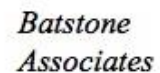
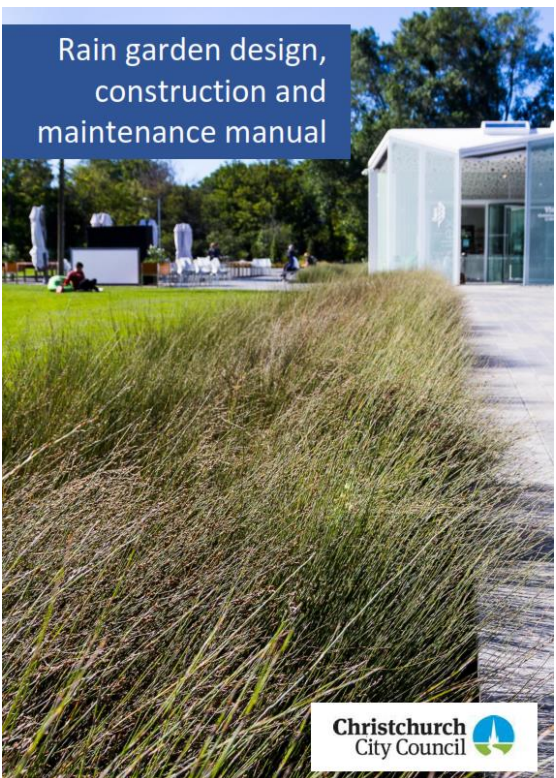


Activating water sensitive design for New Zealand

CENTRAL CHRISTCHURCH WSUD WALK

Building better homes towns and cities science challenge






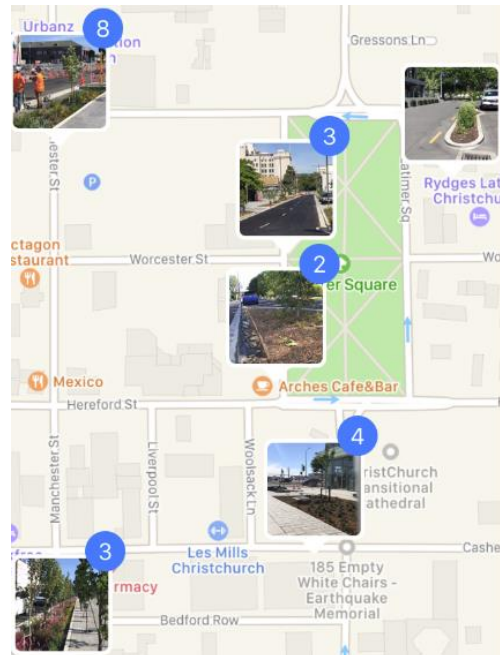
ŌTĀKARO / AVON RIVER CATCHMENT
TAUAKI WAI PĀTAUA / VISION AND VALUES



WSUD walk: Christchurch

Key

-  Dotted line indicates route
- 15** Numbers indicate sites of interest
-  Arrows show direction of travel
-  Red arrows indicate road crossings – please take *extreme caution*



1 – Rydges Latimer carpark:

An opportunity missed. Conventional landscaping beds are isolated by curb from adjacent impervious carpark surface and also above grade; catchpit

2 – Latimer –Hereford corner raingarden / tree pit:

Exposed historic stone kerb retained; organic wood-based mulch is unusual; 2-species of native groundcover planting pallet with Pratia edge (maintains visibility of edges without pruning but vulnerable to sediment or weeds). Water can only enter in high flows (better function if inlet was lowered, wooden edge removed and surface lowered).

