

# Stormwater Pollution Management: Measuring Performance

Andrew Grant, Melbourne Water

June 2018

# Why this talk?

*Decision making*

*Communication*

*Investment*

*"I have been struck by how important measurement is to improving the human condition.*

*You can achieve incredible progress if you set a clear goal and find a measure that will drive progress toward that goal . . . .*

*This may seem basic, but it is amazing how often it is not done and how hard it is to get right"*





## Key Messages

*Developing meaningful performance measures for stormwater management is challenging*

*Hydrological based targets are the most relevant to waterway health*

*We need to transition our performance reporting for stormwater from pollutant-based targets to hydrological based targets*

## **Pollutant Load Approach**

Waterways & Drainage Investment Plan

# Waterways & Drainage Investment Plan

## What is the WDIP?

Waterways & Drainage Charge

21 KPIs:

- Flooding
- Stormwater
- Diversions
- Incident response
- Development services
- Waterways management
- Liveability
- Community satisfaction



# Waterways & Drainage Investment Plan

## Stormwater related KPIs

- Pollutant Loads
- Facilitated Stormwater Management (Living Rivers Program)
- Capacity Building (Clearwater)
- Diversions



# Waterways & Drainage Investment Plan

## Pollutant Load Target

*"Interventions completed over 2016/17-2020/21 maintain or reduce runoff and pollutants from urban and rural catchments against an established baseline"*

## Plain Language

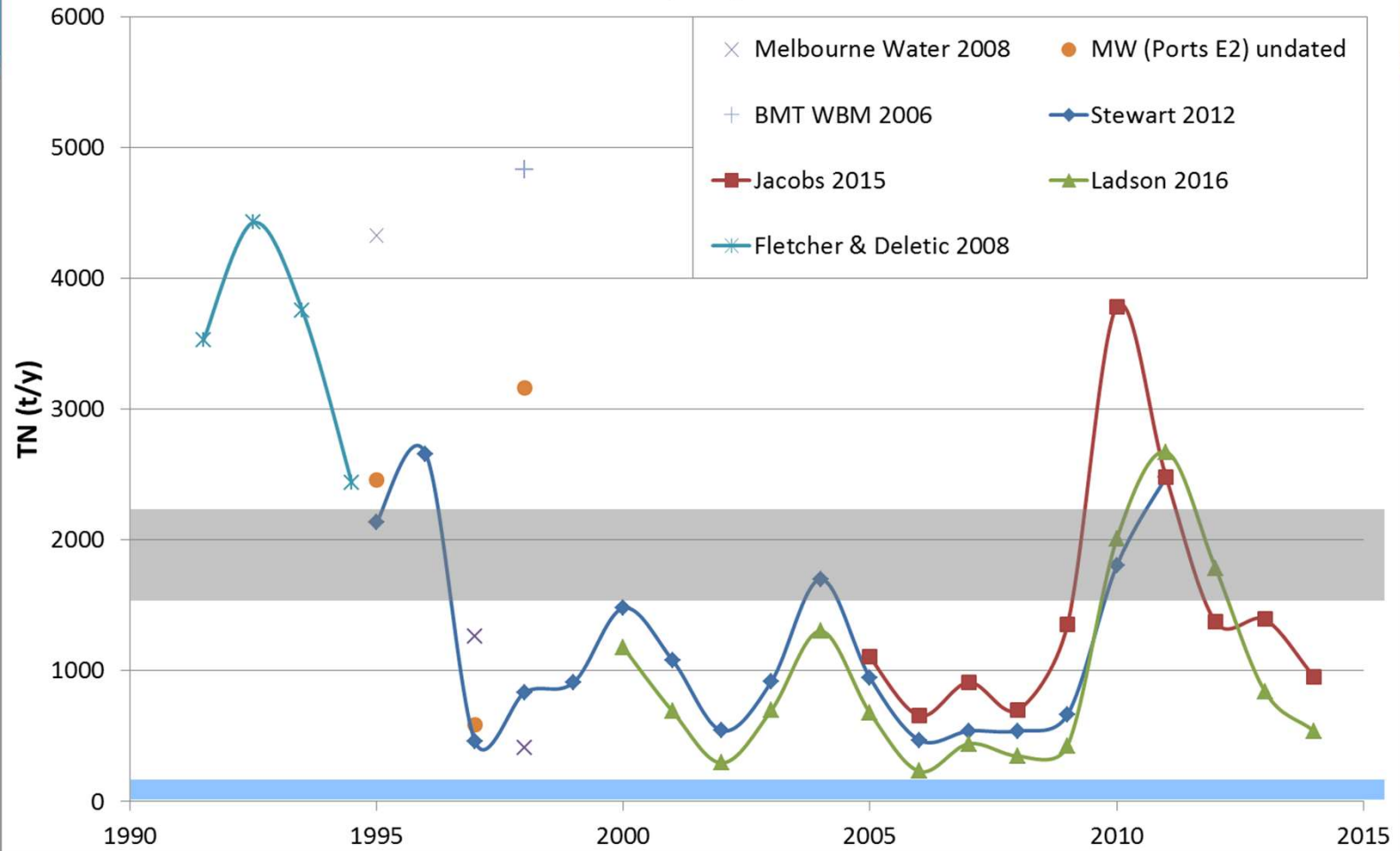
*"Reduce pollutants reaching waterways and the bay"*

