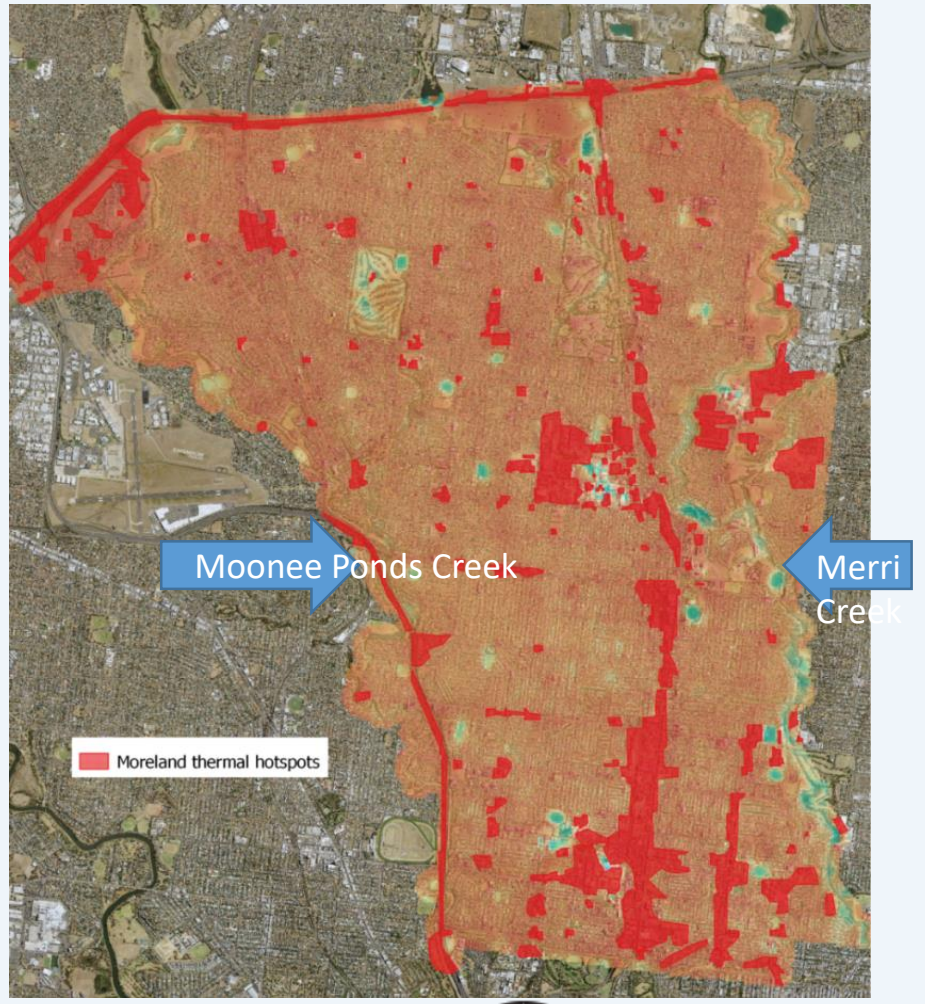
Implementing WSUD in the planning scheme, lessons learnt at Moreland

Vaughn Grey and Kathryn Skidmore

Moreland City Council

Who is Moreland City Council?

- Covers an area of 51 sqm kilometres
- Bordered by Merri Creek and Moonee Ponds Creek
- Population of 160,000 and growing
- Undergoing a ‘development boom’ - higher density apartments being built in Brunswick and Coburg, whilst townhouses/additional dwellings being built in the northern suburbs.