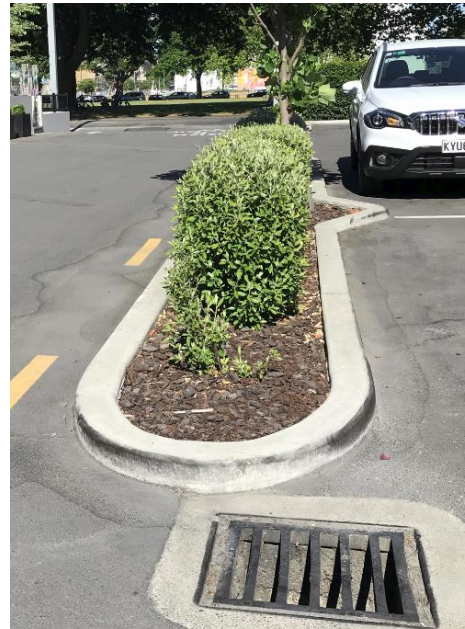
3 – Hereford St single tree pit:

Curbs provide effective edge protection from cars and visual 'stop' cue for pedestrians: below grade from footpath; minimal ponding depth. Adjacent catch pit has fabric cover to provide temporary protection from sediment (needs replacing)

4 – Hereford St continuous tree trench:

Long, broad tree trench allows root volume to support large, long-lived trees with reduced heat island effect and separates traffic from people; benches placed to protect gardens /people. Landscaping below grade to receive runoff from path – lost opportunity to receive road runoff; groundcovers planted in single-species blocks increases risk of failure /maintenance. This axis is a major cycle route and greenway across the city. The area has low ecological value as few native trees are used – totara are in adjacent hoggin surface). Also connectivity is low with vertical concrete surface, absence of (daylighted) water / swales connecting with nearby Avon, instead lots of mown grass and paving.

1



2



3



4



5 – Manchester St Linear park:

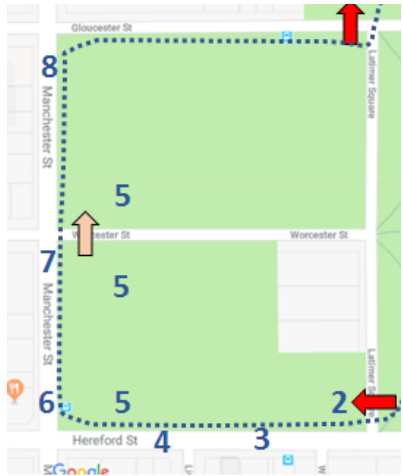
Main ‘swale’ has diverse groundcover species including non-native (often pink-flowered) herbaceous and succulent perennials and small native evergreen trees used in some areas (kowhai, lancewood, cabbage trees). The eclectic species mix does not provide a coherent sense of place (compare with public spaces of Waitangi Park in Wellington and Wynyard Quarter in Auckland). Most species are below 300 mm height and will require ongoing ‘gardening’ to prevent succession to taller shrubland (contrast with Margaret Mahy planting)

Adjacent grassed areas are planted with (ultimately) very large non-native deciduous trees that are likely to over-top and suppress the native trees

Some organic wood-based mulches but generally 20 mm washed pebble mulch as per CCC raingarden guide

Irrigation needed to establish at this time of year; its not obvious if the fall of impervious areas adjacent to the garden is towards to gardens

Compare life-cycle costs (capital and maintenance) of mown lawn, hoggin, paving, landscaping with deciduous or native trees, and maintenance of shrubland vs low groundcovers



Manchester St raingardens:

6 – Raingardens constructed to CCC 2016 raingarden specifications?

- 50 to 150 mm ponding
- At least 1 broad inlet per 30 m
- Most of the recommended groundcover species

7 – Temporary concrete insert to raingarden inlet prevents sediment ingress from adjacent construction

8 – A wide, c. 400 mm unplanted strip of stone mulch adjacent to the active lane in some raingardens



6

7



No raingardens along Worcester St. Landscaping below footpath grade and Street light /sign location outside landscaped pits reduces potential damage.



