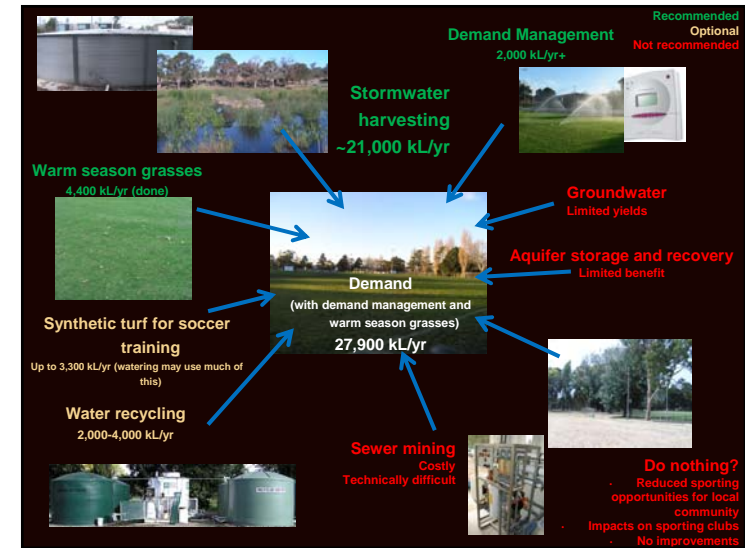
Benefits

- ▶ A reliable source of water providing an average of 21,000 kL/year for irrigating sports fields
- ▶ Increased access to sporting fields and higher participation rates for local sporting clubs
- ▶ A greatly enhanced passive recreational space
- ▶ A landmark entrance feature to the reserve greatly enhancing its appearance and amenity

Costs

- ▶ Stormwater harvesting scheme ~\$1,900,000 (~\$3/kL/yr)

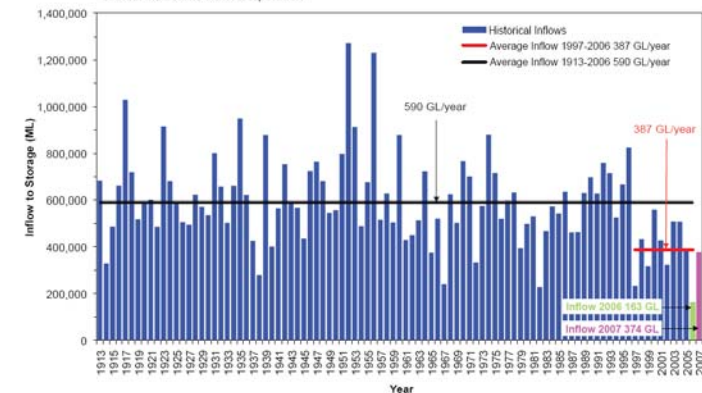
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Recommended option – stormwater harvesting

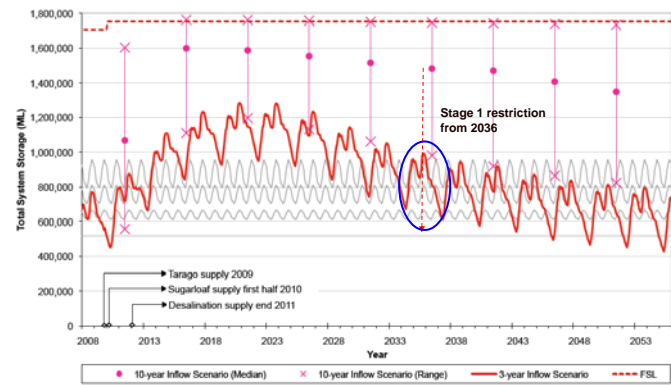


Figure 2.2 Annual Inflows to Melbourne's Main Harvesting Reservoirs (Thomson, Upper Yarra, O'Shannassy and Maroondah Reservoirs)
Source: Melbourne Water Corporation



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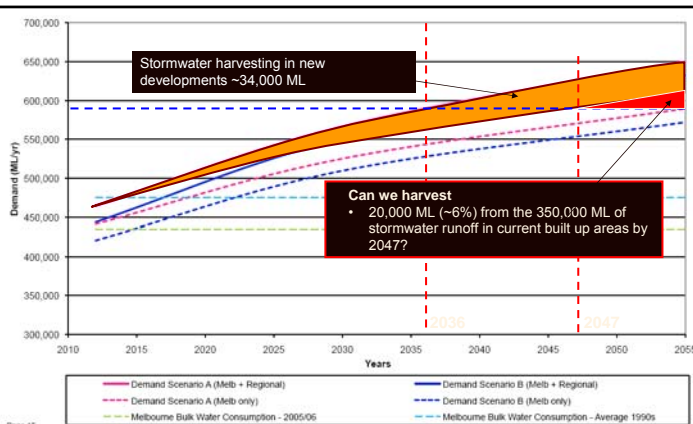
Is desalination the silver bullet? Or does it just buy us time?



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DSE (2008) Augmentation of the Melbourne Water Supply System: Analysis of Potential System Behaviour

Melbourne Future System storage levels



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Supplementing Desalinated Water