## June 30th 2016

155 tN/y is being removed through MW activities in the Port Phillip Bay catchment



### TN loads to Port Phillip Bay from surface waters



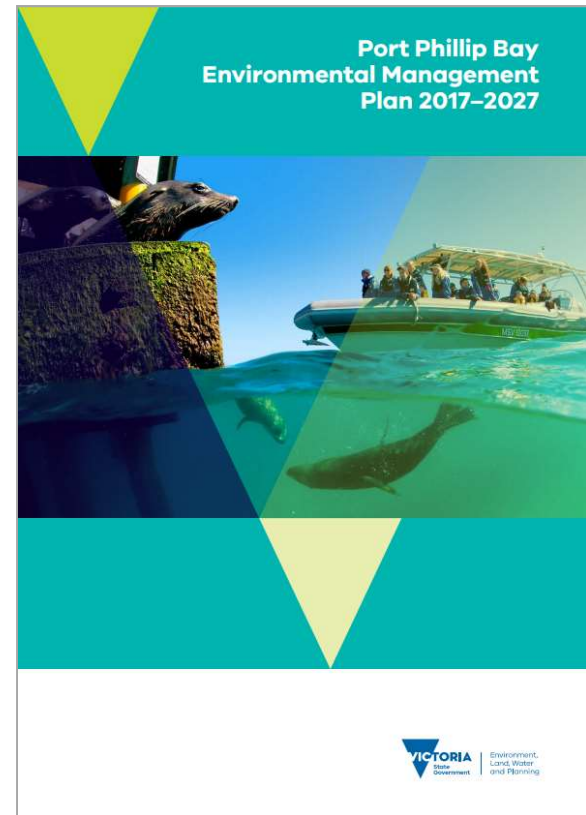
# Why do we use N as an indicator?

## Port Phillip Bay EMP (2017)

3. "Ensure nutrient and sediment loads do not exceed current levels . . ."

3.1 "Effectively maintain existing stormwater infrastructure and programs to mitigate loads to the Bay . . ."

3.3 "Ensure all urban and rural land use effectively controls impacts from stormwater and runoff, and that controls are in place to manage increases in loads"



# Why do we use N as an indicator?

## Strengths

- An indicator of overall stormwater quality
- Commonly used, e.g.
  - Best Practice Environmental Management Guidelines
  - MUSIC modelling
  - Port Phillip Bay Environmental Management Plan
- Melbourne Water's reporting systems set up to measure

# Pollutant Load Approach

## Weaknesses of N as an indicator

- Highly uncertain measurement
- Difficult and expensive to monitor
- Weak correlation with waterway health
- Output measure (rather than outcome)