9 – Armagh St swale/raingarden:

Unusual but effective combination of mown grass and landscaped swale /raingarden with deciduous trees planted in mown area. **10**

The best design of any of the examples on the walk because no kerb – instead a small but effective drop ensures road runoff enters along its entire length. However, odd to include a grass swale, lined by trees along invert which over time may impact on the conveyance function of the swale (because tree base will rise). The trees are planted into the grass (which is mown much shorter than the 100 mm height usually specified for swales) and the base of every tree has bark that has been physically damaged (by weed-whackers?), creating opportunities for fungus to enter, so shortening tree life/stability.

Margaret Mahy Playground

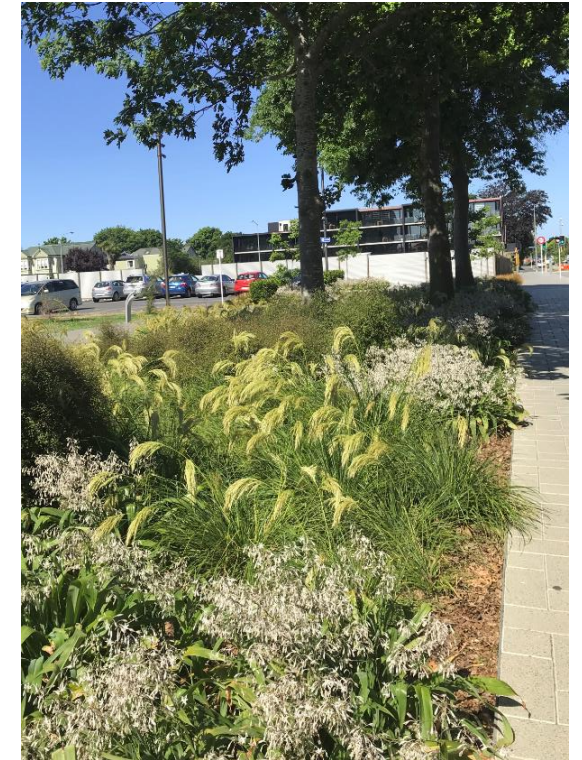
Includes water play within the playground and the adjacent Avon River jetty provides public access to waterside – being protected by the WSUD features

10 – Large beds edged by seating on play ground side with dense, taller native groundcover shrubs and groundcovers; below-grade with adequate volume to support large trees that provide essential (summer) shade / UV protection.

