RAIN GARDENS

Operation & Maintanence Guide

STORMWATER DEVICE INFORMATION SERIES

Auckland Council

Te Kaunihera o Tāmaki Makaurau

What are rain gardens?

Rain gardens help remove pollutants and slow down stormwater flows, recharge freshwater bodies and look attractive. They filter stormwater through soil mix and plants. These absorb and filter contaminants before stormwater flows to surrounding ground, pipes, drains and streams, and eventually to the sea.

Rain Garden at Albany Park and Ride station showing the slotting curb allowing storm water inflow and outflow structure

Rain Garden at Albany Park and Ride station - finished rain garden

How and when should maintenance be carried out?

Rain gardens require regular inspection and maintenance to work properly. The maintenance schedule overleaf lists what needs to be done, when. In general, a rain garden should always be checked after heavy rainfall for blockage or damage, and a full inspection should be carried out one year after construction and then annually.

As part of the full inspection, a flow test is needed to check the underdrain works properly and that the rain garden drains within 24 hours. This may coincide with the end of the defects liability period for the construction contractor. In most cases an operation and maintenance manual covering detailed maintenance of the rain garden will be produced by the designer of the rain garden.

WARNING - CONTAMINATED SOIL

Where rain gardens treat stormwater run-off from roads, carparks, driveways or other surface areas, the rain garden soil mix will accumulate pollutants, contaminating the soil mix. Unless soil tests show soil is not contaminated, all material removed from these sites MUST be disposed of at a secure landfill.

Six key components of a rain garden

Rain gardens have six main elements, shown below.

1. Rain garden soil mix

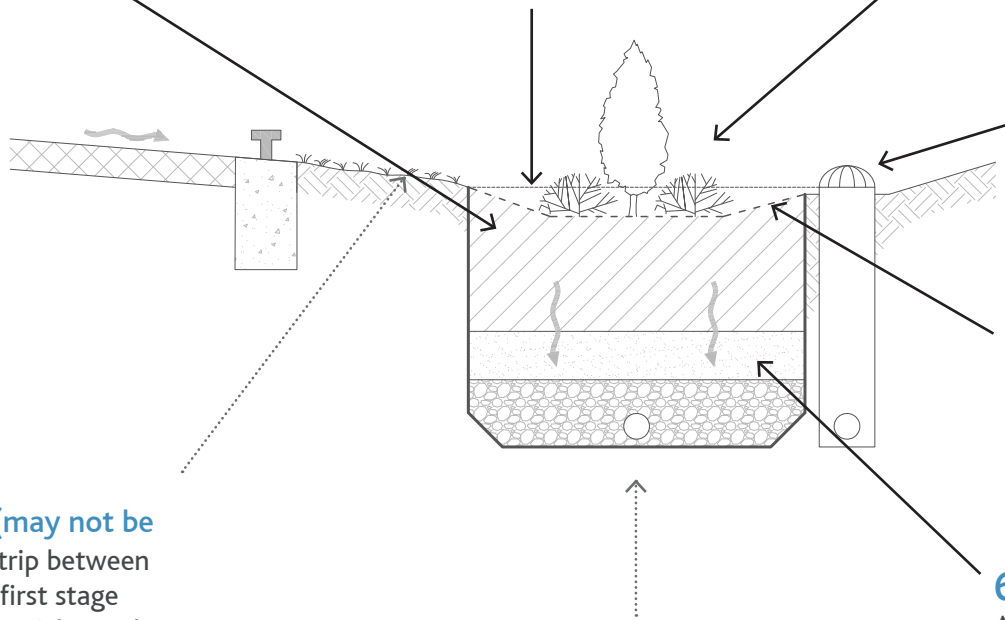
Most important component of rain garden – the soil filters pollutants. Usually sandy loam, loamy sand or loam.

2. Ponding area

Holds stormwater runoff until it seeps through the planting mix and into the underdrain system. Usually max 200mm - 300mm lower than surrounding hard surfaces.
Local authorities may have specific maximum depth and minimum capacity requirements for the ponding area. For safety reasons, ponding area should be max 300mm deep.

3. Plants (preferably native)

Plants help filter pollutants and look attractive. Usually native plants - better suited to the extreme wet/dry conditions (such as ponding for up to 24 hrs).



