South East Water

Smart Tank Technology:

Talking Tanks for Water Conservation, Flood Management and Environmental Baseflow

Dr David Bergmann

R&D Manager, South East Water

Stormwater Victoria Webinar

16th July 2020

Water Conservation

Flood Management

Environmental Baseflow

Agenda

- Smart tanks and Tank Talk®
- Multi-Objectives Research
- The Aquarevo Experience
- Knox Catchment 913
- Saving the Platypus in Monbulk Creek
- Strategies for Fishermans Bend
- New Opportunities

Tank Talk®

Forecast dependant control of rainwater tanks

Makes a rainwater tank smart

Maximises retention of rainfall event

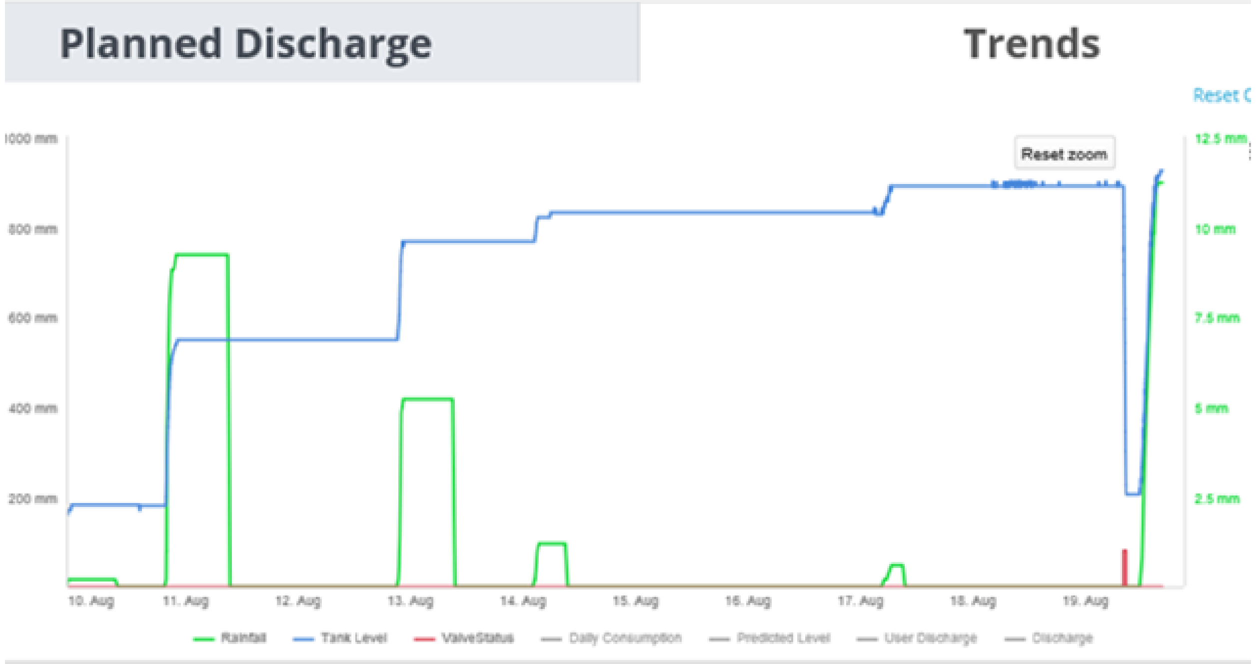
Reduces impact on local stormwater system

Contributes to healthy waterways

South East Water

How does Tank Talk® work?

- Reviews forecast rainfall vs discharge thresholds
- Reviews tank level
- Calculates discharge required
- Automatically discharges rainwater from tank
- At programmed time and rate



Video: Tank Talk(R) powered by OneBox(R)

Applications

Residential	Commercial	Urban Flooding	Healthy Waterways
Household Supply • Aquarevo	**Offices & Apartments** • Waters Edge • Fishermens Bend	**Nuisance Flooding** • Knox Catchment 913	**Protecting the Environment** • Monbulk Creek




