

Landscape practices



WaterSmart development involves simple design and management practices that take advantage of natural site features and minimise impacts on the water cycle. It is part of the contemporary trend towards more 'sustainable' solutions that protect the environment and cost less.

This **WaterSmart Practice Note** explains how to undertake landscape practices that promote efficient water use and good plant growth.

- **Soil preparation**
- **Planting, mulching & plant care**
- **Ongoing landscape maintenance**

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Soil preparation

Preparation of the soil is dependent on soil type and site conditions. There are three main types of soil:

- sandy soils that drain rapidly
- clay soils that hold water
- loamy soils containing a mixture of coarse and fine particles.

Soil texture determines the soil's ability to retain water for use by plants. Fine-textured clay soils hold the most water due to the greater surface area around soil particles. These soils may be unsuitable for some types of plants. Sandy soils may dry out quickly in dry weather. Loamy soils that contain plenty of organic matter are ideal for plant growth. Check with your local plant nursery for advice on local soil types and soil testing.

It is best to use plants that are suited to the site's soil conditions. Adding a veneer of the best 'garden mix' is not recommended as this will discourage roots to penetrate deeply into the soil below. Hardy, deep rooted plants can help break up poor soils. Organic matter can be added to soil to encourage microbial and worm activity, thereby improving soil condition and moisture retention.

Potential acid sulfate soils and salinity are major soil problems. Check with your local council to see if your site could be affected, and whether any specialised strategies are required. Careful design, construction and on-going management techniques for building, drainage and landscaping works are necessary in these situations.

If soils have been compacted by construction work or vehicles, remediation can be undertaken to open up pore spaces, promote aeration, and improve water infiltration and holding abilities.

There are a number of soil additives that can be used to improve general soil performance. Always seek specialised advice as to the correct rates and situations for application. Common soil additives include the following.

- **Wetting agents** for hydrophobic ('non-wetting') soils, including some sandy soils and soils with lots of organic matter. Watering results in beads of water running-off rather than soaking into the root system. The wetting agent can be mixed with backfill at planting times, or applied later.
- **Gypsum** may be added to dispersive or sodic clay soils. Always test the soil to see if it is needed and to determine the correct application rate.
- **Water-storing crystals** can hold hundreds of times their weight in water. When mixed with water they form a soft gel and retain water. This provides a reservoir of moisture for plant roots during dry periods.

Where construction or landscaping works cut into the soil subgrade, apply the saved topsoil (scraped and stockpiled prior to commencement of work) to a depth of at least 150 mm for turf areas, or 400 mm for garden beds. Roughen the surface before applying the topsoil layer, and water with a fine spray prior to planting to eliminate air pockets.

To avoid compaction of heavy clay soils after rain, allow 2-3 days for free drainage before tilling or using mechanical means to work the ground.

Any additional soil required for landscaping works should be specified to satisfy Australian Standard *AS 4419 Soils For Landscaping and Garden Use*, or current standard. This sets requirements for bulk density, organic matter, weed content, wettability, pH, electrical conductivity, ammonium toxicity, phosphorous content, dispersibility, toxicity, nitrogen drawdown, permeability, soil texture and large particles.

Select the range that suits the proposed type of plants for the site. For example, Australian native plants have different requirements and tolerances. As a guide do not use any soil with more than 20% organic matter in it

Pre-planting

Those parts of the site that are to be landscaped should have all weeds removed prior to the commencement of landscaping work. Use hand tools on smaller weeds. As a last resort, apply herbicide by spot application to larger, perennial or vigorous weeds.

Backfill retaining walls and make other garden beds after brickwork, electrical and drainage works and adjoining pavements have been completed. Apply water to settle the soil down and eliminate air pockets. This must be done with a fine gentle spray to prevent surface erosion.

Mulch should be applied to each area left unplanted in the event that planting is delayed by more than one week from backfilling or other soil preparation.

Planting

Stock selection

The key issues in selecting trees are:

- the trunk has adequate stem taper and is self-supporting in its container
- good root occupancy of the root ball
- no girdling or kinking of roots within the root ball
- roots fill the container without being over-grown
- trees are free from included bark (unless this is typical of the species and is known not to lead to structural failure)
- there is adequate root volume to support and sustain the above-ground sections.

Stock selection should be based on Clarke (1996) *Purchasing Landscape Trees: a Guide to Assessing Tree Quality*.

Tubestock generally give faster growth, but semi-mature seedlings need less watering.

Hardening off plants

Arrange delivery of plants to a location within the locality of the site at least four weeks before planting out. Maintain plant root systems moist at all times, giving particular attention to watering during the on-site installation period before and during planting.

Planting guidelines

To avoid damage to trunks and root zones of retained vegetation, use hand tools and barrows in adjacent areas. Undertake planting according to any landscape plans and drawings for the site and observe the following guidelines.

