

GARDENING WITH WATER

Gardening when it's dry:

In Waitakere City, a well designed garden should not need much watering. This will save you water, money and time. The following sections offer some simple tips on how to manage your garden and lawns for dry periods, which plants can cope best, and how to manage an irrigation system (if you must).

Gardening with the rain:

Waterlogging and flooding tend to be more of a problem than droughts in Waitakere City. The challenge is to work with nature to make the most of the water that naturally falls on your garden and to ensure that it will not kill your plants in winter.

Water in the garden

The average Waitakere household pours 180,000 litres of water into the garden and lawn each year. This is about 10% of their total water use - less than most other parts of New Zealand - but most of it is used in the dry periods of the year when water is scarce. Our water supplies must be managed for those peak summer demand periods, so a reduction in water used on gardens will have a significant effect on the need to find new sources of water supply.

On the other hand, too much water in our gardens can become a problem. In winter the soil becomes water-logged and plants can rot and die. Many Waitakere residents spend time and money on drainage to reduce this problem.

When water soaks into the ground or filters through plants it is cleansed of sediment and pollutants. Urbanisation, however, increases the amount of impermeable surface across the city - surfaces that do not absorb water, such as concrete driveways, patios and roofs. Water that used to soak into the ground now runs off the surface and is diverted into stormwater drains. From there it flows into streams and harbours with its load of sediment and pollutants. Whatever we can do to reduce this run-off will improve the condition of our streams and harbours.

Good management

Lawns

In Waitakere City's climate, lawns should not require watering on most sites. If you have free draining soils, such as are found in the volcanic areas, keep lawns to a

minimum to reduce the need for irrigation, or accept periodic drought conditions without irrigation. Your lawn will generally recover.

Don't cut your lawns too short and cut them less often. Longer lawns take much longer to dry out and they have deeper roots (root depth is about the same as above-ground growth) so they take up any ground moisture better. Longer lawns are also healthier and stay weed free. Lawns that are cut too short grow faster, so that you end up mowing more often.

Grass varieties that need less water include red fescue, browntop, crested dogstail, droughtmaster and ryegrass.

Mulch

Mulching your plants (to about 100 mm deep), reduces the water that evaporates from bare soil by up to 70%. You can use bark, or untreated wood chips, or shredded garden waste (Avoid noxious weeds that can re-grow from small parts, or weeds that contain seeds). Mulch also gives nutrients to your soil and prevents weeds from germinating. Weeds compete with other plants for water, so try to control them.

Soils

Add plenty of organic matter (compost) to your soil to increase water retention. Composting is also a good way to utilise the nutrients in your organic waste (food scraps, such as potato peelings, fruit, etc., but not meat or fat). Composting uses natural processes to turn wastes into valuable fertiliser. It is easy to do it in your back yard. You can get information from the Auckland Regional Council on Composting (Ph. 0800 806 040), or study the diagram. The best time of year to add compost and mulch is in Autumn and Winter.



Watering

Learn to tell when your garden needs water - many people over-water. It is OK for the top few centimetres of the soil to dry out - this will encourage your plants to develop deeper roots. Check with a trowel for moisture further down. Wilting leaves and retarded growth indicate that your plants need water.

When you do water your garden, do it in the morning or evening to minimise evaporation. Deep watering of the soil (a good soaking, less often) encourages roots to grow deeper and reduces evaporation. This is more effective than daily watering of the surface and foliage. Allow time for the water to soak into the ground; if it just runs off the surface you are wasting water. See also the following section on Irrigation Systems.

Use roof water to water your garden (see *Using Rainwater*). Or you can use the water from the rinse cycle of your washing machine or bath water to water established trees and non-food plants (but only if you are using eco-friendly, biodegradable detergents - no bleach!). If you have a septic tank on your property you can run the dripper line around water-loving plants or plant the disposal field with non-food crops to make use of the water and the nutrients.

Wind shelter and shade

If you shelter your plants from strong winds and sun, evaporation is reduced. Grow shelterbelts. Many plants benefit from being grown under trees that provide shelter from wind and sun.

Irrigation systems

Before you instal any system, assess whether you need irrigation. Waitakere has a wet climate and most gardens can cope without irrigation.

In small gardens it probably makes most sense to use a watering can if extra water is needed during dry periods or while plants establish. This will be more convenient if you have several water sources (taps, ponds) around the garden where you can fill your watering can.