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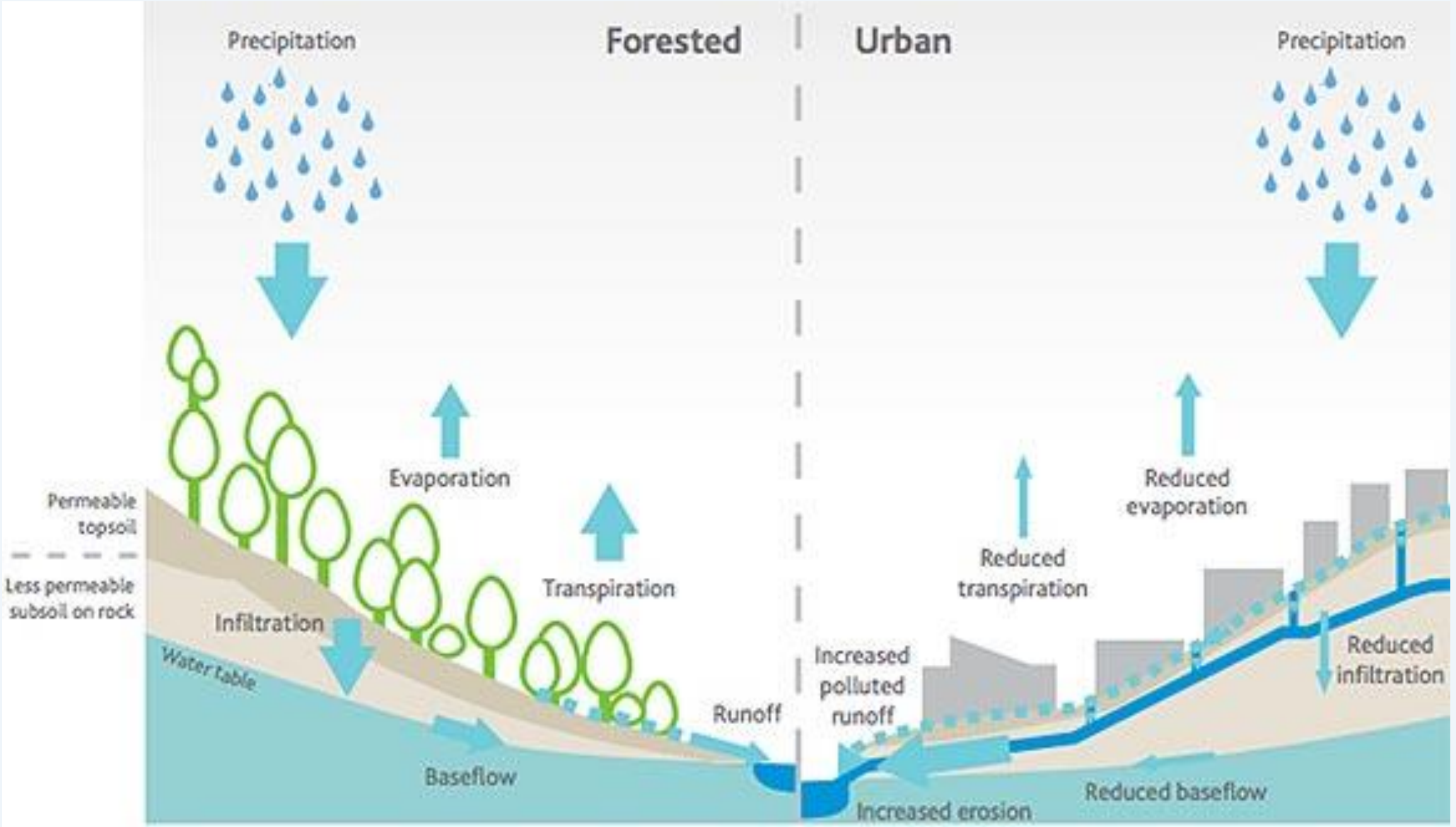
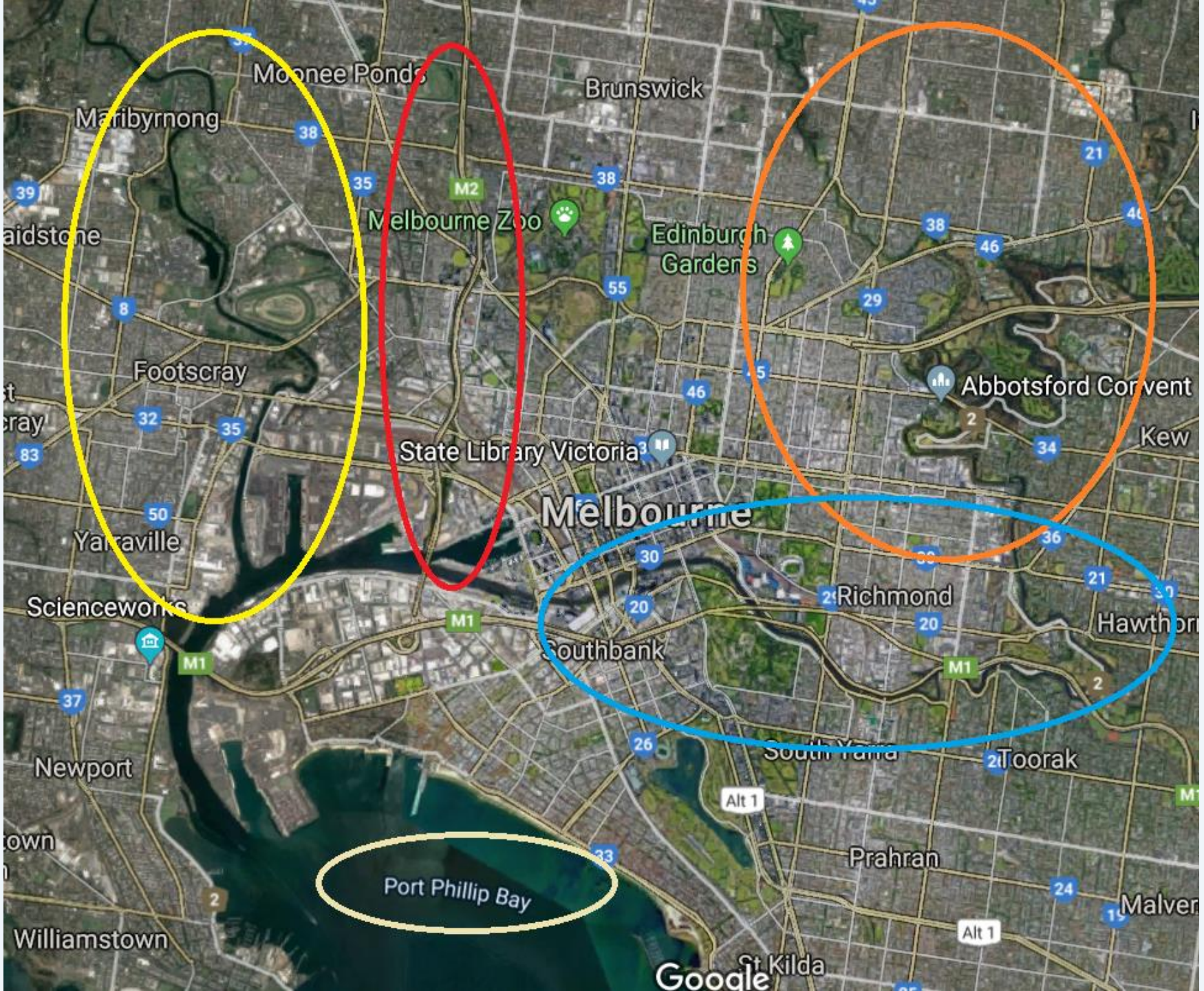
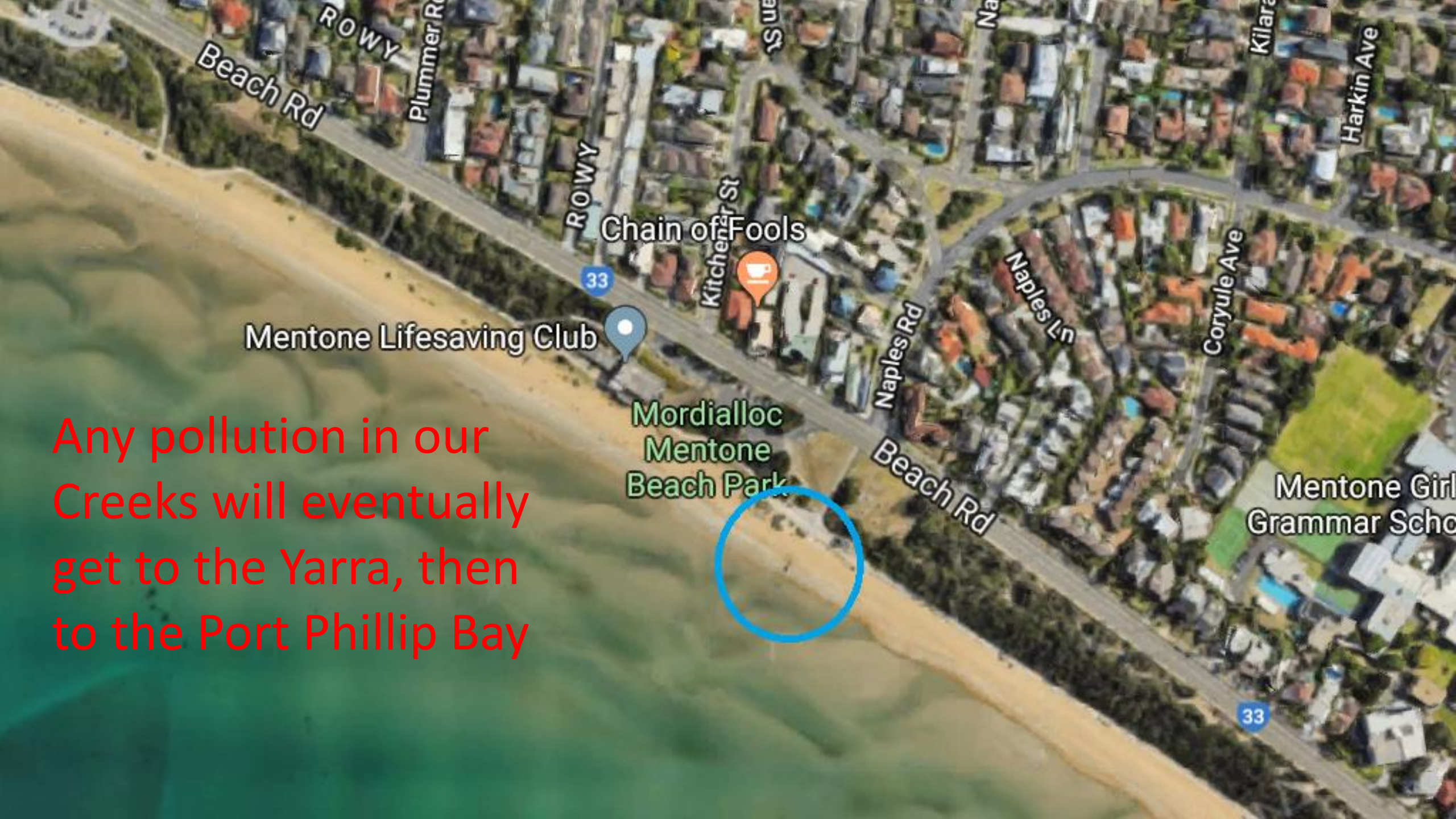
We are losing pervious area