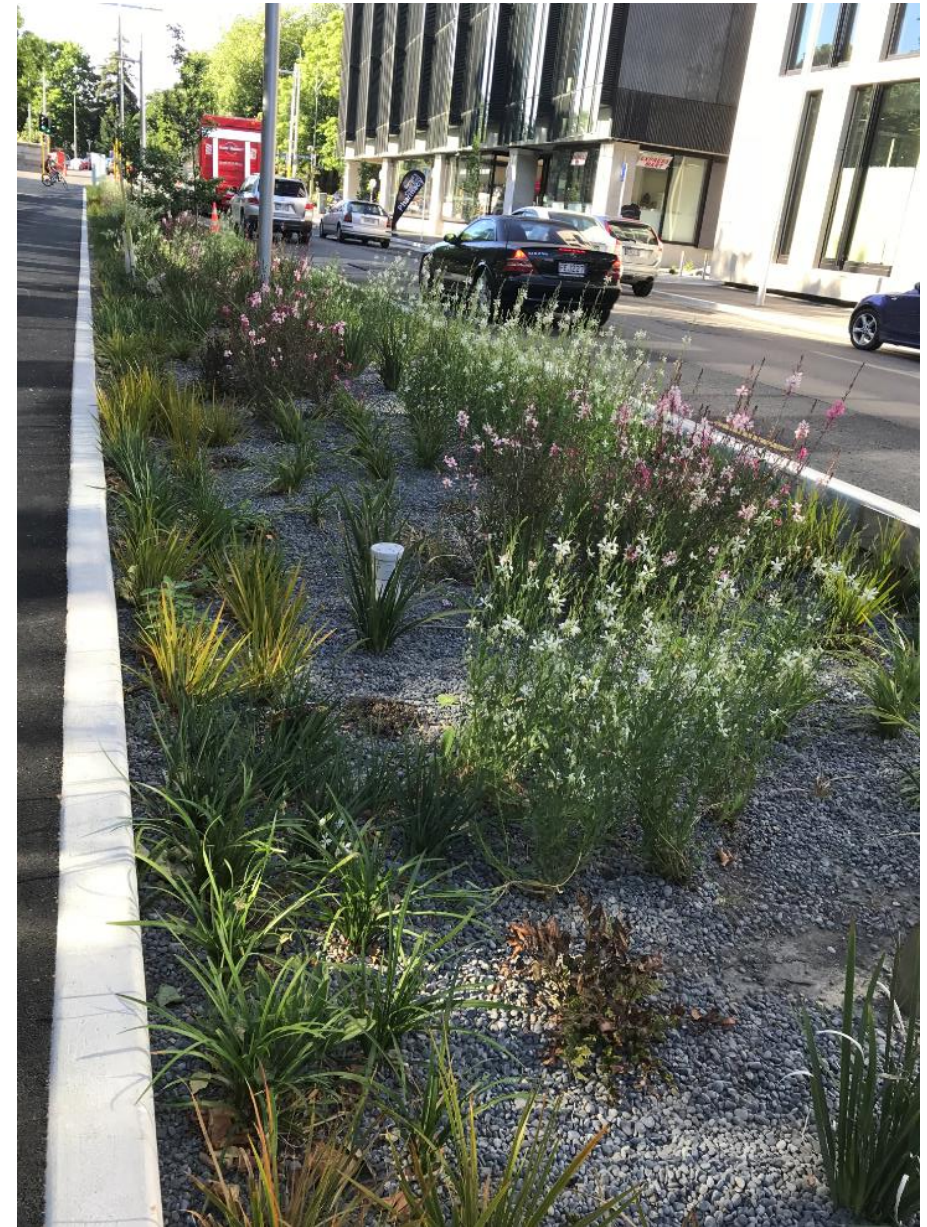
11 – Conventional carpark landscaping isolated from stormwater

12 – Conventional mown grass swale. Grass height for ideal swale function is much higher than park specification

13 – Large trees planted into mown turf (including clusters of native evergreen beech and totara trees). Large trees provide disproportionately more ecosystem services and aesthetics. Across the river is an important area of native trees that were planted by early Christchurch settlers, show casing their contribution to the landscape – including southern rata, totara, beech and cabbage trees



Other Christchurch WSUD features







Avon Catchment Vision

2.6 Street Renewals

Street renewals provide opportunities to include a range of best practise stormwater management methods including: daylighting of streams; springs and drains; stormwater tree pits; rain gardens; wetland swales; dry swales; and permeable pavement. As such, street renewals have the potential to reduce the quantity of contaminants entering the Ōtākaro / Avon River and its' tributaries. They improve the quality of the water entering the system, thus providing additional six value opportunities through enhanced ecological, cultural, landscape and recreational values, and enriched interpretation and/or protection of heritage elements.