# Conundrums

## What is the scope?

- Streams process nitrogen
- Flooding events are the trigger of N blooms in Port Phillip Bay
- Diversions from waterways
- Floodplain engagement
- Revegetation programs



# S.M.A.R.T.

<b>S</b> pecific	✓
<b>M</b> easurable	~
<b>A</b> ssignable	✓
<b>R</b> elevant	~
<b>T</b> ime-related	✓

*"In certain situations it is not realistic to attempt quantification . . . . can lose the benefit of a more abstract objective in order to gain quantification"*

George T. Doran

(who invented SMART criteria)



# Summary

## Pollutant load approach

- Consistent with past approaches
- Reasonably easily understood
- Can track performance
- Drives performance towards improving stormwater quality

## Weaknesses

- Highly uncertain estimate of total load
- Weak correlation with ecological outcomes
- Scope creep

# **Volume Based Targets**

## Healthy Waterways Strategy

# Healthy Waterways Strategy

## What is HWS?

Visions and goals for each of the five catchments

Performance objectives across:

- Stormwater
- Vegetation
- Water Quality
- Litter
- Water for Environment
- Instream Connectivity
- Access & Participation



# Why hydrology as an indicator?

## Urban Stormwater Runoff: A New Class of Environmental Flow Problem

Christopher J. Walsh<sup>1\*</sup>, Tim D. Fletcher<sup>1,2</sup>, Matthew J. Burns<sup>2</sup>

<sup>1</sup>Department of Resource Management and Geography, The University of Melbourne for Liveability, Monash University, Victoria, Australia

### Abstract

Environmental flow assessment frameworks have change. Urban stormwater runoff, which degrades assessment. We used evidence of ecological input to environmental flow assessment. We stormwater runoff, and the mechanisms condition has been protected. We also comparing annual streamflow volumes surfaces under the same rainfall associated with stormwater drainage, associated with the frequency and magnitude of ecological condition, informal drainage such hydrologic change. In urban urban stream ecosystems by out of the stream, and if discharge flow problem: one that requires best type of problem, because human use.

## Principles for urban stormwater management to protect stream ecosystems

Christopher J. Walsh<sup>1,10</sup>, Derek B. Booth<sup>2,11</sup>, Matthew J. Burns<sup>1,12</sup>, Rebecca L. Hale<sup>3,14</sup>, Lan N. Hoang<sup>4,15</sup>, Grant Livingston<sup>5,16</sup>, Matteo Scoggins<sup>8,19</sup>, and Angela Wallace<sup>9,20</sup>

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## Urbanization and stream ecology: five years later

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Seth J. Wenger<sup>4</sup>

River Basin Center, University of Georgia, 110 Riverbend Parkway, Athens, Georgia 30602 USA

## Stream restoration in urban catchments through redesigning stormwater systems: looking to the catchment to save the stream

CHRISTOPHER J. WALSH<sup>1</sup>

Cooperative Research Centre for Freshwater Ecology, Water Studies Centre, and School of Biological Sciences, Monash University, Victoria 3800, Australia

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# Why hydrology as an indicator?