For larger gardens and for people with less time, there is a wide range of irrigation systems available, some more water-efficient than others. Even though you can set irrigation systems to operate automatically with a timer switch, this does not always make sense. Often the garden ends up being irrigated when it has no need of extra moisture. Soil moisture sensors are available, which can be used to give the most efficient inputs of water.

Porous hose systems

Porous hose systems let water drip into the mulch layer or into the soil. Up to 70% of water is saved, because it is delivered under the mulch layer and less of it evaporates. The system can be used on mains pressure or low pressure, which makes it suitable for connection to rainwater tanks and gravity feeding (see *Using Rainwater*). Instal porous hose only where the water is required, and use ordinary (non-leaking) hose to span the distances in between.

Drippers

Drippers deliver the water directly to specific plants, making them a very efficient watering system. They also generally deliver water at a slow rate allowing time for absorption into the soil.

Spray systems

Spray systems apply larger amounts of water above ground. This means that water can evaporate, but they are generally more efficient than sprinklers if they are used to deliver water to specific plants.

Sprinklers

A sprinkler is probably the least efficient way of watering the garden - it can use up to 800 litres an hour! A sprinkler with a high flow rate can result in run-off and wasting, because there is not enough time for the water to penetrate into the soil. The finer the spray the more water evaporates before it reaches the ground (wind shelter can reduce this). Timers can reduce the amount of waste because sprinklers are easily forgotten. Place a tin can on the lawn to measure how much water your sprinkler is sprinkling - a healthy lawn needs no more than 25mm a week.

Choosing plants

By grouping your plants into those which require watering and those which don't, less water is wasted on plants that don't need watering. You can install separate irrigation systems for the different groups or simply water the groups that need more regular watering with a watering can.

Note the natural microclimates of your land over the year and plant accordingly. There will be areas that are naturally drier, such as steep slopes, areas with well draining soil, or areas exposed to dry summer winds. On the other hand, areas at the bottom of a slope, depressions, or poorly drained areas may be wet, especially in winter. If you use plants that naturally grow in these conditions, you will spend less time maintaining them.

You can also influence and change these local microclimates. Planting a shelterbelt or trees to provide shade and wind protection, for example, can reduce evaporation and the need for irrigation.

Drought resistant plants

Plants have developed many different strategies to cope with drought conditions. Some have long tap roots that can access low groundwater, others have small leaves covered with fine silver hairs, or a waxy coating to reduce evaporation, or even no leaves at all, such as cacti and broom. Plants lose varying amounts of water to the air by transpiration – ("sweating"). Plants with large leaves will generally lose more water than those with small leaves. Some plants become dormant over the dry period or they can produce seeds and die at the start of the dry period, ensuring that the seeds are ready to germinate when rain returns.

Many drought resistant species do not like being water logged in winter, which can be a problem in wet climate. Native plants are generally better adapted to handle both drought and dampness. This applies especially to those marked with an asterisk (*) on the following table.

Plants that naturally grow in your area are totally adapted to the local conditions and should not need watering once they are established. Using native plants is the easiest way to achieve low maintenance, a water efficient garden and encourage native birds. Waitakere City Council encourages residents to plant natives and has published a guide on revegetation. This booklet (*A Guide for Planting & Restoring the Nature of Waitakere City*) gives very detailed information on the diverse original plant communities and ecosystems in the city and is available from Council (phone 839 0400).

Native drought resistant plants

Larger trees (8m+):

Pohutukawa (*Metrosideros excelsa*)¹
Kanuka (*Kunzea ericoides*)
Tawapou (*Planchonella costata*)
Karaka (*Corynocarpus laevigatus*)
Rewarewa (*Knightsia excelsa*)
NZ Cedar, Kawaka (*Libocedrus plumosa*)
Horoeka/Lancewood (*Pseudopanax crassifolius*)
Toru (*Toronia toru*)
Puriri (*Vitex lucens*)
Towai (*Weinmannia silvicola*)¹
Totara (*Podocarpus totara*)
Hall's Totara (*Podocarpus cunninghamii*)

Small trees/large shrubs (2-7m):