VICTORIA ST
Victoria St
Rosser St
SYDNEY RD
Howarth St
Frith St
Wilkinson St
Lobb St


Forested
Urban
Precipitation
Precipitation
Evaporation
Transpiration
Permeable topsoil
Less permeable subsoil on rock
Infiltration
Water table
Runoff
Baseflow
Reduced transpiration
Reduced evaporation
Increased polluted runoff
Reduced infiltration
Increased erosion
Reduced baseflow

We went from this…(minus the ferns…)


Moonee Ponds
Brunswick
Maribyrnong
Melbourne Zoo
Edinburgh Gardens
Footscray
Abbotsford Convent
Kew
State Library Victoria
Melbourne
Yarraville
Richmond
Scienceworks
Southbank
Newport
Toorak
Port Phillip Bay
Prahran
Williamstown
St Kilda
Google


Beach Rd
ROWY
Plummer Rd
ROWY
Kitchener St
Chain of Fools
33
Mentone Lifesaving Club
Naples Rd
Naples Ln
Coryule Ave
Harkin Ave
Mordialloc
Mentone
Beach Park
Beach Rd
Mentone Girl
Grammar Scho
33
Any pollution in our
Creeks will eventually
get to the Yarra, then
to the Port Phillip Bay

It’s a drain…

Stormwater VPPs

Apply to:

- Commercial subdivisions and developments
- Industrial subdivisions and developments
- Public use developments
- Residential multi-dwelling subdivisions and developments

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Stormwater VPPs

Require all new developments falling in the above categories to meet the following stormwater management objectives:

- minimise damage to properties and inconvenience to the public from stormwater
- To ensure that the street operates adequately during major storm events and provides for public safety
- To minimise increases in stormwater and protect the environmental values and physical characteristics of receiving waters from degradation by stormwater
- To encourage stormwater management that maximises the retention and reuse of stormwater
- To encourage stormwater management that contributes to cooling, local habitat improvements and provision of attractive and enjoyable spaces

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Stormwater VPPs

Stormwater management system should be:

- Designed and managed in accordance with the requirements and to the satisfaction of the relevant drainage authority
- Designed and managed in accordance with the requirements and to the satisfaction of the water authority where reuse of stormwater is proposed
- Designed to meet the current best practice performance objectives for stormwater quality as contained in the Urban Stormwater - Best Practice Environmental Management Guidelines (Victorian Stormwater Committee, 1999)
- Designed to ensure that flows downstream of the site are restricted to pre-development levels unless increased flows are approved by the relevant drainage authority and there are no detrimental downstream impacts
- Designed to contribute to cooling, improving local habitat and providing attractive and enjoyable spaces

Environmentally Sustainable Design policy and WSUD (since Nov 2015)

- Moreland planning policy as of November 2015
- Requires minimum ESD response, ranging from energy efficiency, waste management to stormwater
- Applies to 2+ dwellings and commercial 100sqm+
- Refers to the Melbourne Water *STORM* tool, the eWater *MUSIC* tool and the *2006 CSIRO Urban Stormwater Best Practice Guidelines*
- Advocacy at state level for greater WSUD policy (i.e. Water for Victoria actions, revised SEPP targets, state-wide ESD policy)

Water resources:

- *To improve water efficiency*
- *To reduce total operating potable water use*
- *To encourage the collection and reuse of stormwater*
- *To encourage the appropriate use of alternative water sources (e.g. greywater).*

Stormwater management:

- *To reduce the impact of stormwater run-off.*
- *To improve the water quality of stormwater run-off.*
- *To achieve best practice stormwater quality outcomes.*
- *To incorporate the use of water sensitive urban design, including stormwater re-use.*

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What have we learnt?

- Planning permit applicants often lack knowledge of what is best practice *water resources* and *stormwater management* objectives and how to demonstrate this + no single source of specific information for Moreland applicants

- Raingardens in tight urban environments are rarely simple – especially so in smaller developments due to a lack of upfront Civil Engineering, lack of expertise of consultants undertaking the work, and a lack of space!

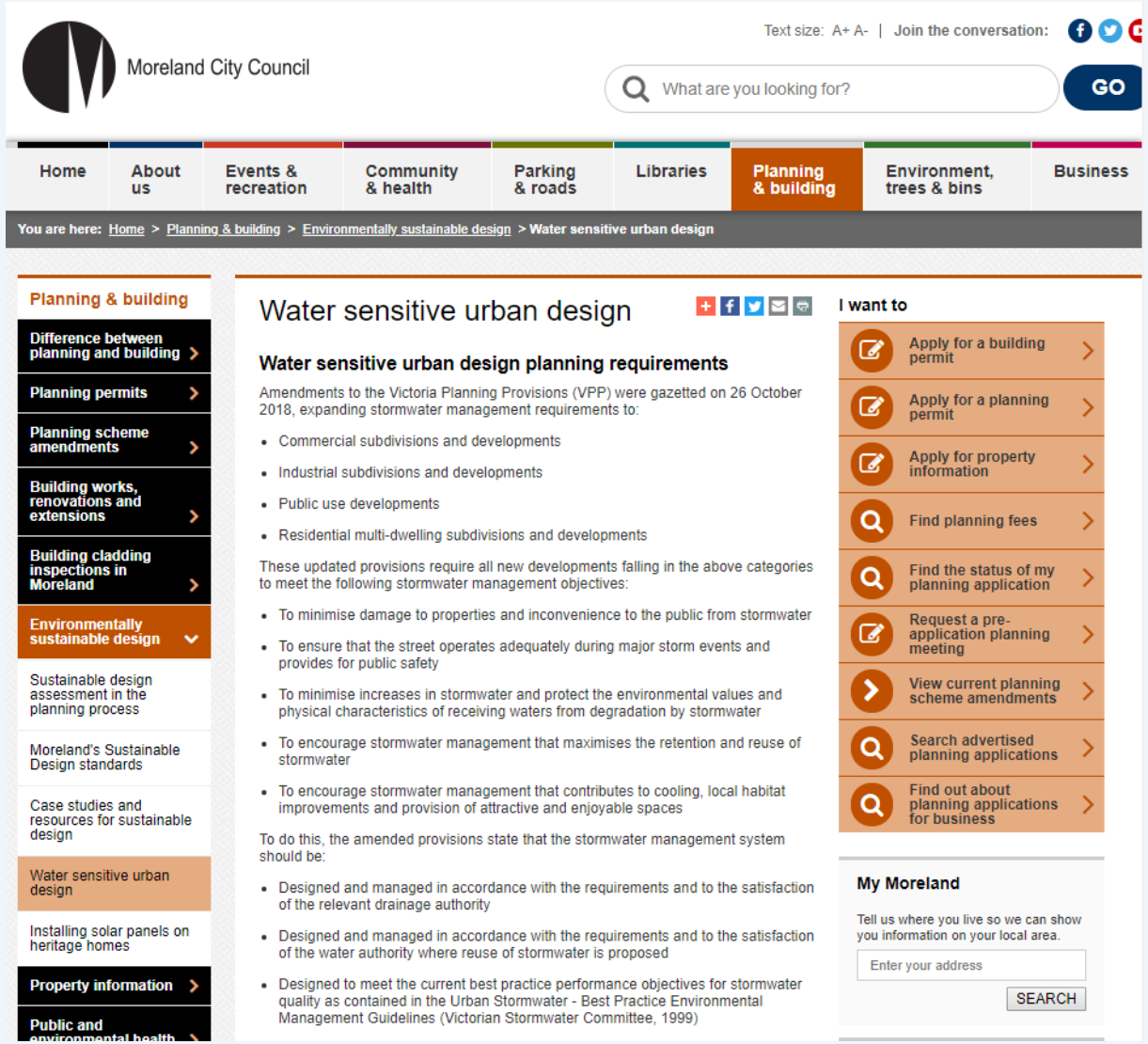
- This consumes a lot of Officer time, and can lead to conflicts between Planning, ESD and Drainage teams

So what have we done?