## Strengths of hydrology as an indicator

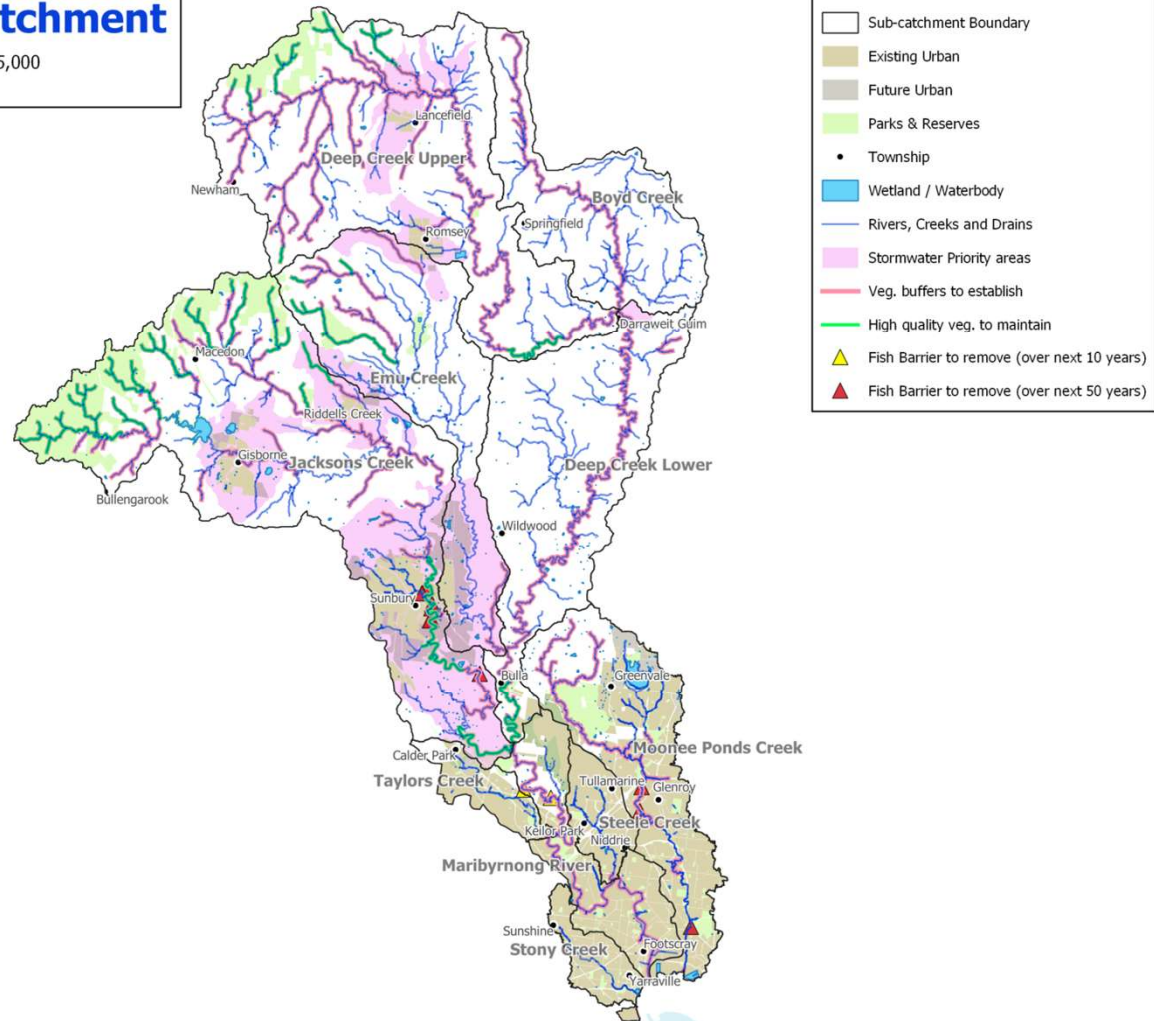
- Strong correlation to waterway health
- An indicator of overall stormwater quality
- Easy\* to model