SEW & UoM Research on Tanktalk for Environmental Flow

1. Modelling Study

Smart Tank

Environmental Flow

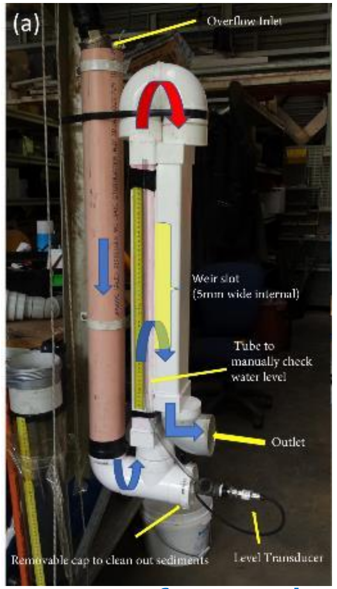
Stormwater Retention

Water Supply

2. Proof-of-Concept - Empirical

Site at residential house

Real-Time Monitoring of Discharge



Novel structure for tank monitoring

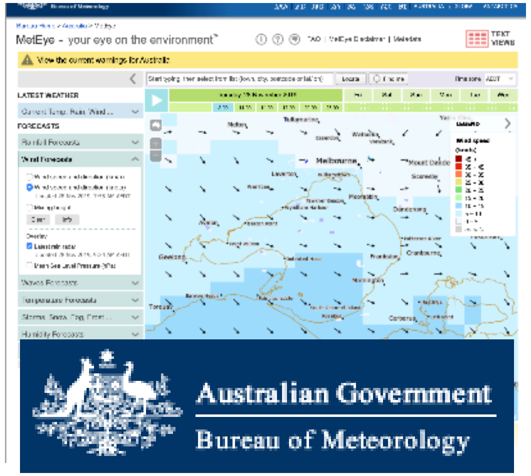
South East Water healthy water for life

THE UNIVERSITY OF MELBOURNE

WATERWAY ECOSYSTEM RESEARCH GROUP

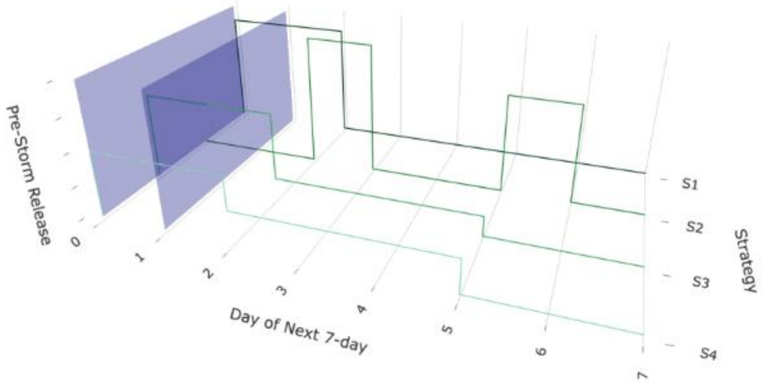
SEW & UoM Research on Tanktalk for Environmental Flow

Advanced Smart Control using 7-day Forecast



7-day Rainfall Forecast

Continuously optimises on rolling forecast

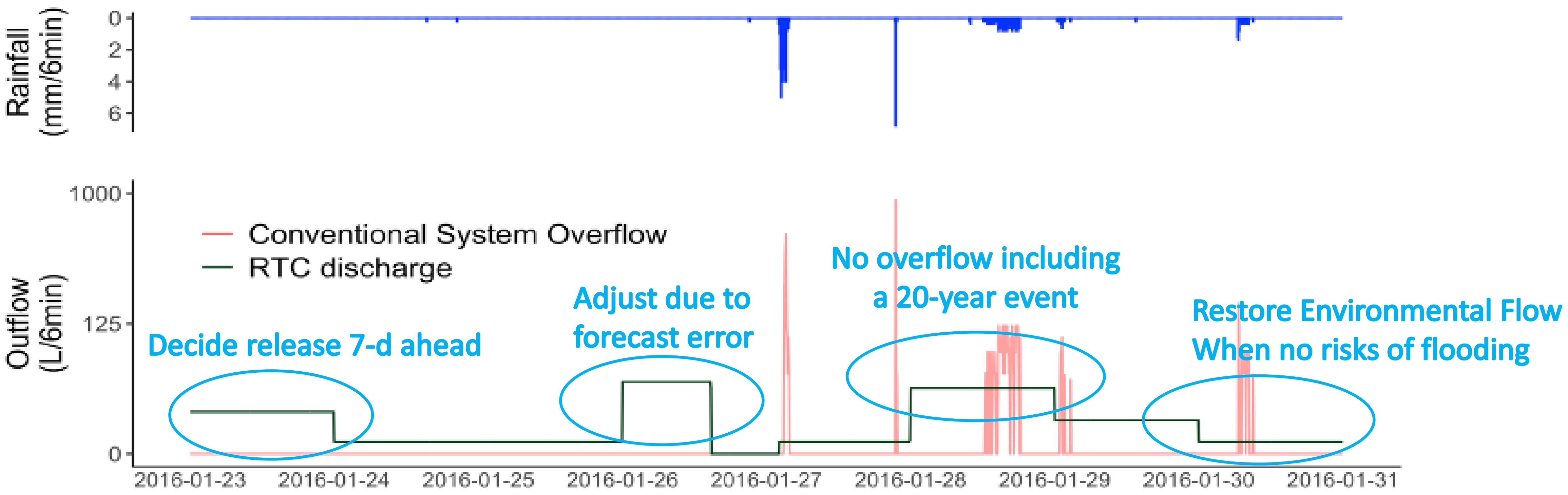


Model then demonstrate how effective for multi-objective outcomes

Deploy rules for smart tank objectives

SEW & UoM Research on Tanktalk for Environmental Flow

Advanced Smart Control using 7-day Forecast



South East Water

villawood properties

AQUAREVO
LYNDHURST

South East Water

villawood properties

- Former Cranbourne Treatment Plant
- 42ha - 460 lots
- Block sizes: from 240- 700sqm
- Over 346 lots sold
- Over 113 houses are occupied
- Equipped with Rainwater for Hotwater
- Supplied with Class A Recycled Water
- Will save up to 70% drinking water
- Each house has smart tank technology
- 5ha of open space and wetlands