- Moreland therefore wanted to address this via compiling a set of guidelines for our development community to streamline the assessment of WSUD assessments, have greater assistance and guidance for our Urban Planners, provide clarity for all and ultimately achieve improved outcomes

- We specifically wanted to:
  - Define WSUD in a non-technical way for developers
  - Describe various WSUD treatments, their benefits and maintenance considerations
  - Create a hierarchy of preferred WSUD treatments
  - Provide practical examples for Moreland-type developments
  - Make this info publicly available online
  - Use this to educate our internal colleagues, external development community and Moreland residents

Moreland WSUD for Developers webpage



https://www.moreland.vic.gov.au/planning-building/environmentally-sustainable-design/water-sensitive-urban-design/

Part of the “Building and Planning” webpage

Access direct from front page

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Sets out requirements

Water sensitive urban design

Water sensitive urban design planning requirements

Amendments to the Victoria Planning Provisions (VPP) were gazetted on 26 October 2018, expanding stormwater management requirements to:

- Commercial subdivisions and developments
- Industrial subdivisions and developments
- Public use developments
- Residential multi-dwelling subdivisions and developments

These updated provisions require all new developments falling in the above categories to meet the following stormwater management objectives:

- To minimise damage to properties and inconvenience to the public from stormwater
- To ensure that the street operates adequately during major storm events and provides for public safety
- To minimise increases in stormwater and protect the environmental values and physical characteristics of receiving waters from degradation by stormwater
- To encourage stormwater management that maximises the retention and reuse of stormwater
- To encourage stormwater management that contributes to cooling, local habitat improvements and provision of attractive and enjoyable spaces

To do this, the amended provisions state that the stormwater management system should be:

- Designed and managed in accordance with the requirements and to the satisfaction of the relevant drainage authority
- Designed and managed in accordance with the requirements and to the satisfaction of the water authority where reuse of stormwater is proposed

Best practice

The Victorian Urban Stormwater Best Practice Environmental Management Guidelines (Victorian Stormwater Committee, 1999) mentioned in the VPP's define best practice stormwater pollutant removal as:

- 80% reduction in the typical urban load of total suspended solids
- 45% reduction in the typical urban load of total phosphorous
- 45% reduction in the typical urban load of total nitrogen
- 70% retention of typical urban load of litter.

In addition, the VPP require flow from the site to be:

- Designed to ensure that flows downstream of the site are restricted to pre-development levels unless increased flows are approved by the relevant drainage authority and there are no detrimental downstream impacts.

Moreland City Council is located in the middle reaches of Merri Creek and Moonee Ponds Creek, with downstream flows impacting the lower reaches of the Yarra River. Meeting the stormwater quality objectives is important to maintain the health of the downstream Yarra River, Bay and Ocean. Meeting the stormwater flow objectives is important to ensure the health and stability of the Merri and Moonee Ponds creeks.

To find out more visit the Melbourne Water website.

Demonstrating meeting best practice

Meeting the VPP requirements can currently be demonstrated in two ways:

Either:
Submitting a MUSIC model demonstrating a treatment train that achieves the above targets.

OR:
Submitting a STORM report achieving a score of 100% or above

When submitting an application to Council, be sure to include all the information required in the WSUD response check list:

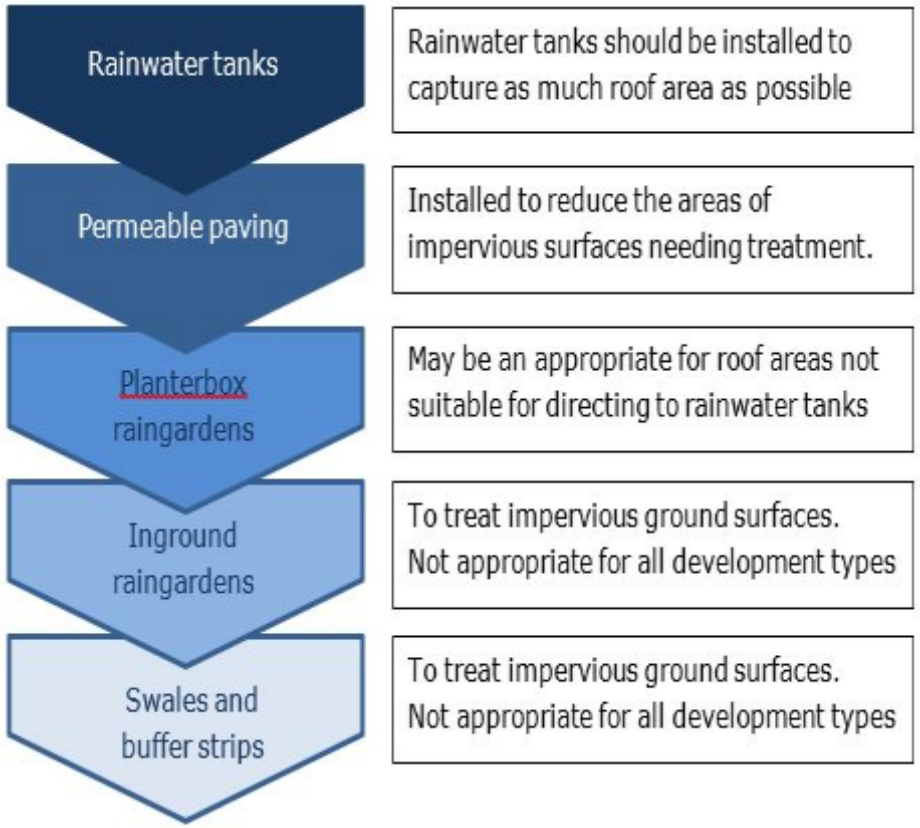
See WSUD submission checklist (PDF 310Kb).

Best practice in Moreland

Water sensitive urban design treatments

A range of water sensitive urban design treatments can be used to demonstrate best practice stormwater management.

Moreland has created a hierarchy to demonstrate which treatments are considered to meet the intent of the VPPs and have a good track record of successful implementation within the Moreland municipality.



See WSUD treatment options (PDF 753Kb) for further details on each of these treatments

See WSUD treatment standard drawings (PDF 1Mb) for standard drawings of some WSUD treatment options that may be used in a WSUD response to Moreland.