\* Subject to guidelines being written

# Maribyrnong Catchment

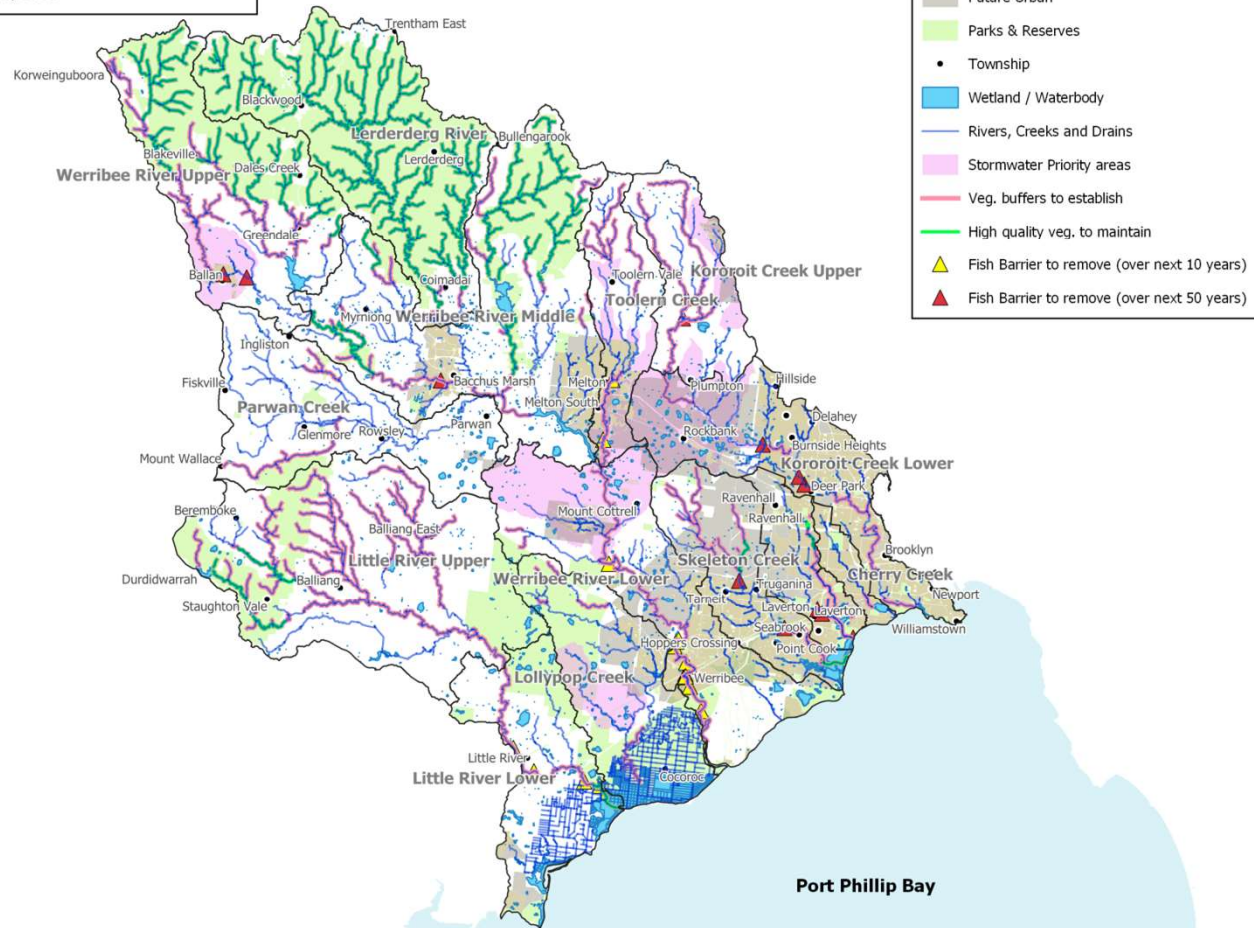
Map at A4 Scale 1: 315,000  
24/05/2018



Source: Melbourne Water.