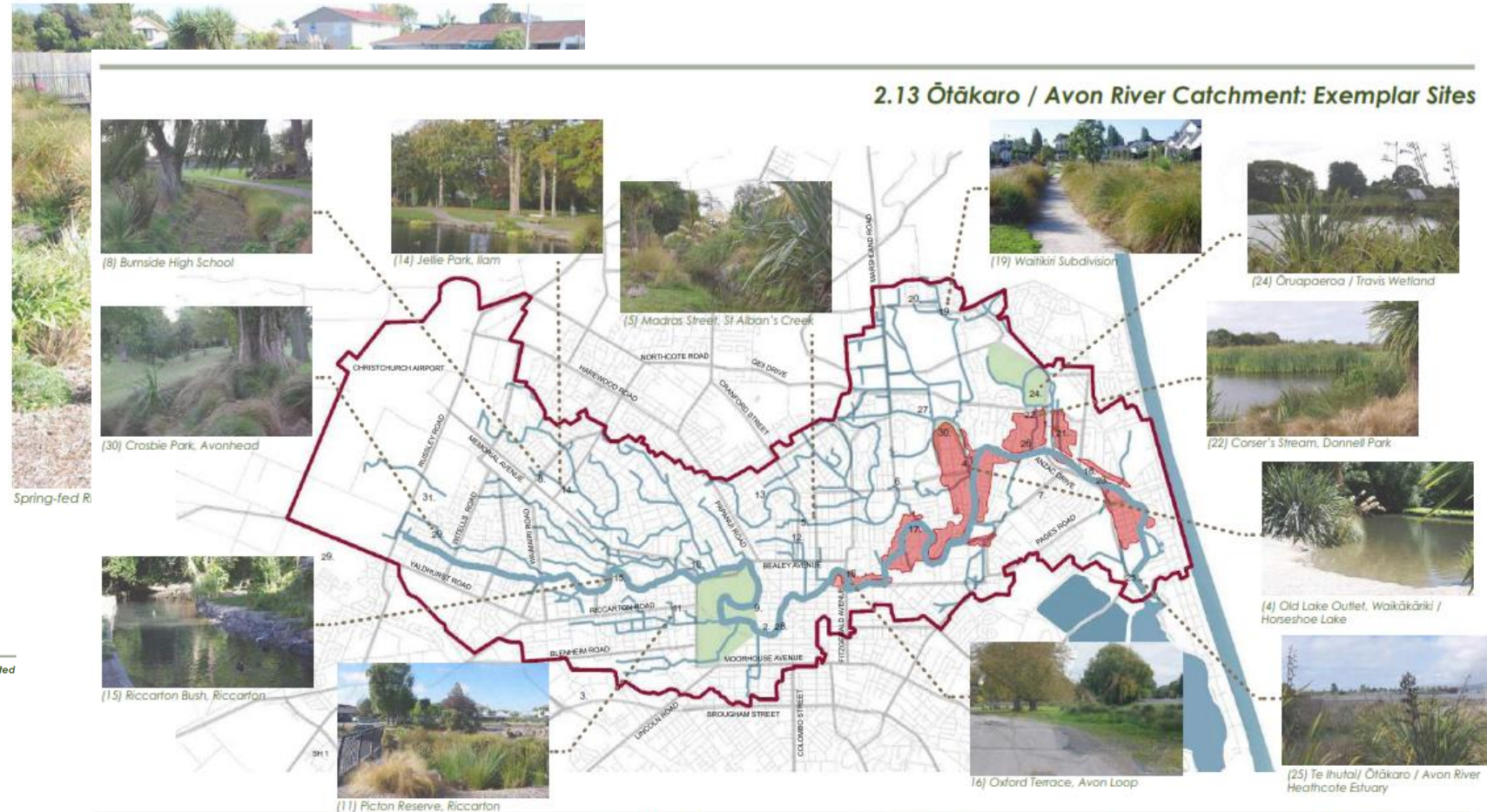
Street renewal projects that have enhanced six values and can be used as exemplars in future street renewal projects include:

- Peveril Street, Riccarton: a road narrowing project that included exposing a spring that was then interpreted further through design elements including fountains, art and native planting;
- Picton Avenue/Dilworth Street: in conjunction with the construction of a new pump station and localised road narrowing, the existing spring-fed waterway was drain timber-lined and enhancement works including planting, walkways, observation decks, and a playground were created to provide a multi-value asset to the local community and provide downstream benefits; and
- Papanui Street/Papanui Stream: a Council streets renewal project in Papanui that was integrated with the naturalisation of Papanui Stream. The project is an exemplar of rain gardens, swales, narrowing of carriageways and the removal of a timber-lined utility drain reconstructed as an open, natural-sided, meandering stream with diverse aquatic habitat values.