AQUAREVO

LYNDHURST

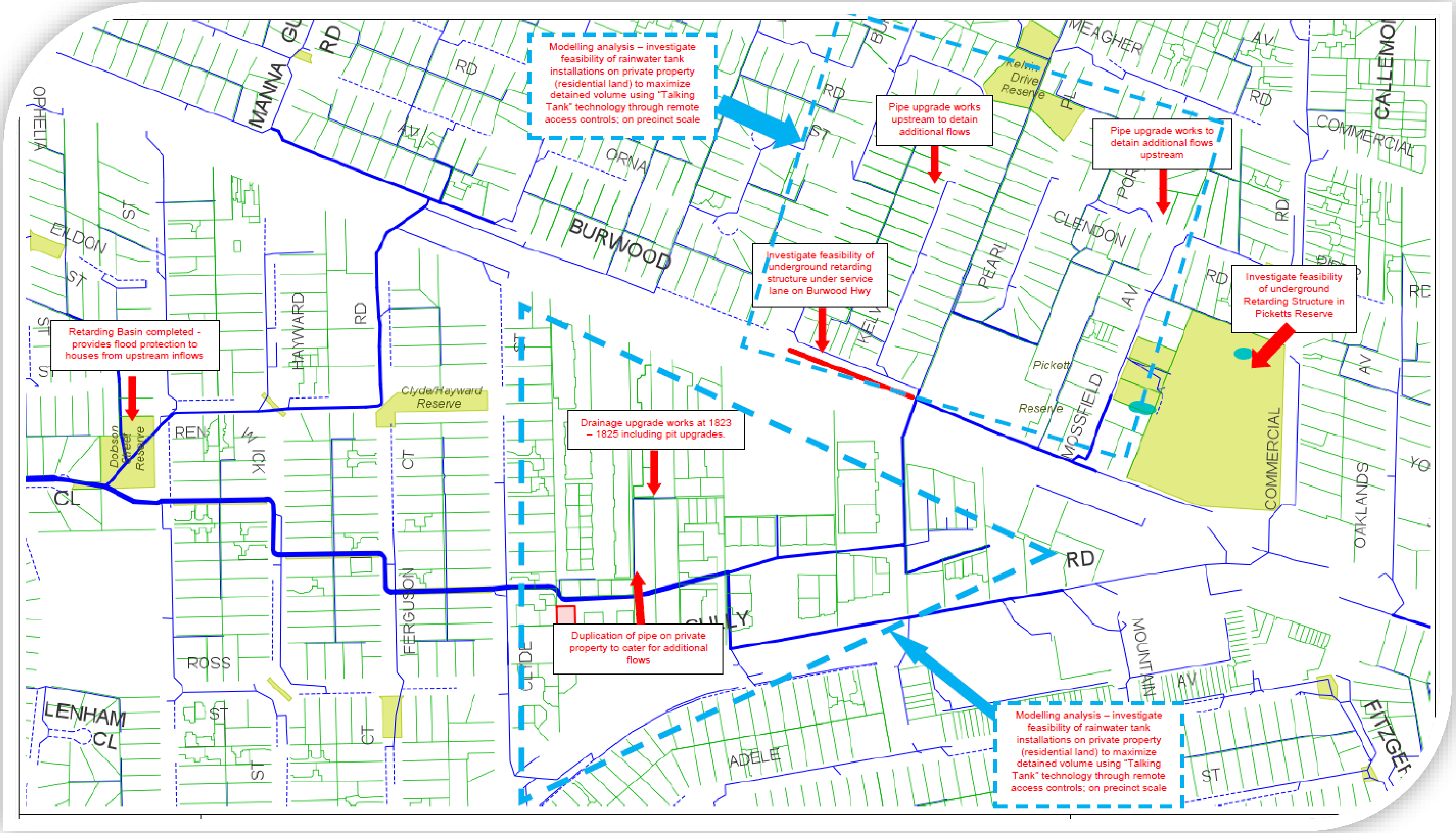
Tank Talk @ Aquarevo

- Will be installed at all 460 lots once fully developed
- Currently active at over 100 properties
- Modelling work suggests about 26% reduction in peak runoff across the estate
- Will be used to test the networked tanks solution and measure reduction in peak flows

knox
your city

Reducing flood impacts with a distributed approach

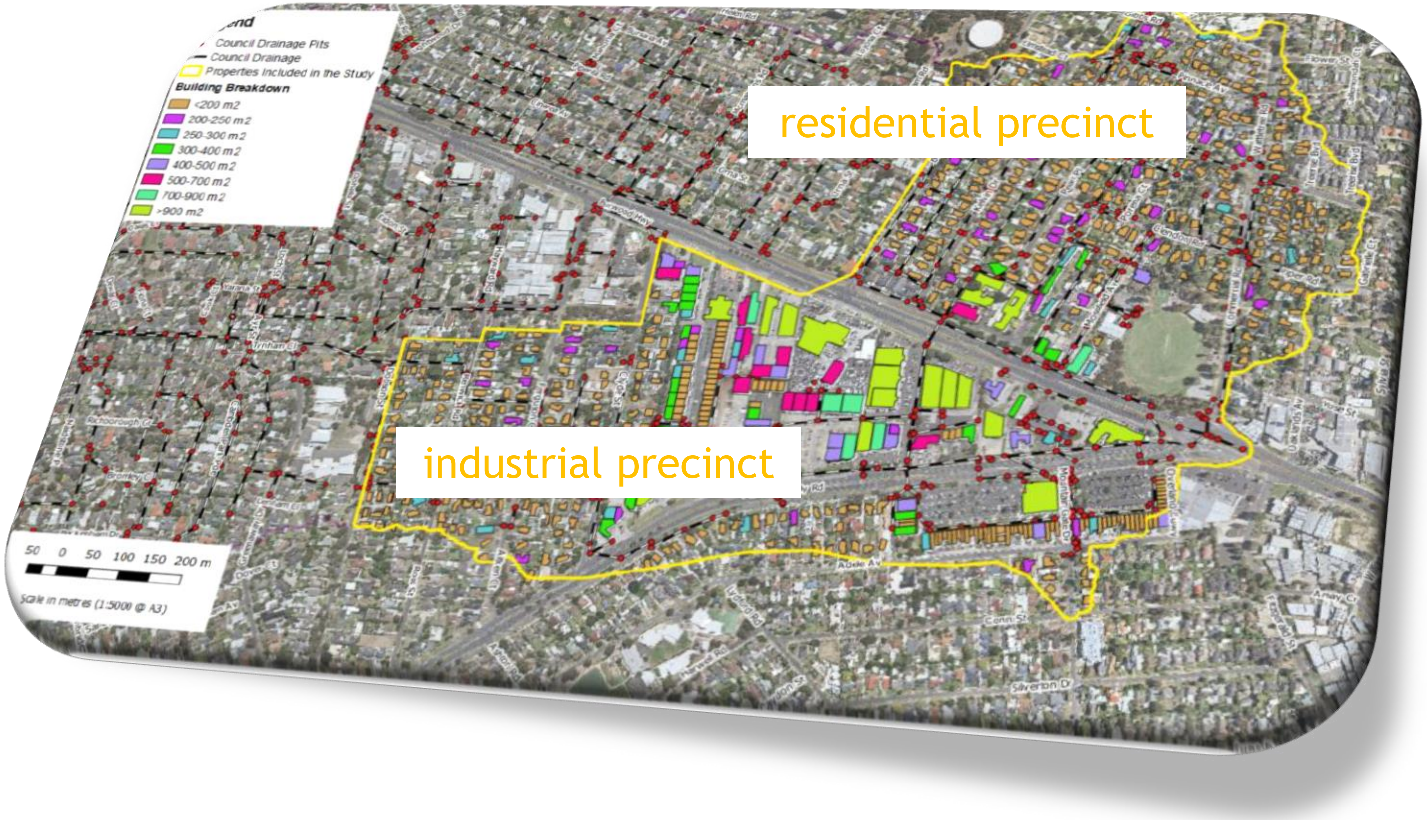
Knox City Council



Case Example: Sub-Catchment 913 – Ferntree Gully

Knox City Council

Flood Mitigation – Sub-Catchment 913 – Ferntree Gully



The Project:

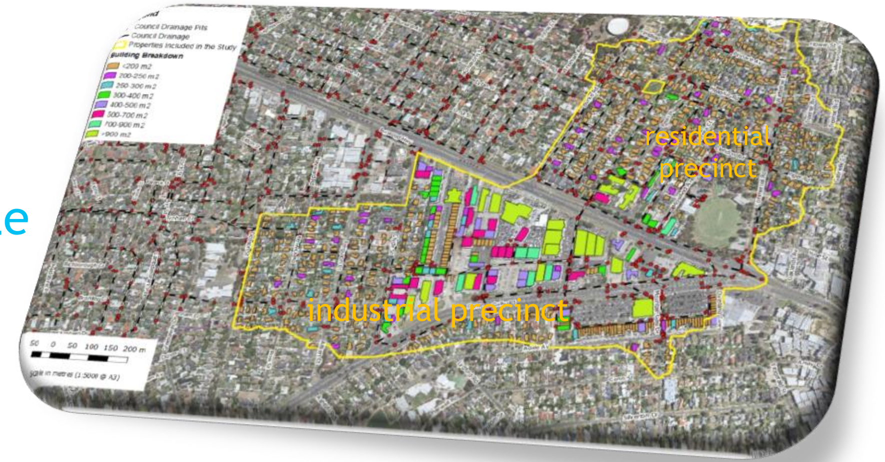
Applying smart technology in a fully developed, constrained and flood affected catchment (Sub-Catchment #913, Blind Creek system).

Knox City Council

Flood Mitigation – Sub-Catchment 913 – Ferntree Gully

Knox City Council & South East Water - Proof of Concept Modelling Distributed Storages (2014 - 2018, Water Technology and Engeny)

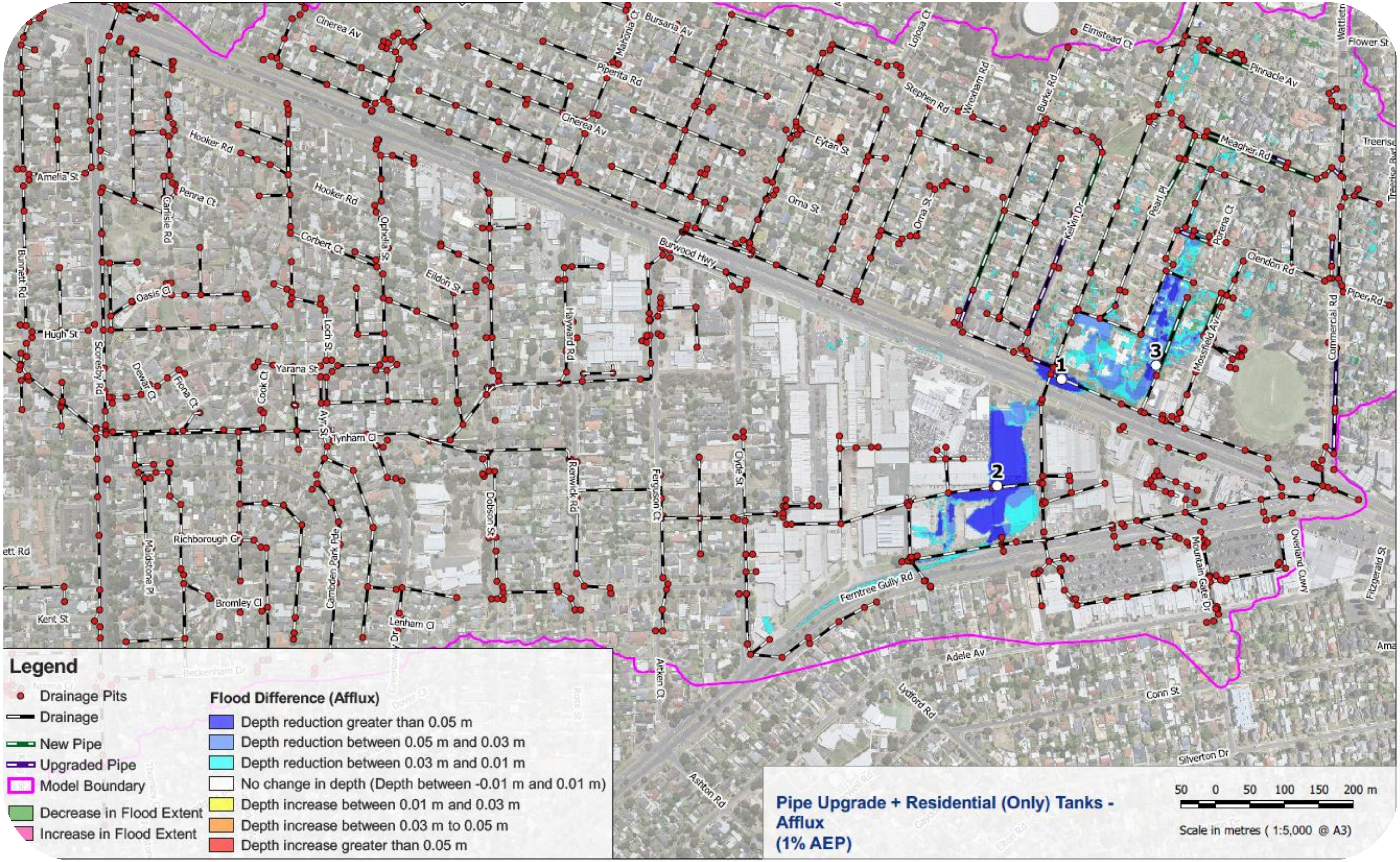
- Steep, flood affected, land constrained catchment (#913)
- Residential, commercial, industrial precincts – no overland flowpaths
- Frequent flooding during all ARIs (incl. 18% AEP/5Yr ARI)
- Modelling considered:
    - combination park retrofits to RBs, levees at sportsgrounds, pit/pipe upgrades – limited success
    - Proof of concept ultimately achieved with smart tanks at lot scale for all AEPs, incl. climate change scenario models (16% intensity factor applied