West Coast Kowhai (*Sophora microphylla* var *fulvida*)¹ and Kowhai (*S. microphylla*)
Whauwhaupaku/Fivefinger (*Pseudopanax arboreus*)
Houpara (*Pseudopanax lessonii*)
Tauhinu (*Cassinia leptophylla*)
Taupata (*Coprosma repens*)
Ake ake (*Dodonea viscosa*)
Tree Daises-Akepiro (*Olearia furfuracea*),
Akiraho
(*O. paniculata*),
Coastal Tree Daisy (*O. solandri*) & Tunguru (*O. albida*)
New Zealand Brooms
Rangiora (*Brachyglottis repanda*)
Shining karamu (*Coprosma lucida*)
Karamu (*Coprosma robusta*)
Kanono (*Coprosma grandifolia*)
Whau (*Entelia arborescens*)
Manuka (*Lepstospermum scoparium*)*
Mingimingi (*Leucopogon fasciculatus*)
Poataniwha (*Melicope simplex*)
Ngaio (*Myoporum laetum*)
Ti Kouka/Cabbage Tree (*Cordyline australis*)*
Pukapuka (*Griselinia lucida*)
Korokio (*Corokia*)
Karo (*Pittosporum crassifolium*)
Mapou (*Myrsine australis*)*
Kowhai-ngutu-kaka/Kakabeak (*Clianthus puniceus*)
Kumerahou/Golden Tainui (*Pomaderris kumerahou*)
*Hebe stricta, macrocarpa & speciosa*¹

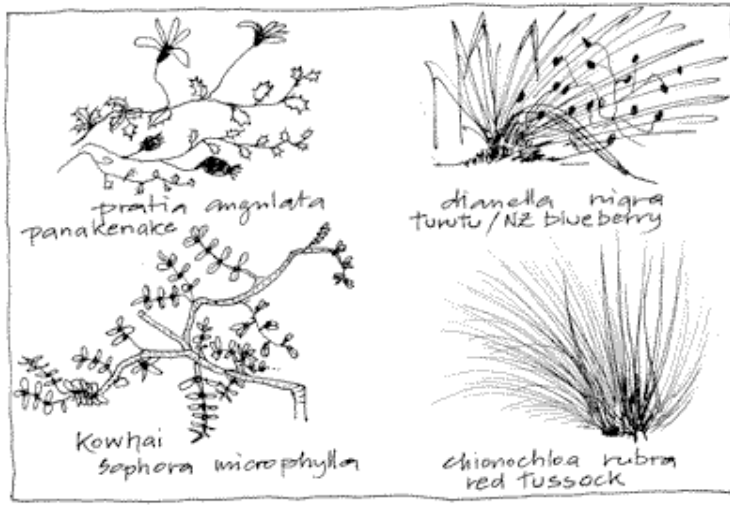
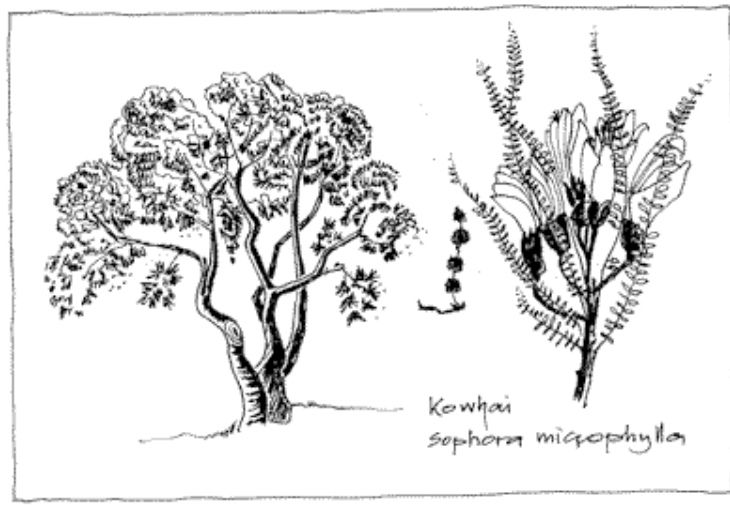
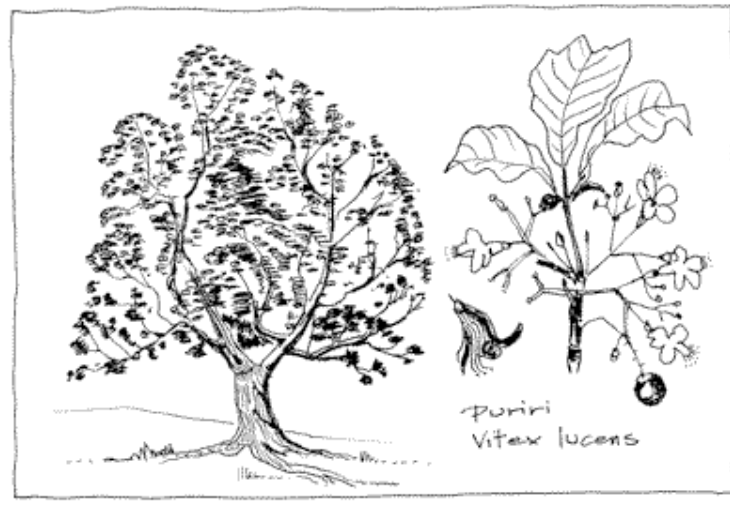
Shrubs and flax like plants (<2m):