# Werribee Catchment

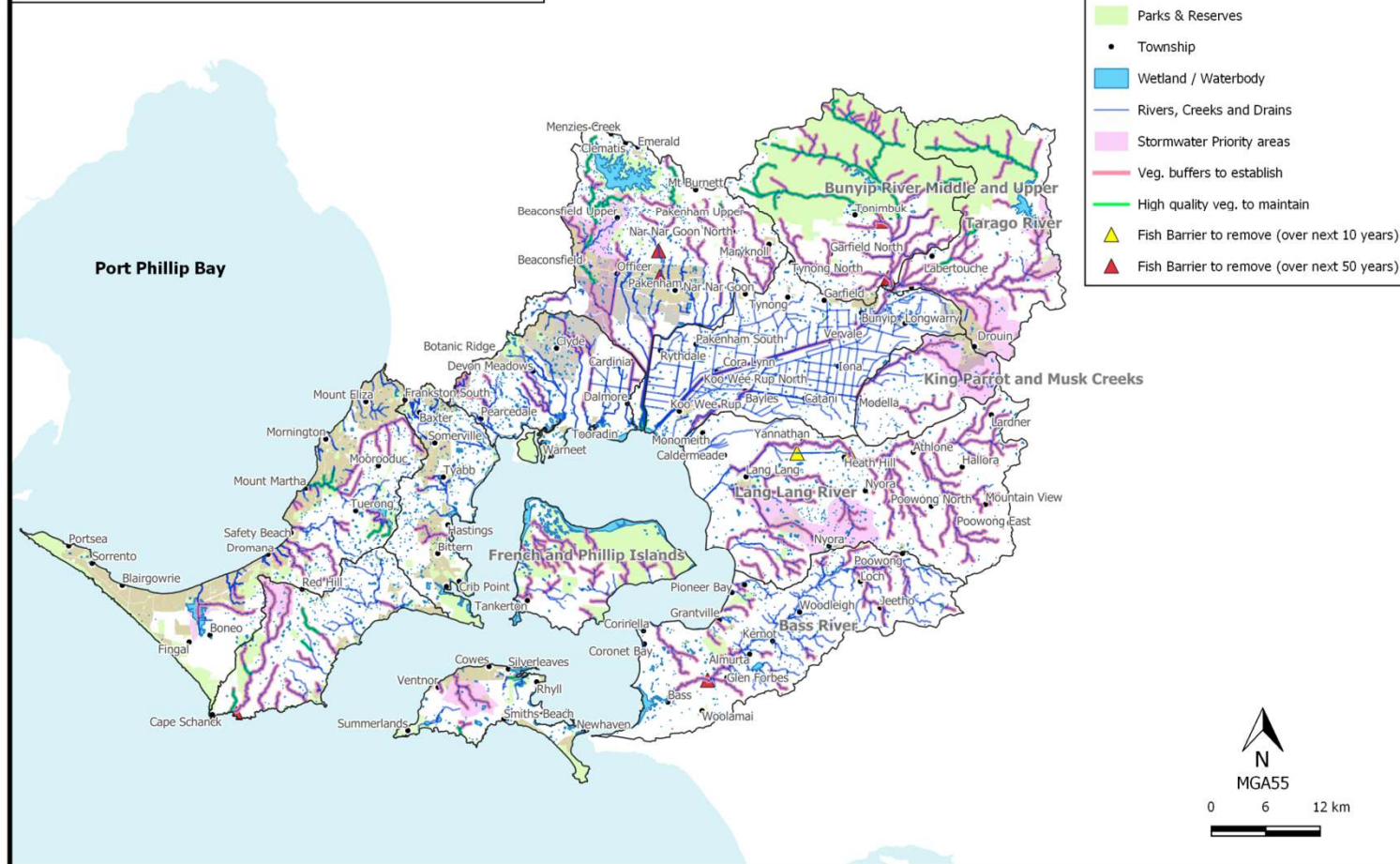
Map at A4 Scale 1: 375,000  
24/05/2018



Source: Melbourne Water.

