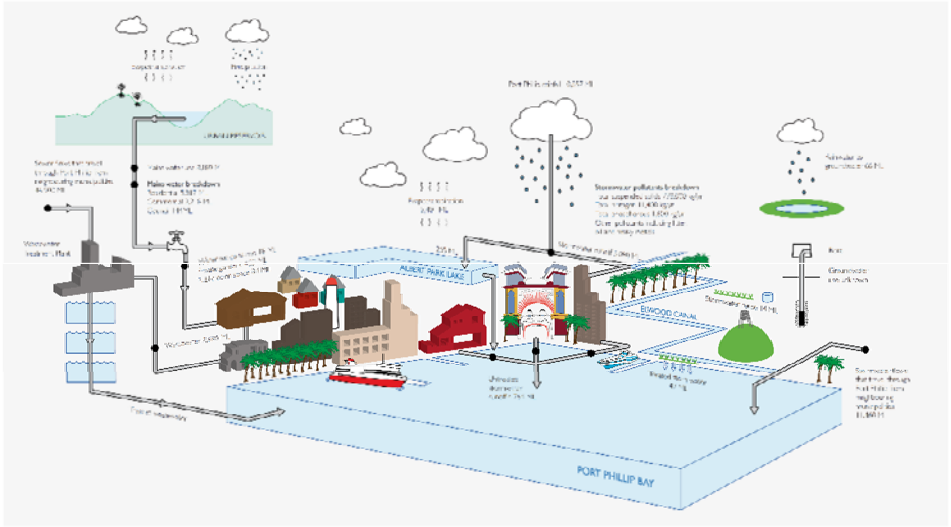
Raingarden Maintenance: Problem or a solution waiting to happen?

Sam Innes – City of Port Phillip

CoPP Water Plan – Toward a Water Sensitive City



- Water Efficiency
- WSUD & SW Harvesting in parks and reserves
- Streetscape WSUD
- Planning and regulation of private development

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2020 load reduction targets:

- 19% reduction in TSS
- 15% reduction in total P
- 10% reduction in total N

Key initiative – streetscape raingardens:

Raingardens – realising the vision

/Planning

/Design

/Construction

Get them in and sort the rest out later

/ Successful ongoing maintenance

So we have a problem!

Here's the symptom but what's the problem?

Broadly two main problems

The structural problem

Build them properly

Planning

Design

Construction

It doesn’t stop there

- Once we’ve got a good asset we need to figure out how to maintain it

The organisational problem

- Does the asset exist?
  - Is it recorded on the asset management system?
- Who owns the asset?
  - Maintenance accountability rests with the asset owner (Parks? Drainage?)
- Who manages the asset?
  - Assigning maintenance responsibilities is critical
- Is there budget?
  - Without dedicated budget you're lost
- Do we have the skills and resources?
  - It takes skills and resources from right across council and sometimes beyond

STREETSCAPE WATER SENSITIVE URBAN DESIGN REVIEW

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Purpose of the review

- Assess the current condition of WSUD assets
- Identify maintenance needs and prioritise works
- Identify opportunities to improve future designs
- Undertake infiltration testing
- Develop targeted maintenance procedures
- Build capacity into the operations and maintenance areas of council
- Clarify maintenance responsibilities

Condition assessment

- E2Design and Council maintenance staff
- Over 100 individual streetscape assets

Location	Suburb	Assets
Coventry St & Clarendon St Intersection	South Melbourne	3 x Raingardens
Rouse St (Princes to Bay St) - Stage 1	Port Melbourne	15 x Raingardens
Dow Street (Rouse to Beach St)	Port Melbourne	15 x Infiltration raingardens 2 x Tree pits
Carlisle St (Chapel to St Kilda Rd)	St Kilda	5 x Tree Pits
Danks St (Pickles to Foote St)	Middle Park	3 x Raingardens
Beaconsfield Parade (Fraser to Cowderoy St)	St Kilda West	4 x Raingardens
Howe Parade	Port Melbourne	15 x Raingardens
Fitzroy St (Acland to Loch St)	St Kilda	5 x Raingardens 28 x Tree Pits (approx)
Richardson St & Langridge St Intersection	Middle Park	3 x Raingardens
Inkerman St (Henryville to St Kilda Rd)	St Kilda East	7 x Raingardens
Elwood Carpark (Stage 1)	Elwood	1 x Bioretention swale
Elwood Foreshore WSUD	Elwood	2 x Infiltration raingardens

Assessment process

- Vegetation elements
  - Plant species
  - Vegetation health
  - Vegetation densities
  - Weeds
- Filter media
  - Sediment forebay
  - Surface damage
  - Surface clogging
  - Reduced infiltration
  - Algae or moss growth
  - Scour
  - Short circuiting
  - Mulch
  - EDD
- Civil components
  - Inlet
  - Outlet
  - Pits
  - Perforated pipes
  - Pipes
  - Bollards, access ramps, walls, rock protection
  - Batters and bunds
- Infiltration Testing
  - FAWB Constant Pressure Head Test

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Results of condition assessment