Flax (*Phormium spp.*)*
Tussock grasses
Stiff Stemmed Coprosma (*Coprosma crassifolia*)
(*Coprosma rhamnoides*)
Korokio (*Corokia cotoneaster*)
Koromiko (*Hebe macrocarpa*)
Mountain Flax* / Wharariki (*Phormium cookianum*)-note this is not the common flax harakeke

Low ground plants:

Waitakere rock daisy (*Celmisia major* var. *major*)
-this plant only occurs in Waitakere City!!
Coastal Astelia (*Astelia banksii*)
Dwarf Cabbage Tree, / Ti rauriki (*Cordyline pumilio*)
Turutu / NZ blueberry (*Dianella nigra*)
New Zealand Spinach (*Tetragonia trigyna*)
Mercury Bay Weed (*Dichondra repens*)
NZ iceplant / horokaka (*Disphyma australe*)¹
West Coast Cliff Hebe (*Hebe obtusata*)¹
Patotara (*Leucopogon fraseri*)
Pohuehue (*Muehlenbeckia complexa*)
Toetoe (*Cortaderia fulvida*, *Cortaderia splendens*)*

[¹ These plants can cross with other varieties of the same species. Ultimately this could mean that they become extinct, because the genetic material is lost. Please do not plant related species in areas where they might cross with the naturally occurring variety]



Exotic drought resistant plants:

Flowers:

Ice Plants
Daisy, such as:
Argyranthemum frutescens,
Arctotis, *Brachyglottis*,

Shrubs:

Crape Myrtle (*Lagerstoemia indica*)
Smoke Bush (*Cotinus americanus*)

Trees:

Vanilla Tree
Maytenus
Olives (*Olea europaea*), not
african type

Gazania and Euryops.
Drosanthemum
Proteas
Lavenders
Most aromatic herbs
Stachys byzantina
Echium

Artemisia arborescens
Convolvulus cneorum
Euryops pectinatus
Grevillea
Callistemon
Cistus
Nerium oleander
Leucadendron
Leucospermum
Protea
Dryandra
Melaleuca

Almond
Black locust
Burr oak
Carob
Banksia
Cork Oak
Pomegranate
Fig
Holm oak
Pistachio

Palms:

Washingtonia
Brahea armata
Butia capitata
Jubaea chilensis

Winter flowering plants:

Pansies
polyanthus
Primula malacoides
Primula obconica
Wallflowers
Iceland poppies
Nemesia

Succulents:

Yuccas
Aloe

Reducing run-off

You can reduce your run-off by increasing plant cover and reducing the amount of impermeable surface (e.g. concrete). More water then soaks into the ground and is absorbed by the plants. Water is also cleansed when it is filtered by vegetation.

Driveways

- minimise the length and width of your driveways.
- pave two tyre strips only (unless your driveway doubles as a play area - skateboarding, etc).
- for permeable paving you can use turf blocks or similar systems. These systems allow grass or other ground-cover to grow on your driveway, while providing structural support. Permeable paving is still less permeable than planted areas.

Paths and walkways

There are many options for permeable paths, such as pebbles, stepping stones or bark. On steep slopes create meandering paths to divert the run-off into planted areas at the sides.

Increasing permeability and absorption

Intensely planted areas absorb a lot more water than a lawn area. You can increase the water retention ability of your soil by adding compost.

Reducing contamination

Heavy rain can flow over gardens and outdoor surfaces, picking up contaminants from the following sources, which then pollute groundwater, local streams and harbours.

Pesticide use

Pesticides can be washed off plants and soil and enter waterways. You can avoid the use of pesticides by using plants which are naturally resistant to insect pests, or by techniques such as companion planting (consult an organic gardening book).

If you do use pesticides, use the less toxic ones - there are some naturally occurring pesticides available such as pyrethrum. And follow the instructions: avoid spraying before rain or in the evening, and don't rinse the container on to the garden.