MORELAND

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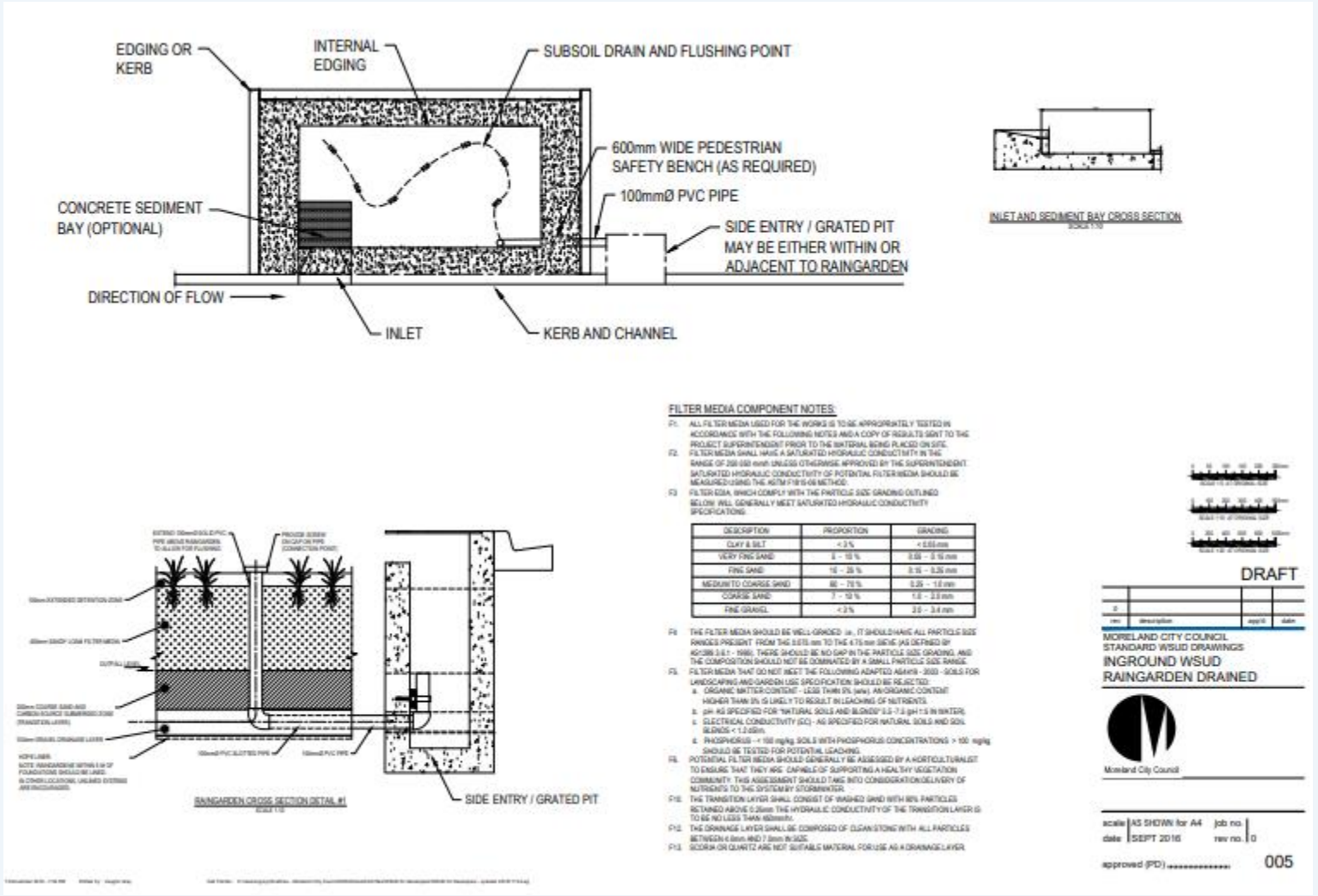
Including standard drawings



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Recommended solutions

Townhouse style developments

Preferred solution

- Direct as much roof space as possible to rainwater tanks for reuse in toilet flushing, laundry and irrigation.
- Driveway and backyard paving to be “permeable paving”

Example WSUD response for townhouse development - preferred (PDF 230Kb)

Less preferred solution

- Direct as much roof space as possible to rainwater tanks for reuse in toilet flushing, laundry and irrigation
- Other roof space directed to planterbox raingardens
- Driveway and backyard paving to be “permeable paving”

Example WSUD response for townhouse development – less preferred (PDF 473Kb)

Least preferred solution

- Direct as much roof space as possible to rainwater tanks for reuse in toilet flushing, laundry and irrigation
- Other roof space untreated
- Backyard paving to be “permeable paving”
- Driveway to be treated by in-ground raingarden

Note re. in-ground raingardens for townhouse developments. In general, townhouse developments do not have sufficient space to ensure an in-ground raingarden can function effectively and avoid potential flooding problems. In-ground raingardens therefore require a significant amount of “up front” civil engineering to assess whether they are a viable proposition. If in-ground raingardens are specified for a townhouse style development within Moreland, they should be accompanied by engineering work to demonstrate:

- They will not cause any flooding issues
- Untreated water can adequately drain into the raingarden
- Treated water can adequately be discharged to the legal point of discharge (note Moreland will not accept pumping from a raingarden to the legal point of discharge)

If Civil Engineering details covering these issues are not submitted as part of the planning application, then it is likely that an in-ground raingarden will be rejected in favour of one of the two above more preferred WSUD treatment solutions.

Example WSUD response for townhouse development – least preferred (PDF 468Kb)

Recommended solutions – townhouse

SMALL TOWNHOUSE DEVELOPMENT PREFERRED SOLUTION

ESD April 2019

The development site is 735 m². Six new residential units are proposed for the site. The townhouses will each have three stories and three bedrooms. The table below shows a breakdown of surface types within the site. Each unit has a 10 m² balcony. Rainwater tanks are used to treat as much roof area as possible. Permeable paving will be used for all of the driveway and non-trafficable paving within the development.

Surface type	Area (m²)	Typology for purpose of stormwater quality assessment
Unit 1 roof to tank (2,500 L)	65	Impervious
Unit 2 roof to tank (2,000 L)	45	Impervious
Unit 3 roof to tank (2,000 L)	45	Impervious
Unit 4 roof to tank (2,000 L)	45	Impervious
Unit 5 roof to tank (2,000 L)	45	Impervious
Unit 6 roof to tank (2,500 L)	65	Impervious
Unit 1 roof untreated (balcony only)	10	Impervious
Unit 2 roof untreated (includes balcony)	20	Impervious
Unit 3 roof untreated (includes balcony)	20	Impervious
Unit 4 roof untreated (includes balcony)	20	Impervious
Unit 5 roof untreated (includes balcony)	20	Impervious
Unit 6 roof untreated (balcony only)	10	Impervious
Driveway to inground raingarden	150	Pervious
Paths (permeable paving)	100	Pervious
Garden beds	75	Pervious
TOTAL	**735**	

Stormwater runoff from the site will be treated using rainwater tanks and permeable paving.

a) Rainwater tanks

Runoff from the roofs of Units 1 to 6 (excluding balcony) will be diverted to 2,000 L or 2,500 L above ground rainwater tanks. Rainwater will be used for toilet flushing and cold laundry taps within Units 1 to 6. Rainwater tank overflows will be directed to the legal point of discharge.

Note that some roof runoff from Units 2 to 5 will not drain to rainwater tanks due to constraints on draining the whole roof to the tank (i.e. charged stormwater pipes should not go under buildings).