/ Coventry and Clarendon St intersection

Results of condition assessment

/ Coventry and Clarendon St intersection

Raingarden 1 (southwest)	• **Clean out inlet zone** • **Clean out leaves** • **Re-profile filter media and mulch to achieve level surface across base of raingarden** • **Re-plant scour pathway and bare areas** • **Consider modifying northwest corner kerb to provide a more rounded shape to reduce risk of vehicle's over-running kerb and batter**
Raingarden 2 (southeast)	• Repair damaged kerb • Prune planting • Clear leaf litter from surface, inlet and outlet
Raingarden 3 (northeast)	• Clear leaf litter from inlet, surface and outlet

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Prioritising maintenance

Location & Raingarden#	Maintenance requirements (specific details)	Works type: Planned maintenance – Cleaning Rubbish, leaf litter, sedime removal	Planned maintenance – Investigation To inform further works	Planned maintenance – Landscape Pruning, surfa level adjustment, planting, filter media amelioration	Planned maintenance – Civil Works/repairs to pits, pipes, kerbs etc	Corrective Maintenance – Corrective works Major civil and /or landsca works (resetting)	Prioritisation matrix: Amenity & Profile	Loss of WQ Treatment	Simplicity of Works	Safety Risk	Strategic Importance	Comments	Priority rating	Maintenance includes surface resetting
COVENTRY STREET AND CLARENDON STREET INTERSECTION														
Raingarden 1 (southwest)	• Clean out inlet zone • Clean out leaves • Re-profile filter media and mulch to achieve level surface across base of raingarden • Re-plant scour pathway and bare areas • Consider modifying northwest corner kerb to provide a more rounded shape to reduce risk of vehicle's over-running kerb and batter	√		√	√	√	H	H	M	L	H		High (12)	Y
Raingarden 2 (southeast)	• Repair damaged kerb • Prune planting • Clear leaf litter from surface, inlet and outlet	√		√	√		H	L	H	L	L	Small catchment area reduces strategic importance	Medium (9)	
Raingarden 3 (northeast)	• Clear leaf litter from inlet, surface and outlet	√					H	L	H	L	L	Small catchment area reduces strategic importance	Medium (9)	
ROUSE STREET														
Raingardens 1, 4, 5 & 6	• Temporarily remove plants and regrade filter media to ensure fall from gutter through as much of raingarden as practicable with fall from adjacent bluestone not exceeding 190 mm. Where necessary, split raingarden into two sections (a higher and lower section) with 'terrestrial' planting (not receiving stormwater and not providing water quality treatment) and 'raingarden' planting (wetter species in the lower level that receive stormwater inundation and provide water quality treatment) • Replant tree with different species					√	M	H	L	L	M		Medium (9)	Y
Raingardens 2, 7, 8 & 9	• Remove build-up of leaves and coarse sediment from Raingardens 2, 7 & 8 • Retain as passive irrigation systems in the short term • Regrade (to allow stormwater inflows) and replant in the long term (with an alternative	√ (short term)				√ (long term)	M	H	H (short term) L	L	M		High (short term - 11) Medium	Y (long term)

Targeted Maintenance Plan
The practical how to guide

PLANNED MAINTENANCE

Rubbish removal
Leaf litter removal
Minor sediment removal
Mulch maintenance
Plant densities – infill planting
Weed removal
Pruning
Plant health check
Minor surface level adjustments
Blockage detection/removal
Repair minor vehicle or pedestrian damage

Delivered through maintenance contracts

CORRECTIVE MAINTENANCE

Major sediment removal
Reinstatement of ponding depth
Drainage review (e.g. standing water present)
Extensive vegetation replacement
Low flow rerouting
Major scour or erosion repair
Preferential flow path repair (major)
Filter media reinstatement
Filter media replacement (major)
Algae or moss management
Significant damage repair (civil or landscape)
Gravel mulch removal

Delivered through renewals program

Design recommendations

- Ensure raingardens have adequate soil moisture capacity within the filter media to support plants
  - More emphasis on appropriate filter media selection
    - Including choice of media, filter depth and submerged zones.
  - Plant selection to match conditions (species and zoning)

Design recommendations

- Consider vehicle damage and entrapment
  - Avoid raingardens on constrained intersections where possible
  - Consider truck turning pathways
  - Consider use of bollards and/or at grade buffers
  - There are some places where it might be better to not build a raingarden

Design recommendations

- Drop from inlet to rain garden important to minimise blockage
- Dense planting should be used in preference to mulch (at least 6-8 plants/m^2)
- Increase plant diversity
- Ensure raingardens have a flat base

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Outcomes

- Inspections provided a wealth of data
- Allowed a very targeted approach
- Good condition and well established, needed very little maintenance

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Outcomes

Maintenance broadly falls into two categories

- Planned maintenance is straight-forward – litter, sediment removal, weeding, minor re-planting
- Corrective maintenance more often than not needed to address design, construction and establishment issues

By creating this maintenance framework we have been able to integrate maintenance into operations and maintenance processes

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Thank-You

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