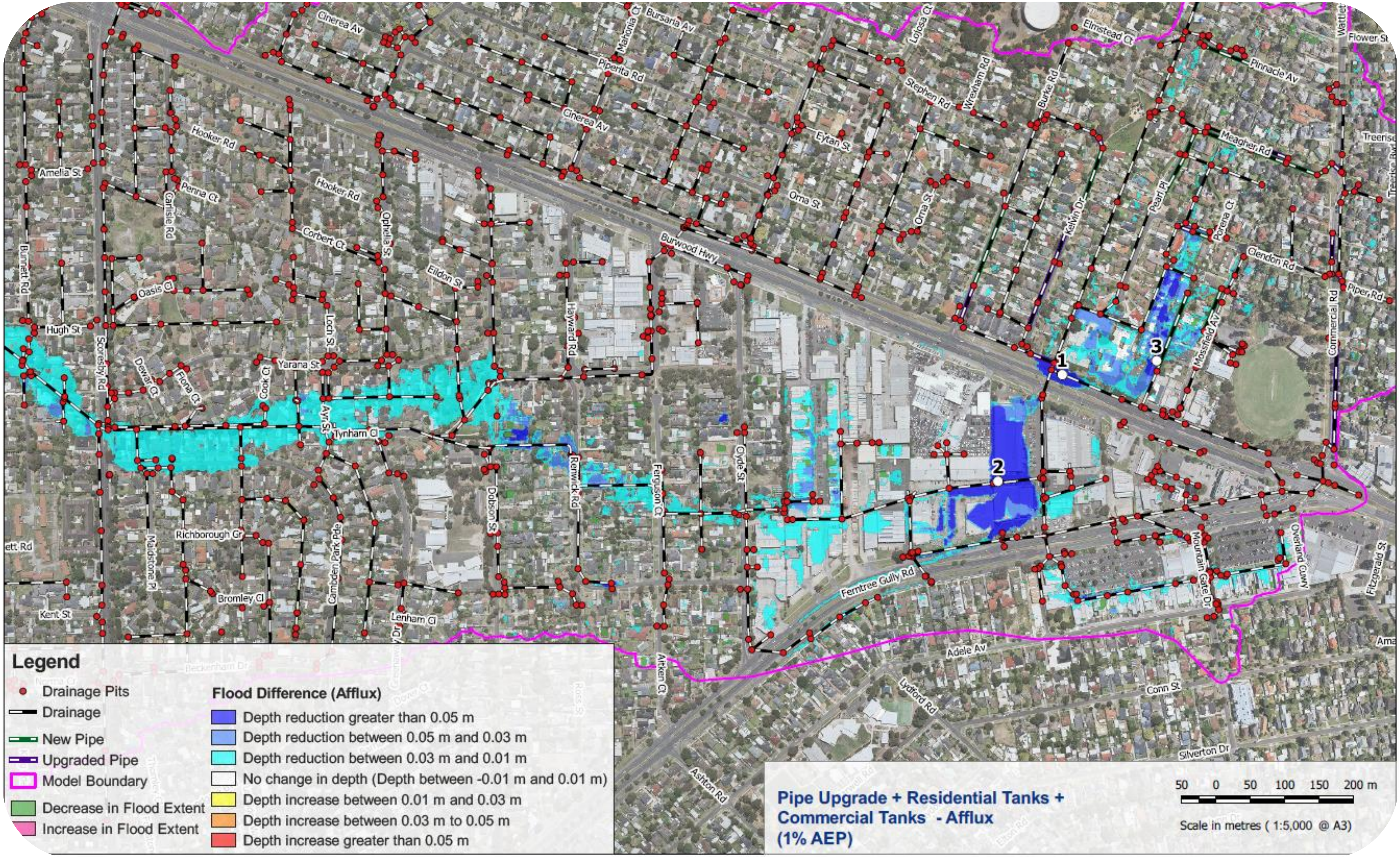
Melbourne Water / DELWP Study (2017) – Potential benefits of distributed storages for flood management study

- Distributed storages have potential to provide benefits in almost all catchments (incl. 1% AEP)
- Greatest benefits found in smaller, steeper catchments, and for more frequent flooding events
- Moore likely to be of benefit in highly urbanised, flood affected catchments.

Knox City Council



Knox City Council



Knox City Council

Key Findings

- A package of system solutions required across the whole catchment
- Some pits and pipes, with bunds and levees and smart tanks
- Smart tank technology key to making the most of under-utilized stormwater in the industrial precinct

Knox City Council

Customer Engagement & Governance Structures

Alluvium Consulting engaged to develop options…..

Stage 1:

- Develop governance arrangements - partner roles/responsibilities/administration
- Develop cost share structure / co-investment model(s) - benefits all parties
- Identify planning / compliance mechanisms for ongoing function / maintenance
- Identify risks and mitigation options - effectiveness and permanency / monitoring and performance
- Identify learnings to be applied in future locations - considerations / recommendations

Stage 2:

- Engagement / Communications Strategy - for private landowner buy-in
- Partnership agreements (all stakeholders) / Private Owner acceptance models