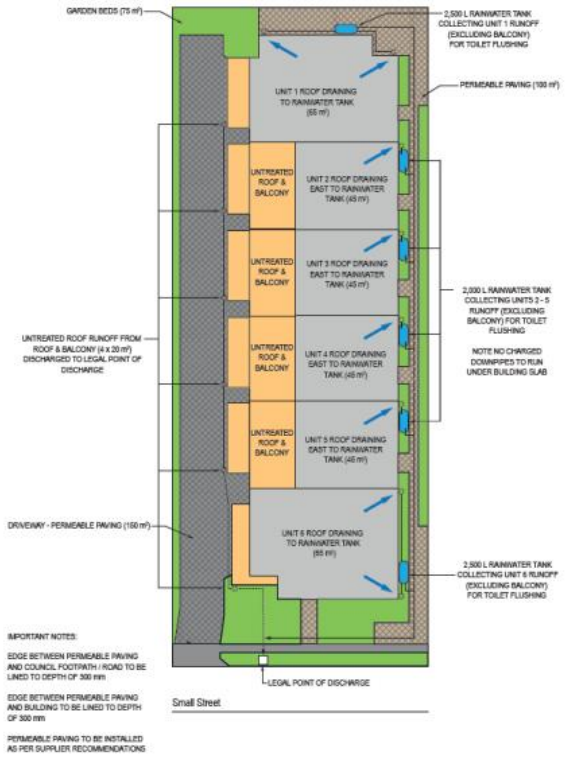
b) Permeable paving

Stormwater runoff from all of the driveway and footpaths will be infiltrated to the underlying soils using permeable paving. During large rainfall events, stormwater that cannot be infiltrated via the permeable paving will flow either overland or through underground drainage to the legal point of discharge.

c) Other catchment areas

No treatment will be provided for balconies and parts of the Unit 2 to 5 roofs that drain to the south. Rainfall on garden beds and turfed areas to the front and rear of the property will be directly infiltrated to the in situ soils.

Site layout plan



STORM Report

The STORM report is shown below. Note that only impervious surfaces are entered into the STORM tool.

Melbourne Water **STORM Rating Report**

TransactionID: 760386
Municipality: MORELAND
Rainfall Station: MORELAND
Address: Small Street

Vic
VIC

Assessor:
Development Type: Residential - Multiunit
Allotment Site (m2): 735.00
STORM Rating %: 127

Description	Impervious Area (m2)	Treatment Type	Treatment Area/Volume (m2 or L)	Occupants / Number Of Bedrooms	Treatment %	Tank Water Supply Reliability (%)
Unit 1 roof to tank	65.00	Rainwater Tank	2,500.00	3	166.00	82.00
Unit 2 roof to tank	45.00	Rainwater Tank	2,000.00	3	170.00	82.00
Unit 3 roof to tank	45.00	Rainwater Tank	2,000.00	3	170.00	82.00
Unit 4 roof to tank	45.00	Rainwater Tank	2,000.00	3	170.00	82.00
Unit 5 roof to tank	45.00	Rainwater Tank	2,000.00	3	170.00	82.00
Unit 6 roof to tank	65.00	Rainwater Tank	2,500.00	3	166.00	82.00
Unit 1 roof untreated	10.00	None	0.00	0	0.00	0.00
Unit 2 roof untreated	20.00	None	0.00	0	0.00	0.00
Unit 3 roof untreated	20.00	None	0.00	0	0.00	0.00
Unit 4 roof untreated	20.00	None	0.00	0	0.00	0.00
Unit 5 roof untreated	20.00	None	0.00	0	0.00	0.00
Unit 6 roof untreated	10.00	None	0.00	0	0.00	0.00

Date Generated: 16-Apr-2019 Program Version: 1.0.0

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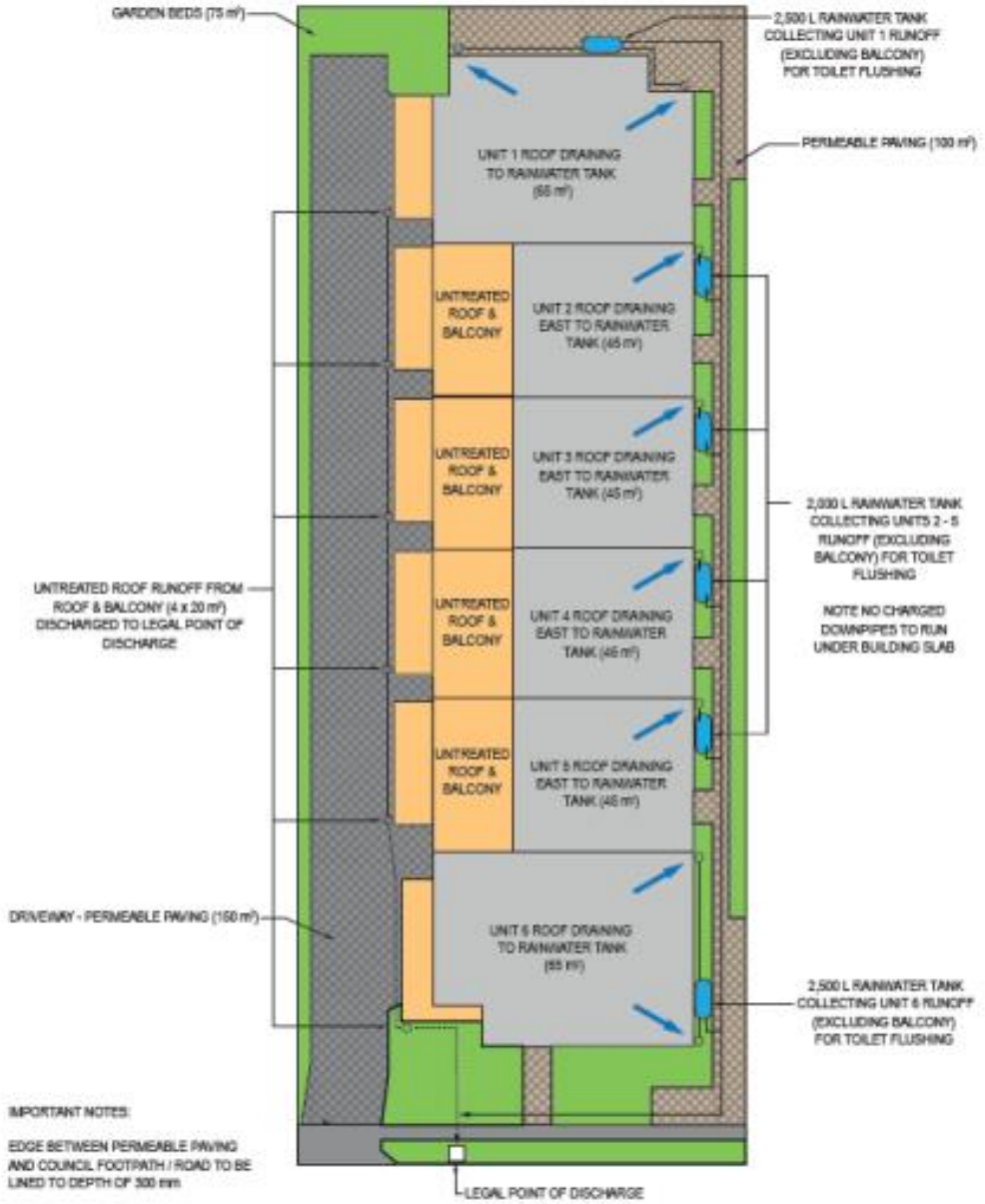
Site layout plan



Recommended solutions – townhouse preferred (deemed to comply)

