Stormwater harvesting:

The potential for
Managed Aquifer Recharge
at the proposed Nambeelup Industrial Estate

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Contents

• Regional overview
• Planning for multiple needs
• The issues to be addressed

• The Nambeelup drainage and water management strategy
  – Constraints
  – Potential for MAR
  – Benefits
  – Costs and offsets
...but not without share of problems
Highly connected.

Overview / Issues
Availability
Suitability
Demand
...water logged,
..and flood prone,
Question: How should we manage water in this landscape?
Nutrient overload

- We do not meet EPP targets
- Status quo will continue degradation of the estuary

Traditional urban has greater nutrient inputs and increased flows that efficiently convey nutrients to streams

(see Peel-Harvey nutrient modelling, Kelsey et al. 2010)
Diminishing resource:

Cattamarra Aquifer
100% allocated everywhere

Leederville Aquifer
Fully allocated in Nambeelup and Coolup

The end of ‘easy’ water?
Many competing needs

Environmental values

- Existing users
- RAMSAR estuary
- Recreation
- Traditional culture
- CCW wetlands
- Aquatic ecosystems

- Development
- Livestock
- Water supply
- Acid sulfate soils
- Sand supply issues
- EPP for phosphorous

Hence the DWMP, BUWM, stormwater manual, and the MAR feasibility study...

Overview / Issues

Availability

Suitability

Demand
Better Urban Water Management framework

- **State water planning**
  - Perth-Peel regional water plan
    - Drainage and Water Management Plan

- **Drainage and Water Management Plan**
  - Hydrology technical studies
  - Flood study
  - Nutrient study
  - ASS & hydrochemistry review
  - EWR study
  - Flora and fauna studies
  - MAR feasibility study
• **Key Principle 1**
  – Manage catchments to maintain or improve water resources

• **Key Principle 2**
  – Manage flooding and inundation risks to human life and property

• **Key Principle 3**
  – Ensure the efficient use and re-use of water resources

**MAR can be integrated to achieve all three principles**
MAR feasibility study

Overview / Issues

- Availability
- Suitability
- Demand

- Potentiometric surface
- Recharge
- Discharge

- Treatment systems

- Urban drainage

- Wanneroo Member
- Mariginiup Member
- South Perth Shale
- Yarragadee / Cattamarra Coal Measures

- Leederville Aquifer
- Confining Layer
MAR feasibility study

Potentiometric surface

Recharge
Discharge

Treatment systems

Urban drainage

Wanneroo Member
Mariginiup Member
South Perth Shale
Yarragadee / Cattamarra Coal Measures

Leederville Aquifer

Confining Layer

Overview / Issues
Availability
Suitability
Demand

Irrigation

Urban drainage

Overview / Issues
Availability
Suitability
Demand
• Availability
  – how much drainage water will be available?
• Suitability
  – aquifer mapping
  – water quality information
• Demand
  – is there demand for an alternative water supply?
• Viability Assessment
• Difficulty Assessment
• Knowledge gaps
Total drainage from all developments:
Min: 12 GL/yr (Dry climate, drains at ground level)
Max: 22 GL/yr (Wet climate, drains at 1 mBGL)

e.g. Nambeelup Development
Min: 2.7 GL/yr (Dry climate, drains at ground level)
Max: 4.6 GL/yr (Wet climate, drains at 1 mBGL)
Suitability – Geology

Overview

Availability

Demand

Suitability

- Geology
Suitability - aquifer

Cattamarra Aquifer
Confined
Few existing users
Salinity mainly >1500 mg/L
• Balance a lack of measured data with conservative assumptions and value ranges, including:
  – A brackish, hydraulically connected aquifer thickness of 50 m
  – A hydraulic head limited to 1984 levels (mostly pre-abstraction)
  – A confined aquifer extent limited to the interpreted extent of the South Perth Shale (confining layer)
  – An upper and lower storage coefficient of $1 \times 10^{-4}$ and $5 \times 10^{-4}$

• Lower = 20 Gigalitres
• Upper = 100 Gigalitres
**Demand**
- 13 GL/yr additional demand by 2031 for public water supply
- 14 GL/yr additional demand for 'self-supply'

**Regional demand**

**Suitability**

**Availability**

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Nambeelup Industrial Area