Knox City Council

Monbulk Creek

Environmental Flows for healthy waterways

Waterway Ecosystem Research Group

The University of Melbourne

Yarra Ranges Council

South East Water

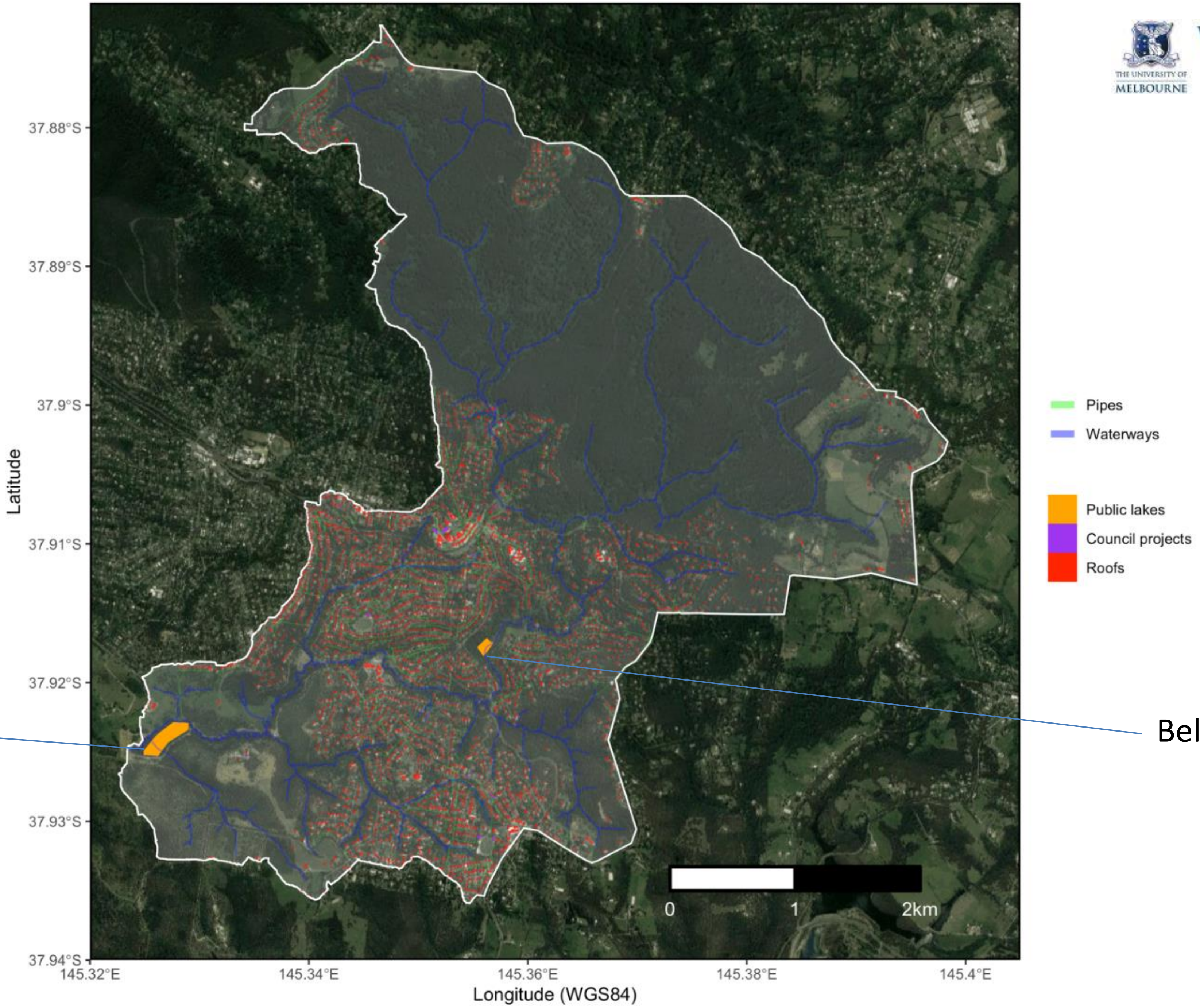
Melbourne Water

Corhanwarrabul, Ferny & Monbulk Sub-catchment

Melbourne Water

THE UNIVERSITY OF MELBOURNE

WATERWAY ECOSYSTEM RESEARCH GROUP



Birdsland Reserve

Belgrave Lake

Monbulk Creek Sub-catchment

Project Objectives

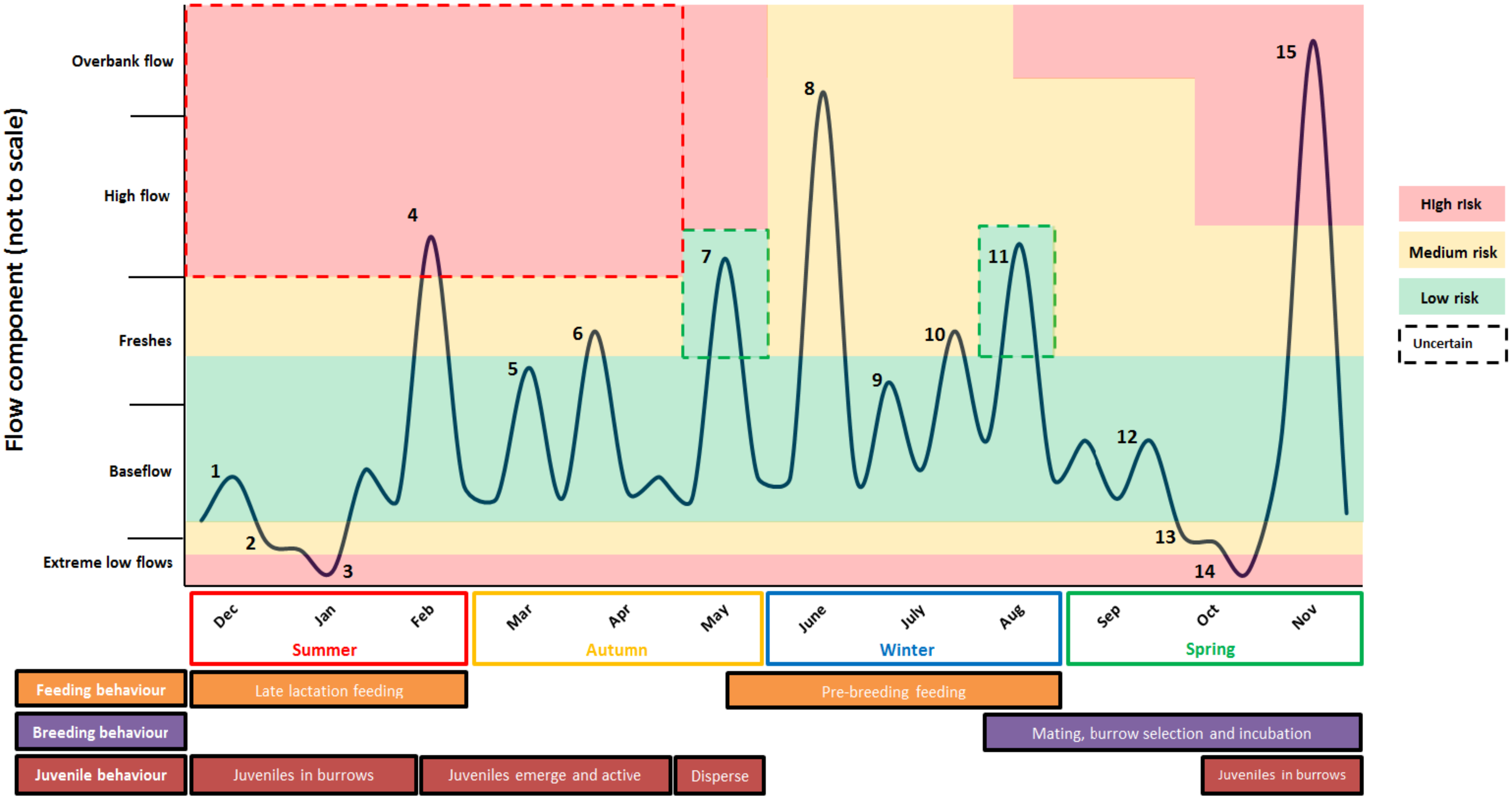
1. Protect **platypus** populations through appropriate **management of stormwater** and environmental flows (in Monbulk/Ferny Ck) as per HWS