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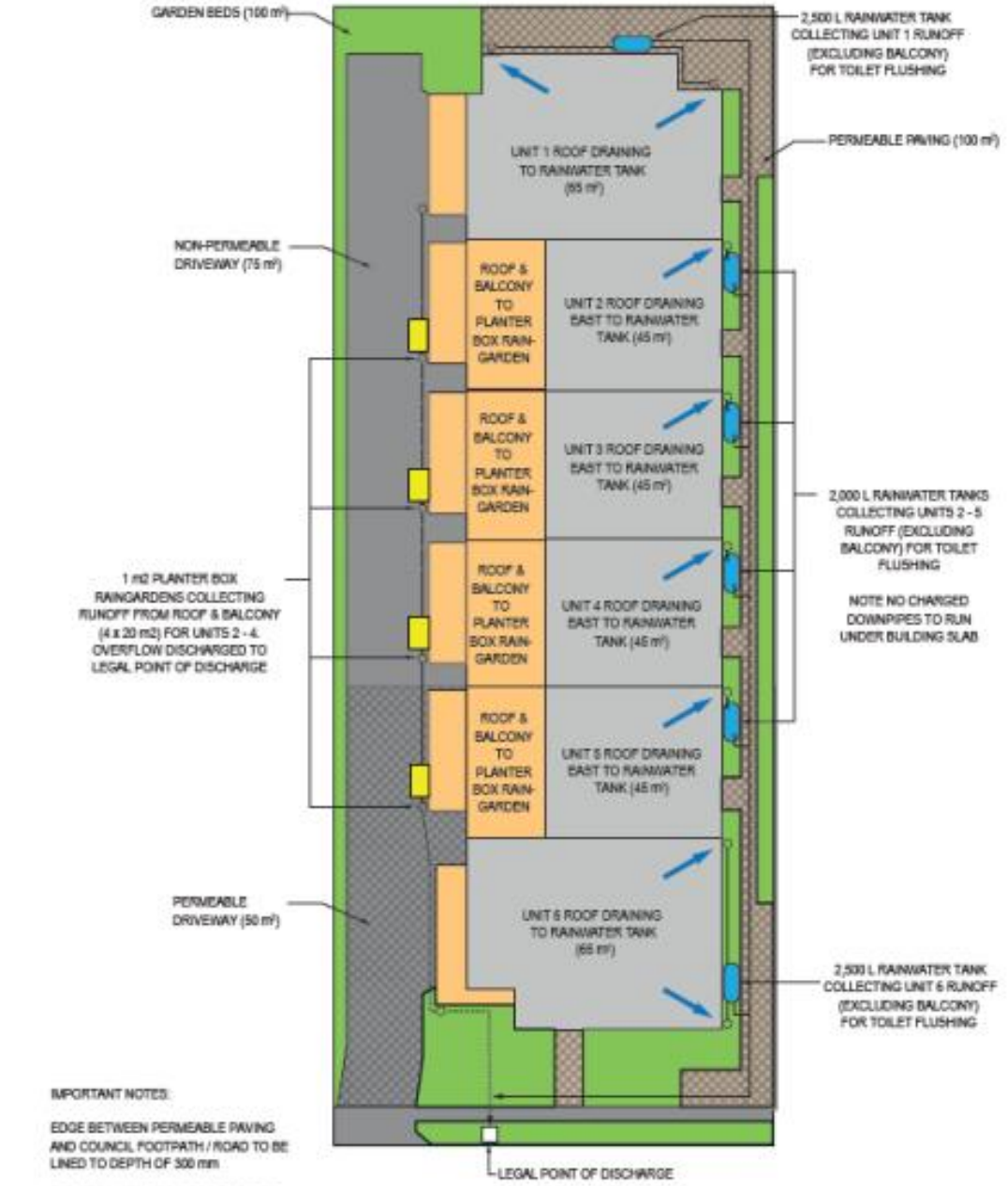
Site layout plan



Recommended solutions – townhouse less preferred

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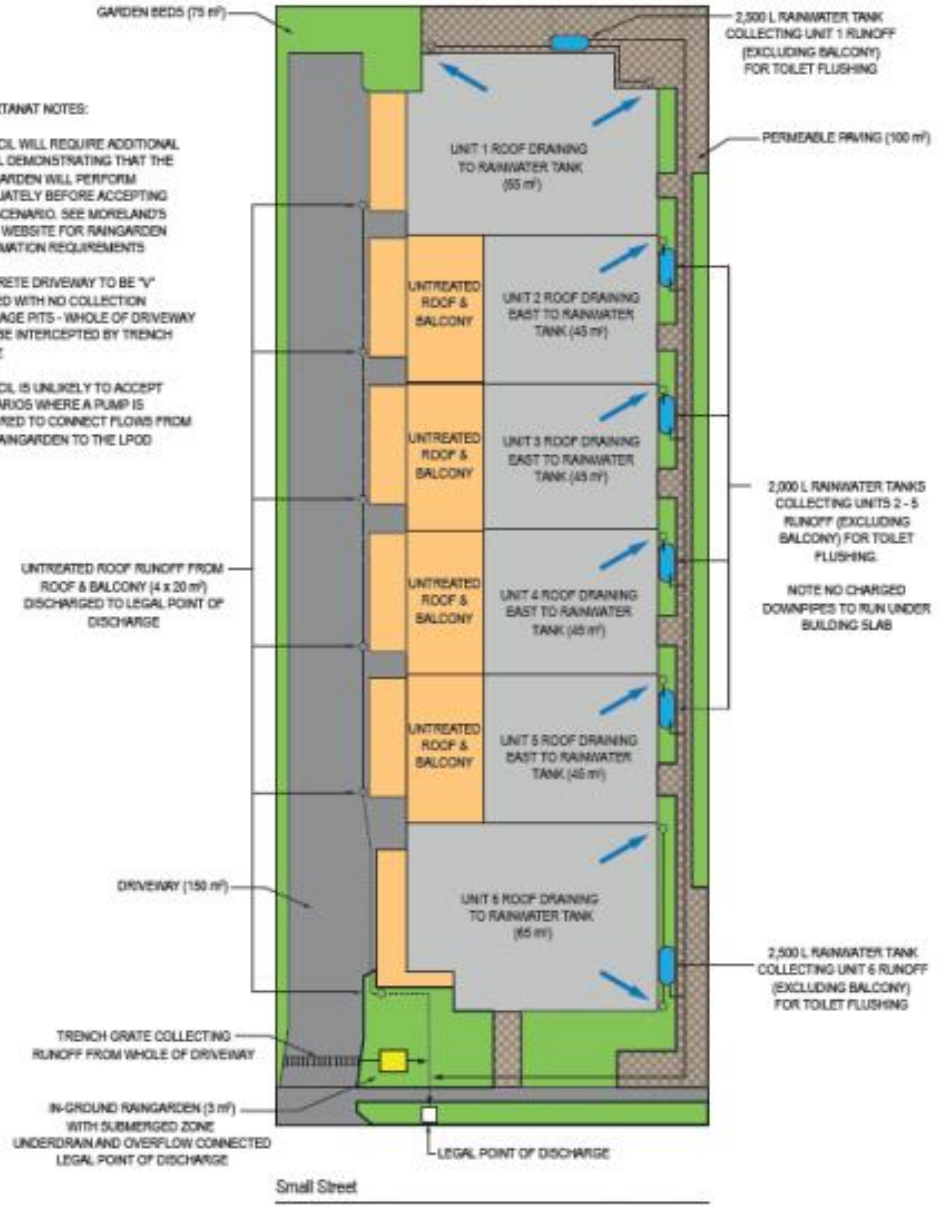
Site layout plan



Recommended solutions – townhouse least preferred

Civil Engineering Requirements

As this solution requires an in-ground raingarden, in order for this solution to be accepted civil engineering design will be required at the Planning Stage demonstrating:

- The untreated water from the impervious surfaces the raingarden is treating can adequately drain into the raingarden
- The design of overland flow paths on site will not cause any flooding issues
- The raingarden overflow will not cause any flooding issues
- Treated water can adequately be discharged to the legal point of discharge (note Moreland will not accept pumping from a raingarden to the legal point of discharge)

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STORM 100% doesn’t always mean it works…