Fertilisers

Nutrients from excessive fertiliser use can cause algal blooms and oxygen deficiency in streams. Compost is generally safe, and natural fertilisers such as blood-and-bone are generally preferable to those made from fossil fuel. Use all fertilisers in moderate amounts and dilute. Native plants generally don't respond well to fertilisers.

Paints and household chemicals

Wash paint brushes in your laundry basin (water-based paints only), not outside. If you wipe them on newspaper or old cloth first, less paint will go down the drain. Dispose of toxic chemicals and their containers carefully (consult Solid Waste Business Unit for advice) or better still, don't use them in the first place.

Cars

Vehicles pollute. Maintain your vehicle and ensure it does not leak oil, brake fluids, etc. When working on your vehicle avoid spilling any chemicals or oil and dispose of chemicals carefully. Many petrol stations take oil for recycling. If you do have a spill, soak it up with newspaper or sawdust and dispose of it through the rubbish - don't hose it away or let the rain wash it away! Don't leave old batteries and spare parts lying around outside where they will be exposed to rain.

Wash your car on the lawn - some of the pollutants will be absorbed by the plants and soil where they slowly break down - and you are watering the lawn at the same time! Some pollutants will take a long time to break down or not break down at all, such as lead. You should therefore avoid growing food in areas that might become contaminated from car run-off. If you don't have a lawn, use a car wash that handles the wastewater environmentally.

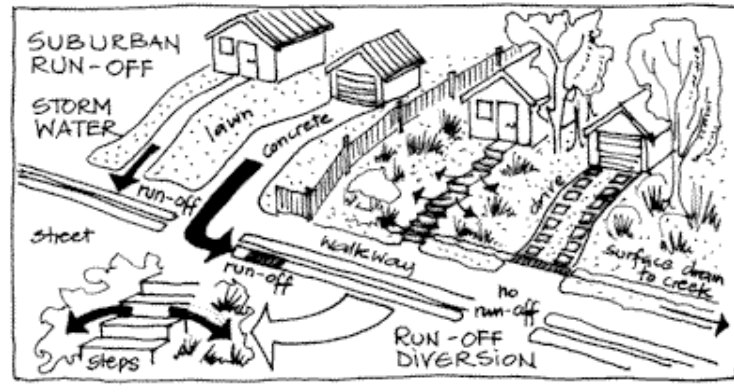
Soil erosion

Soil is perhaps our most undervalued resource. Most Waitakere City properties have vulnerable clay soils. Conserve it and avoid washing it into waterways causing siltation, which can kill small organisms and plants.

Bare soil should be planted (even with a temporary crop of grass or lupin) or covered with mulch. Steep banks can be stabilised by intensive planting with species that have extensive root systems. If you can't avoid having soil exposed, divert water away from it and catch silt in a silt traps (such as a hay bale). See *Site Earthworks*.

Harvesting water

Water that falls on your land can be harvested for irrigation or for water features.

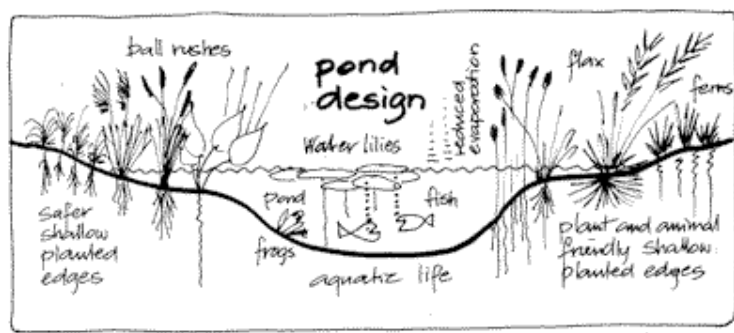


Consider safety issues when designing water features because children can drown even in shallow water. Children's play areas and water features should always be separated by fences or densely planted areas. Gently sloping ponds, which are shallow at the edges and densely planted are safer. Kids might get muddy feet in wet boggy pond edges, but they are less likely to drown.