4. Overflow system

Bypass for excess flows when raingarden pond is full.

5. Mulch / pebble/ rock layer

Prevents weeds and helps prevent soil drying out.

Grass buffer strip (may not be included)

Grassed buffer strip between hard surface and garden as first stage filtration, removing larger particles and creating runoff sheet flow (to avoid erosion). Not always included in rain garden design, due to site constraints.

Underdrain system (may not be included)

If present, water drains through soil mix to underdrain, then is piped to stormwater network or waterways (e.g. stream, open water).
Some free draining soils may not require underdrain, as runoff will drain to groundwater aquifers.

6. Sand layer (if included)

Additional stormwater filter, removing pollutants passing through the planting bed. Also helps retain soils within the rain garden.

MAINTENANCE SCHEDULE

TIMING	COMPONENT	ACTION
Following storms	Grass filter strip (if included), kerbing, paved area	• Remove rubbish, leaves and other debris from the grass filter strip and surrounding drainage area.
	Ponding area	• Clear inflow points of sediment, rubbish and leaves. • Check for erosion or gouging and repair. • Test drainage of ponding area - check garden 24 hours after rain to ensure no water is ponding. • Top up soil and mulch as necessary (ensuring level is below surrounding hard surface and overflow).
	Mulch	• Mulch may need to be redistributed or added around inflow points.
3 monthly	Grass filter strip, kerbing, paved area	• If grass strip is present, mowing frequency depends on growth rates and seasons. • Mow no shorter than 50mm (approximately 3 finger widths). Do not mow grass shorter or the filter strip will not work properly. • Re-sow grass as necessary. • Remove rubbish, leaves and other debris. • Check soil and mulch level is below surrounding hard surface areas and overflow. • Remove excess mulch/soil if required.
	Ponding area	• Clear inflow points of built up sediment, rubbish and leaves. Check for erosion or gouging – repair if necessary.
	Mulch layer (bark, pebbles, etc)	• Remove rubbish, leaves and other debris. • After storm events mulch may need to be redistributed or added around inflow points.
	Plants	• Water establishing plants monthly during extended dry periods. • Check plant health and replace dead plants as necessary. • Use native species to suit garden conditions (e.g. full sun or shaded). - See ARC TP10 for partial list of suitable species. • Remove weeds – do not use herbicides, pesticides and fertilisers as these chemicals will pollute the stormwater runoff.

MAINTENANCE SCHEDULE CONT...

TIMING	COMPONENT	ACTION
Annually	Ponding area	• Clear inflow points of sediment, rubbish and leaves. • Check for erosion or gouging and repair. • Check all water has drained 24 hours after heavy rain. • Alternatively test drainage of ponding area. Dig a hole 200mm wide x 200mm deep. Pour in 10 litres water in hole. Check drainage rate over 1 hour period - minimum 25mm/hour. • If crust of fine sediment present on surface of soil mix, remove with spade and rework using rake. Top up soil and mulch as necessary (ensuring level is below surrounding hard surface and overflow). Dispose of contaminated crusted topsoil in a secure landfill (unless soil testing shows no contamination).
	Rain garden soil mix	• Check soil level is below surrounding hard surface level and overflow grate. Use drainage test described above to check soil is free draining.
	Mulch layer (bark, pebbles, etc)	• Check surface of mulch for build up of sediment, remove and replace as required.
	Underdrain system	• Use inspection well (if present) to check underdrain is working properly. • Check rain garden draining freely using the drainage test. If rain garden is not free-draining, the underdrain may be blocked. Try back-washing under drain from the outlet. If still blocked, the rain garden may need plants and rain garden soil mix removed and replaced.