# Westernport Catchment

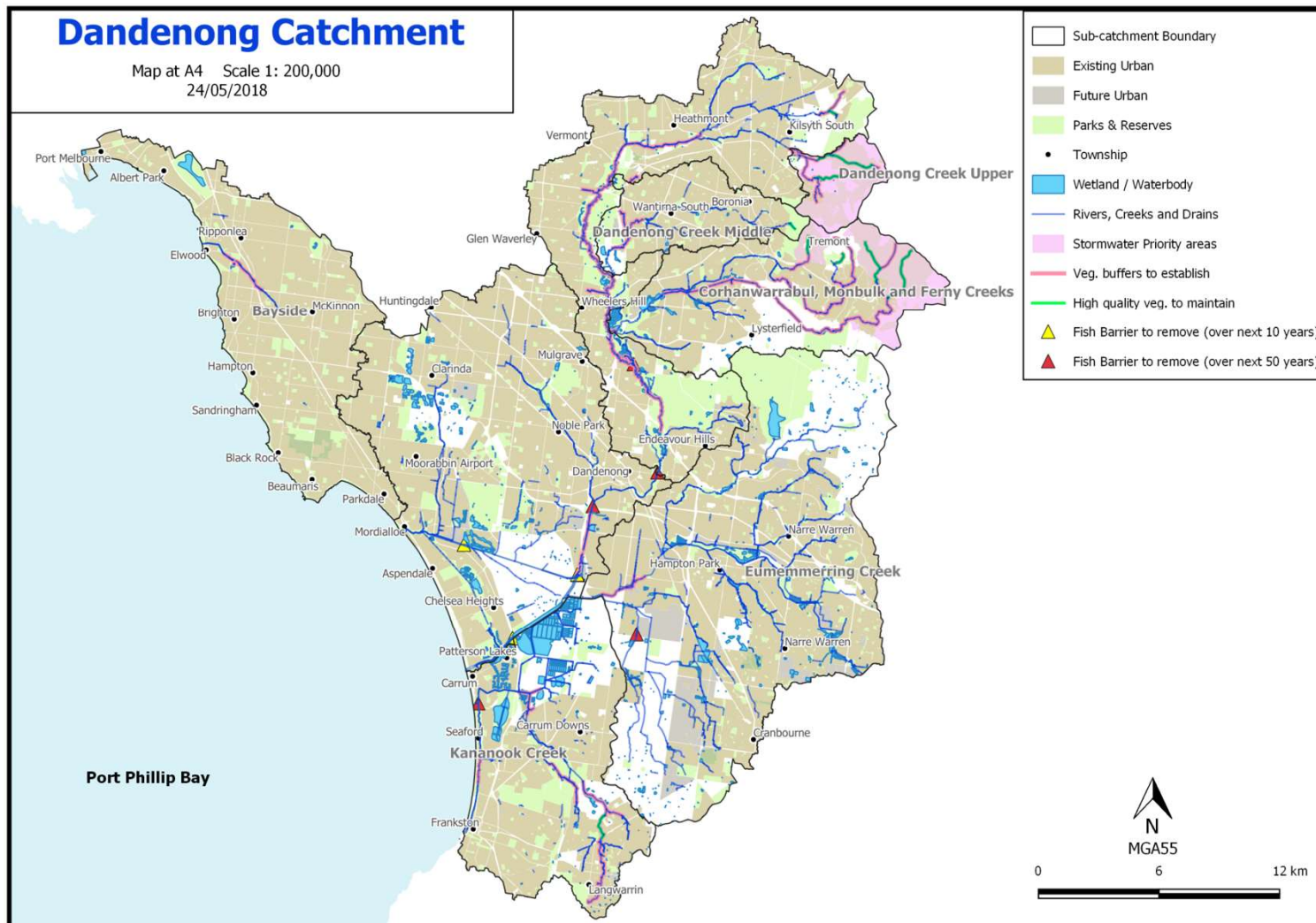
Map at A4 Scale 1: 470,000  
24/05/2018



Source: Melbourne Water.