Diversion channels, dams and ponds

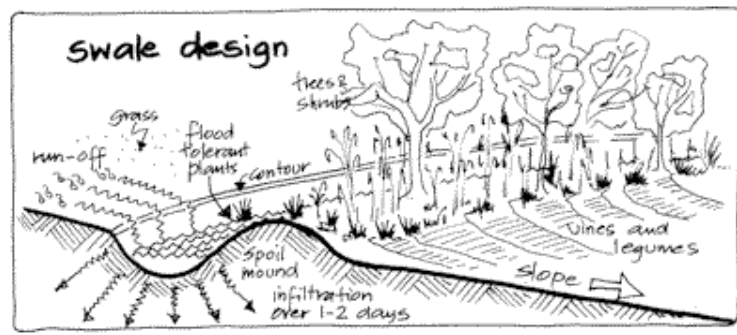
You can divert water along channels from areas where it is not needed to ponds. These features might be on a large scale on a farm, or quite small in a suburban backyard. Channels need to be fairly impermeable, perhaps with a clay base, if the aim is to collect the water rather than to make it soak into the ground. You can shape channels and plant them to appear like natural streams. This will encourage wildlife, prevent erosion and look more pleasant.

Ponds can be constructed by using plastic liners or clay. Other cheap options for small storage ponds are old bathtubs or laundry basins. Ponds should be planted to encourage wildlife, to avoid them becoming anaerobic and smelly, and to discourage mosquito breeding.

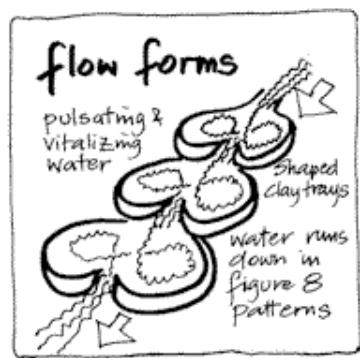


Swales

Swales are wide, gently sloping, vegetated channels or ditches. They capture the water and allow it to filter into the soil. Water loving plants can then be grown on the edge of the swale.



Flowforms



Flow forms are designed to replicate the natural flow patterns in streams, aerating and cleansing the water. The water flows in a figure-eight path, lengthening the time in which pollutants can be broken down by natural processes and oxygen can be taken up from the air. A natural stream, with its great variety of water conditions and plant life, is nevertheless preferable.

Water loving plants

Plants absorb water through their roots, and later "sweat" it back into the air (transpiration). They act as a storage facility for water and reduce flooding while holding onto the moisture. This is why dense forests are damp. Plants with large leaves lose more water into the air and are useful in boggy areas. By planting the wetter areas of your section with water tolerant species you can work with nature to make the most of your specific conditions. Plant instead of drain!

Native plants suitable for moist environments (ecologically suitable for Waitakere):

Native grasses (*Carex flagellifera*, *Carex maorica*, *Carex virgata*, *Carex lessoniata*)
 Toetoe (*Cortaderia fulvida*) - not the Argentinian pampas!
 Hangehange (*Geniostoma rupestre*)
 Flax (*Phormium tenax*) - food for birds
 Panakenake (*Pratia angulata*) - attractive ground cover
 Karamu (*Coprosma robusta*) - food for birds
 Gahnia (*Gahnia xanthocarpa*)
 Rushes (*Juncus gregiflorus*, *Juncus planifolius*)
 Manuka (*Leptospermum scoparium*) - attractive flowers
 NZ (native) Broom (*Carmichaelia aligera*) - attractive flowers
 Swamp Coprosma (*Coprosma tenuicaulis*)
 Kiekie (*Freycinetia banksii*)
 Pukupuku (*Doodia media*) - fern

Turutu, NZ blueberry (*Dianella nigra*) - beautiful blue berries
Cabbage Tree (*Cordyline australis*)
Nikau (*Rhopalostylis sapida*)
Pate (*Schefflera digitata*)
Kawakawa (*Macropiper excelsum*)
Lacebark (*Hoheria populnea*)



Further information

Introduction to Permaculture, Bill Mollison, Tagari Publications; 1991
A Guide for Planting and Restoring the Nature of Waitakere City, Waitakere City Council, 1997
Waitakere Gardening Guide (pamphlet), Waitakere City Council, 1998
Slip Sliding Away - Planting to Prevent Erosion (pamphlet), Waitakere City Council, 1998
Water - BBE 10, Building Biology and Ecology Institute of New Zealand
A list of environmentally damaging plants can be found in the *District Plan* (available in all libraries)

Advice at Waitakere City Council:

Eco-friendly Building Advisor 839 0400
Green Network 8368000 Ext. 8508
(native planting and stream restoration)
Building Consents 839 0400
Planning and Resource Consents 839 0400
Leaks and General Water Enquiries 839 0400

Further information can be obtained from the contributing writers for this chapter of Waitakere City's Sustainable Building Sourcebook.

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