2. Demonstrate proof of concept for **actively** managing urban stream flows (through technology such as talking tanks, on both public and private assets)

Melbourne Water

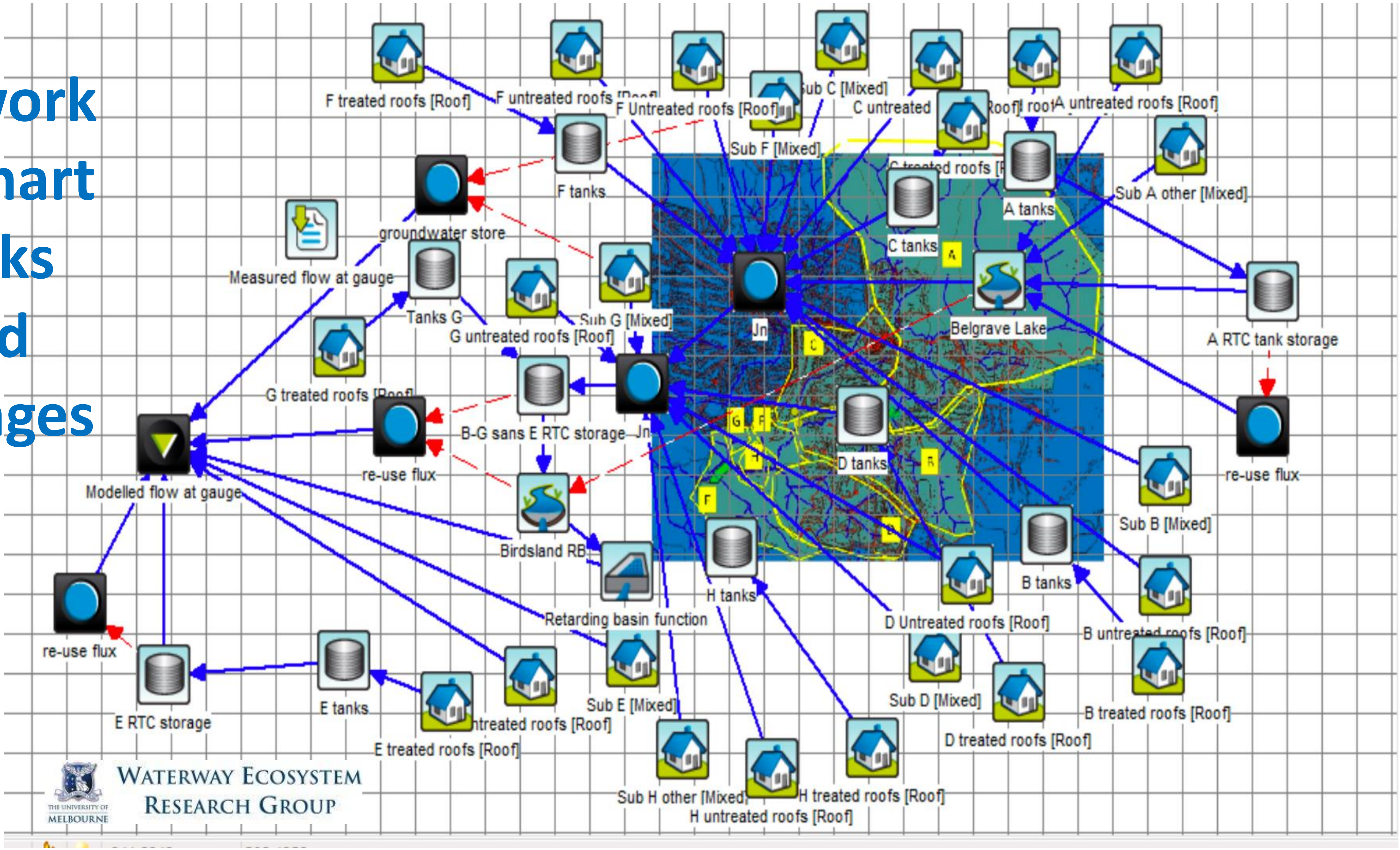
Yarra Ranges Council

Management of Environmental Flows



The objective is to deliver a stormwater flow regime of high benefit and low risk to platypus

Network of Smart Tanks and Storages



THE UNIVERSITY OF MELBOURNE

WATERWAY ECOSYSTEM RESEARCH GROUP

Building the business case

Modelling shows that larger storages in the catchment are required to meet the low flow requirements of the platypus.