# Dandenong Catchment

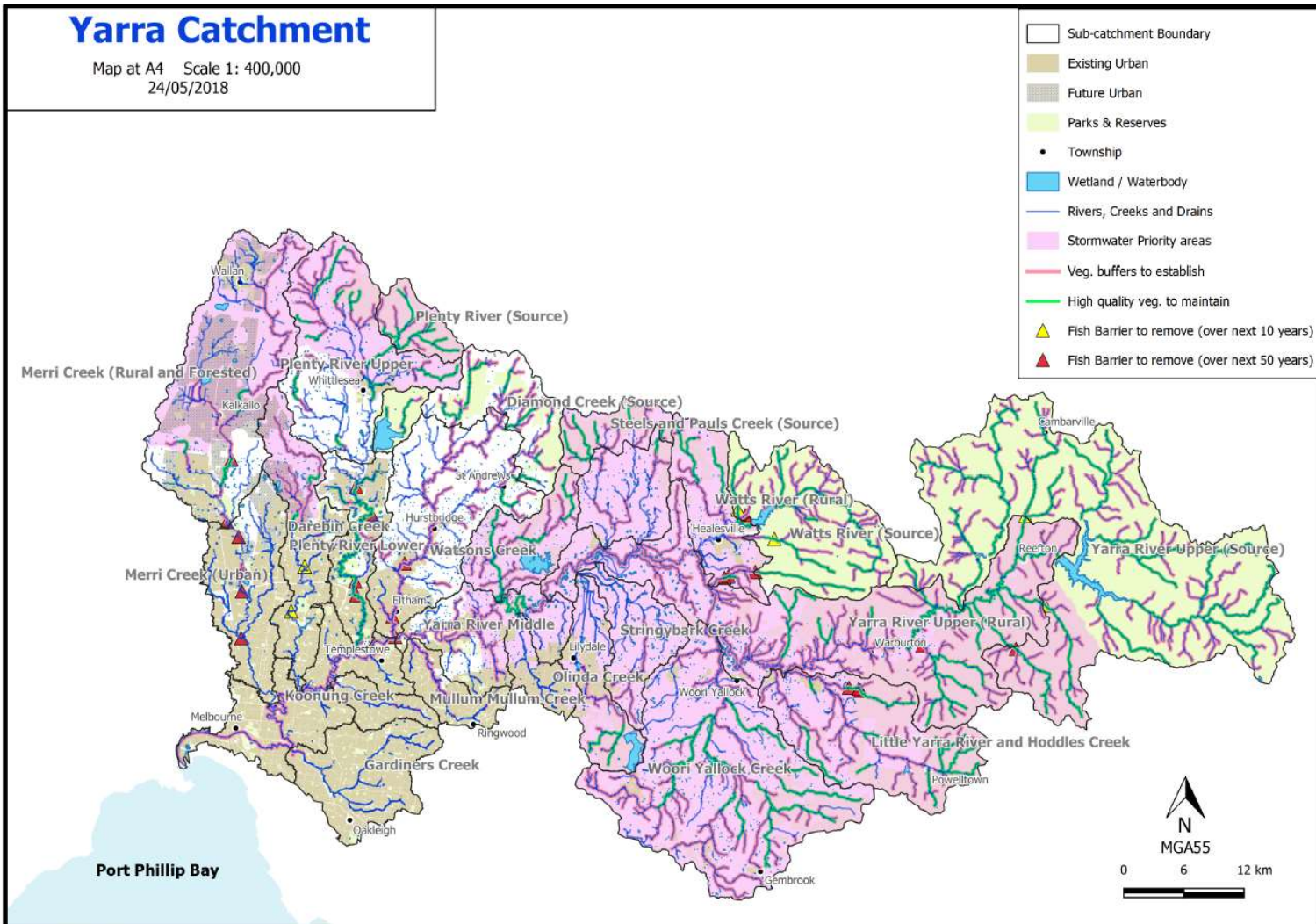
Map at A4 Scale 1: 200,000  
24/05/2018



Source: Melbourne Water.

# Yarra Catchment

Map at A4 Scale 1: 400,000  
24/05/2018



Source: Melbourne Water.

## Example of a Performance Objective

*"Prevent decline in stormwater condition by treating urban development in Emu Creek catchment (e.g. from new developments in Sunbury), so directly connected imperviousness (DCI) remains below 0.4% at the confluence with Deep Creek.*

*For every hectare of new impervious area, this requires harvesting around 4.4 ML/y and infiltrating 1.1 ML/y, which is about 3.4 GL/y and 0.8 GL/y for full development to the urban growth boundary."*

# Performance Objectives

**38 objectives across the region**

**Over the next 50 years**

- 80 GL/y of harvesting
- 20 GL/y of infiltration



## S.M.A.R.T.

**S**pecific



**M**easurable



**A**ssignable



**R**elevant



**T**ime-related



## Key Messages

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**Thank you**

**Acknowledgement:  
Sharyn Rossrakesh for development of the Healthy  
Waterways Strategy stormwater targets**

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