Melbourne Water

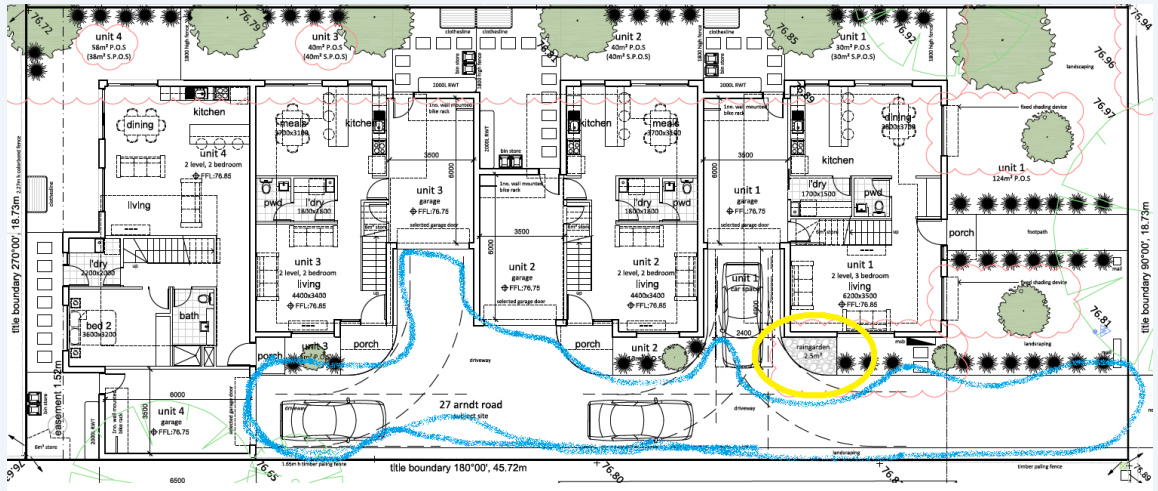
STORM Rating Report

TransactionID: 571545
Municipality: MORELAND
Rainfall Station: MORELAND
Address: 27 Arndt Road

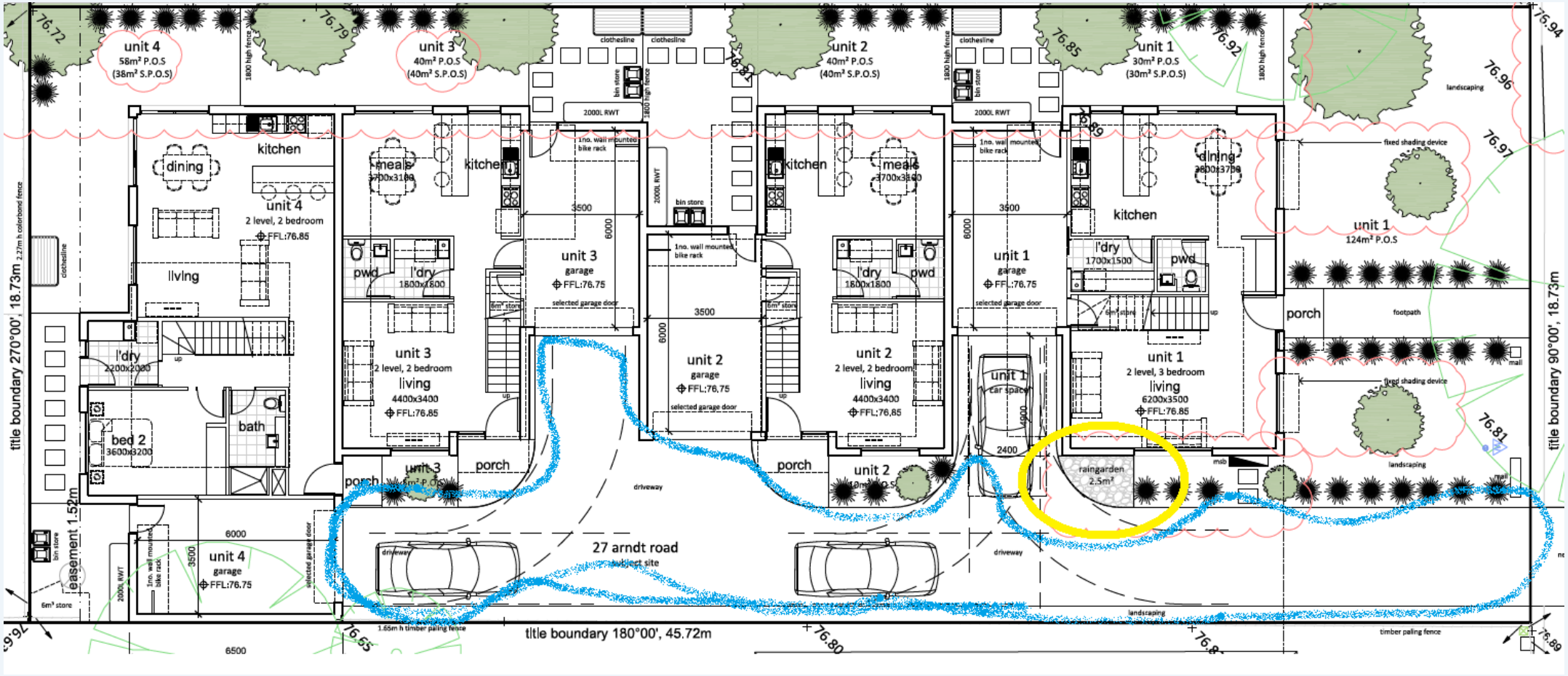
Pascoe Vale
VIC 3044

Assessor: Green Rate
Development Type: Residential - Multiunit
Allotment Site (m2): 856.00
STORM Rating %: 100

Description	Impervious Area (m2)	Treatment Type	Treatment Area/Volume (m2 or L)	Occupants / Number Of Bedrooms	Treatment %	Tank Water Supply Reliability (%)
Unit 1 Roof	104.00	Rainwater Tank	2,000.00	3	121.00	89.50
Unit 3 Roof	87.00	Rainwater Tank	2,000.00	2	113.90	96.40
Driveway - Treated	66.00	None	0.00	0	0.00	0.00
Unit 2 Roof	93.00	Rainwater Tank	2,000.00	2	108.60	97.20
Unit 4 Roof	123.00	Rainwater Tank	2,000.00	2	92.60	96.60
Hard stand - Untreated	115.00	Raingarden 100mm	2.50	0	128.90	0.00



So what's wrong here?



Educating internal staff

- Educating our Urban Planners about WSUD (group training, individual 1-on-1, what is it; why do it; co-benefits; real-life examples)
- Different WSUD options and benefits of each
- Ultimately having better response to planning permit applications

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Demonstration - rainwater tanks

- 35,000L total tank capacity connected to staff toilets

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Demonstration raingardens – planterbox

- To show our developers when we meet at Council
- To show our Urban Planners, Capital Works Team, drainage team, etc.
- Shows how to locate a raingarden with existing levels, different planting options, overflow mechanisms, etc.

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Demonstration raingardens – in ground

- To show our developers when we meet at Council
- To show our Urban Planners, Capital Works Team, drainage team, etc.
- Shows how to locate a raingarden with existing levels, different planting options, overflow mechanisms, etc.

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Dawson St, Brunswick, raingardens

- This is an urban heat island hotspot
- High pedestrian traffic
- Opposite library, pool, train station, shops, etc

Thank you…and questions?

Vaughn Grey vgrey@moreland.vic.gov.au
Kathryn Skidmore
kskidmore@moreland.vic.gov.au

https://www.moreland.vic.gov.au/planning-building/environmentally-sustainable-design/water-sensitive-urban-design/