These can also be remotely controlled, becoming large ‘smart storages’.

Birdsland Retarding Basin

Belgrave Lake

Current activity

- Identifying pilot sites for Tank Talk® on Council assets
- Functional design of control systems for the larger storages
- Grant application for research funds to study outcomes

Smart Tanks
for greening and cooling

AQUAREVO
LYNDHURST

Why waste the water?

- When environmental base flow is not an issue....
- Put the water to better use
- For greening and cooling purposes

The Aquarevo House

The Aquarevo House

- Landscaped and irrigated to maximise cooling
- Research Project with University of Melbourne & CRC for Water Sensitive Cities
- Sensors integrated to OneBox® controlling irrigation and misting systems

Water Sensitive Cities Strategies for Fishermans Bend

.....the role of smart tanks

Water Sensitive Cities Strategies for Fishermans Bend

.....the role of smart tanks

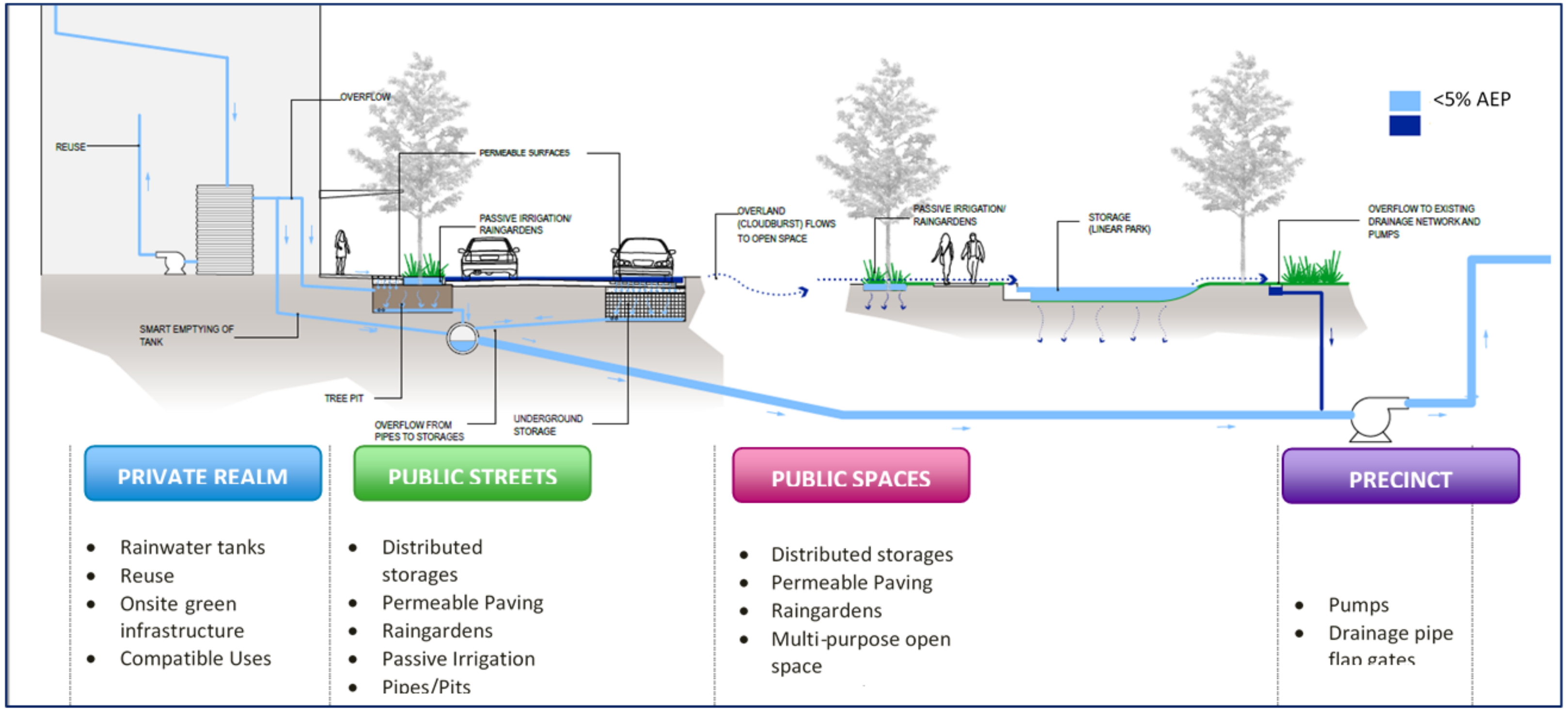


Figure 1 Conceptual drawing of how the different infrastructure and WSUD elements work together to mitigate pluvial, fluvial and coastal flooding (GHD, July 2019).

Water Conservation

Flood Management

Environmental Baseflow

- **Managing the multi-objective outcomes requires a smart approach**
- **Step-change achieved via Tank Talk technology in combination with conventional capital and other WSUD approaches**
- **Partnerships are key**
- **Governance and Customer models to be tested**

Water Conservation

Flood Management

Environmental Baseflow

Acknowledgments

Yarra Ranges Council
Beth Wallis, Jessica Rae, Simon Woodland, Anthony Stratikopoulos.

Knox City Council
Carholine Carvalho*, Sainath Tavate.

University of Melbourne Waterways Ecosystems Research Group – multi-objective modelling
Tim Fletcher, Matt Burns, Daniel (Wei) Xu.

University of Melbourne – cooling study
Stephen Livesley, Kerry Nice.

Melbourne Water
Sarah Watkins, Andrew Grant, Rhys Coleman, Nicole Sutherland

Engeny
Scott Dunn

Water Technology
Luke Cunningham

Alluvium Consulting
Dan O'Halloran, Jonathan Ho.

South East Water
Ninad Dharmadhikari, Jeddah Breman, Pam Kerry, Chris Tancheff

South East Water

Smart Tank Technology:

Talking Tanks for Water Conservation, Flood Management and Environmental Baseflow

Dr David Bergmann
R&D Manager, South East Water

Stormwater Victoria Webinar
16th July 2020