TROUBLESHOOTING

SYMPTOM	POSSIBLE PROBLEMS	SOLUTION
Stormwater run off is bypassing the rain garden.	Local earthworks increasing sediment load to rain garden, blocking rain garden outlets or raising the surface level of garden.	• Check surface of the rain garden is below the surrounding area. • Remove any sediments and debris from inflow areas and from the surface of the rain garden. • Protect rain garden from future construction sediments.
	Rubbish and other debris blocking the inflow points to the rain garden.	• Regularly remove rubbish, leaves and any other debris from inflow points.
Rain garden is ponding for longer than 24 hours. Stormwater and/or mulch flowing off the rain garden.	Incorrect blend of soil mix.	• Replace soil mix with the correct rain garden soil mix. Do Ribbon test or Percolation test to test soil mix is free-draining.
	The soil within the garden compacted during construction or other activities.	• Loosen the top 500mm soil by tilling or forking. Discourage vehicle, pedestrian and bicycle access to the rain garden.
	Layer of fine sediment settled on the garden surface.	• Remove fine sediment layer and turn over the top layer of rain garden soil mix. Protect rain garden from surrounding sediment run off.
	Rain garden filled with too much mulch or soil.	• Remove excess mulch or soil so that surface of ponding area is approximately 200-300mm below the surrounding hard surfaces and overflow.
	Overflows or discharge pipes clogged with sediments or debris.	• Clear overflow and discharge pipes.
	Planting or rain garden soil mix clogged.	• It may be necessary to remove some of the rain garden soil mix and replace with fresh rain garden soil mix.
Sulphur smell coming from the rain garden.	Plants and soils lacking oxygen (anaerobic conditions). Organic material rotting within the garden. The underdrain clogged and water is not properly draining out of the garden.	• Inspect rain garden after rain event to check garden drains within 12 to 24 hours. *(See solutions, above for rain garden ponding.)*

TROUBLESHOOTING cont...

SYMPTOM	POSSIBLE PROBLEMS	SOLUTION
Erosion and gouging occurring within the rain garden	Kerbs and other hard structures channelling stormwater flow. (Rain gardens require an even sheet flow of water to operate effectively.)	• Create openings in the kerb to increase number and width of run off points, or replace kerbing with a different design (e.g. kerbing slightly raised off the ground).
	Inflow points are too concentrated.	• Increase kerb opening size by cutting kerbs or replacing with different design. If this is not possible install rip-rap (i.e. stones set into concrete) at the inflow point to spread flow and reduce erosion.
Plants are stressed or dying. Symptoms may include yellowing of leaves, unseasonal leaf fall, wilting..	Plant varieties selected for rain garden are unsuitable for the location and/or extreme wet/dry conditions.	• Select plants appropriate for the location (e.g. full shade, partial shade, full sun, etc.). • Due to their hardy nature, native plants are recommended *(see ARC TP10 for suggested plant list).*
	Ponding or excessively long periods of flooding cause plants to become stressed and die.	• Inspect rain garden after rain event to check garden drains within 12 to 24 hours. See above solutions for rain garden ponding.
	The plants poisoned by run-off from a hazardous spill (fuel, paint, oil, etc) Pollutants accumulated in the rain garden reached a toxic level for plants	• Check soil and mulch for evidence of heavily polluted run off (e.g. rainbow slick, coloured mulch, etc). • If contamination is extensive, clean out rain garden soil mix and replace fresh soil and new plants. *See construction guide for instructions.*
	The plants dehydrated from extended dry conditions.	• Newly established plants need watering. • Check soil moisture content and water plants if dry. • Establishing plants need watering in dry weather conditions.
	Plants stressed due to attack by plant pests or diseases. Pests may include insects or animals.	• Check for leaf damage or pests and consult gardening manuals or a garden centre for the best treatment. • Stressed plants need replacing with healthy variety or pest-resistant species.
	Rain garden soil mix compacted.	• Loosen the top 500mm of soil by tilling or forking. Do not allow vehicle, pedestrian and bicycle access to the rain garden.

Quick maintenance checks

- ✓ Regularly remove rubbish, leaves, debris and weeds from inflows and ponding area.
- ✓ Use native plants when replanting is required.
- ✓ Replace soil mix with a mix of sandy loam, sand or loam compost. Ready-made rain garden soil mix is available from some garden centres and horticultural suppliers.

Avoid

- ✗ Do not use sprays to kill weeds/vegetation or algae as this will contaminate the downstream waterways.
- ✗ Do not compact the rain garden soil mix – use drainage test as described above to check.
- ✗ Do not add clay or silt in the rain garden soil mix as this will restrict water draining through the soil