Toolbox Treatment Hierarchy Based on Values Supported

Method	Constraints	Suitable Location	Catchment Size	Number of values supported
Waterway restoration	Habitat limiting waterways	Public land beside streams		6
Wetland	Space required. Proximity to houses	New growth area.	Large	6
Sedimentation basin	Space required. GWL>1m	New growth area. Confined aquifer.	Large	4
Soil adsorption basin	Space required. GWL>2.5m	New growth area. Unconfined aquifer.	Large	5
Stormwater tree pit	Clogging after 20 years. GWL> 1m	Central City avenues	Small	4
Rain garden	GWL>0.6m	Streets retrofit	Medium	4
Wetland swale	Width required	High GWL, low gradient sites	Small/medium	3
Dry swale	Width required. GWL>1m	Wide roads. Industrial sites.	Small/medium	2
Permeable pavement	Light traffic. Clog-ging.	Street parking bays. On-site parking.	Small	1
Waterway sediment removal	Site access. Sediment disposal.	In-line weirs and ponds	Large	2
Proprietary filtration devices	Minimum head loss	Busy roads. Industrial sites.	Small/large	1
Vacuum street sweeper	Low interception. Not available in NZ.	Busy intersections		1
Street sump cleaning	Low interception	Busy intersections		1
Stormwater tank	Flow attenuation rather than treatment	Residential intensification	Small	1

*GWL = groundwater level



Partnerships

1. ANZAC Drive
2. Watermark, Ōtākaro / Avon River
3. CHCH Southern Motorway

Protection & Purchase

4. Old Lake Outlet Waikākāriki / Horseshoe Lake
5. Madras Street, St Alban's Creek

Suburban centres

6. Hills Road shopping centre
7. Pak 'n' Save, Wainoni Road

Schools

8. Burnside High School
9. Christ's College
10. Christchurch Girls High School

Street renewals

11. Picton Reserve
12. St Alban's Creek

Linkages, Networks & Corridors

13. Dudley Creek
14. Jellie Park
15. Riccarton Bush, Ōtākaro / Avon River

Residential red zone

16. Oxford Terrace, Avonloop
17. Avonside Drive, Ōtākaro / Avon River
18. Cockayne Reserve

Subdivisions

19. Waitikiri
20. Prestons

Wetlands

21. ANZAC Drive
22. Corser's Stream, Donnell Park
23. Cockayne Reserve
24. Ōruapaeroa / Travis Wetland
25. Te Ihutai / Ōtākaro / Avon River Heathcote Estuary

Waterway restoration

26. Corser's Stream
27. No.2 Drain Shirley Golf course
28. Watermark, Ōtākaro / Avon River

Suburban greenspace

29. Crosbie Park
30. Waikākāriki / Horseshoe Lake
31. Avonhead Park

Avon Catchment Vision

2.4 Suburban Centres

New suburban centres, and/or the redevelopment of existing centres, provide a multitude of opportunities to improve all six values at a local sub-catchment level through the use of sustainable and enhanced surface water treatment devices such as:

- Stormwater tree pits;
- Swales;
- Rain gardens;
- Permeable pavement;
- Storm filters;
- Green roofs.

Project examples include:

- Hills Road Shopping Centre and surrounding neighbourhood, Dudley Creek: a project that incorporated commercial, residential and community centre/education land; Council purchase of private property; the removal of box drains, boundary fences and large areas of hard surface adjacent to the creek; major recontouring of the banks to increase waterway capacity; improved accessibility to the waters edge, improved connectivity along the creek; and significant native planting.
- Under the Suburban Centres Programme, master plans have been prepared for Edgware, New Brighton and Selwyn Street Shopping Centre that outline opportunities for a more sustainable approach to surface water management in urban areas.
- While opportunities may be limited due to spatial or budgetary constraints there are measurable, positive, values-based reasons to incorporate enhanced stormwater treatment devices as a part of any suburban centre retrofit.



nt to carpark in suburban centre, Hills Road, Dudley Creek



Native planting in retention basin, Pak 'n' Save, Wainoni Road



Integrated street art expressing a spring, Peverel Street



Native planting, Hills Road, Dudley Creek