- Ensure that there is an adequate depth of drained soil for the stock size to be used.
- Do not plant if the air temperature is over 35°C or if the soil is waterlogged.
- Relocate existing turf or mulch. At each planting site set aside mulching materials if already applied.
- The planting holes are to be a minimum of twice the width of the container and to the depth of the root ball. For tube stock excavate to a depth equal to the root column and, if possible, to a width of 500 mm.
- The sides of the hole should be rough (not smooth) to promote new root growth.
- Organic matter must not be placed in the bottom of the hole or in the backfill.
- Ensure that all containers are fully removed from the root ball and the hole. No part of the plant should be damaged during this process.
- Depending on container size, remove or gently roughen the outer 5-10 mm of the root ball of trees.
- The plant should be centred in the hole and then backfilled with site soil in good tilth.
- The top of the root ball must be level with the finished level of the soil and must remain so.

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- If fertiliser is to be added it should be placed in the upper section of the backfill. The type of fertiliser, rate of application and area should be to the manufacturer's instructions.
- The backfill must be placed around the root ball to ensure good root contact without being overly compacted.
- Place remaining excavated soil as a mound around the edge of the root ball to create a watering well. This helps retain water.
- Water each plant within one hour of planting. As a rule of thumb, apply one litre of water for every litre of container volume. Apply the water through the root ball, but not so as to damage the plant or dislodge the root ball. For containerised stock up to 45 litres, water the plant bringing the growing medium to container capacity within one hour of planting. For stock over 45 litres ensure that the root ball is moist and that plants are not wilting.
- Depending on soil moisture conditions, additional water may be applied to the soil surrounding the root ball.
- Apply organic mulch to a minimum radius of 500 mm from the trunk, and to a depth of 75 mm.
- If tree protection measures are required such as tree guards or marker stakes, these must be installed so that no damage is done to the trees. In most situations, trees should not be tied to stakes (that is, trees should be self-supporting when purchased—see *Stock Selection* above). Where additional support is required, two or three stakes should be used. These should be driven into the soil beyond the root ball and not interfere with branches or foliage. Trees should be attached with jute webbing or other flexible material that will not damage the plant. The ties must be low enough to allow trunk movement but high enough to provide support for the root ball.
- Remove all other ties and labels from the plants.

On-going plant care

Maintenance period

Specify a pre-determined maintenance period (up to two years from completion of landscaping works) for establishment of landscaping. During this period, missing, dead or unhealthy plants should be replaced with identical species of similar size and quality at the contractor's expense.

Watering

Deeply water all new plantings at least once a week for the first three months, once a fortnight for the next six months and once a month for the subsequent six months. Adjust this frequency to suit local soil, climatic and weather conditions, such as falls of heavy rain. Water should be applied to the root ball and surrounding soil.

Weed removal

Undertake periodic weed removal at least once a month. Hand weeding young plants is recommended as it causes less ground disturbance. Removing weeds whilst still immature limits their ability to establish a wide root network, set seed and spread vegetatively. Herbicide could be used selectively to control the re-emergence of persistent weeds by using cut-and-paint techniques or an applicator where appropriate.

Moderating plant growth

Lightly tip-prune flowering shrubs at the end of their main flowering period to encourage bushy growth. Keep groundcovers 150 mm from tree trunks to allow inspection of the tree trunk. Grasses need to be kept approximately 1m away from new plants for one to two years to prevent competition.

Removing tree stakes

Remove stakes from newly planted trees after the completion of their first growing season. Take care not to cause any damage to the trees.

Mulching

Mulching has many benefits to plant health and water conservation. As well as reducing evaporation, it suppresses weed germination and growth (by reducing light penetration to the soil surface) and stabilises soil temperature (beneficial to root development and soil organisms). Organic mulch slowly breaks down to supply soil nutrients. Use the following guidelines to help ensure efficient water use and good plant growth.

- Apply 75-100 mm of organic mulch over the surface as a blanket on massed plantings. Top up annually. Keep mulch at least 150 mm away from trunks and stems to prevent rot.
- Use a mixture of textures to allow water to pass through. A combination of chipped bark and leaves decomposes at different rates and supplies a variety of minerals and nutrients.
- Avoid introducing pests and diseases from mulch imported to the site. Obtain materials that satisfy Australian Standard AS 4454 *Composts, Soil Conditioners and Mulches*, or current standard.
- Do not apply fresh organic products directly to the soil (such as sawdust, woodchips and pinebark). These materials extract soil nitrogen ('nitrogen drawdown'), competing with plant uptake and causing sickly plants. Add fertiliser (manure or blood and bone) before application, or compost the material before use.
- Inorganic mulch can be used, but does not add humus and nutrients to the soil. Use crushed rock, gravel and brick, silicon chip, coarse river sand, scoria or river pebbles to complement landscape themes or where loose materials may be blown away. Avoid blue metal as this can alter soil pH. Use to a depth of about 50 mm to allow water penetration.
- Mulch matting can be used on slopes where other mulches may slip. When pegged in position, the mat forms a stable surface whilst trees, shrubs and groundcovers establish. Plants

can be pocket planted through the matting. Use 100% organic matting, such as jute. The matting must not contain inorganic fibre such as nylon.

- If using an irrigation system, install an underground or surface drip system to make sure the water reaches the soil below the mulch.
- Avoid using mulch in areas where it is likely to be washed away by surface flow during heavy rain.

Maintenance regimes

After rain

Avoid walking or driving over wet ground as heavy soils are easily compacted when wet. Soil compaction significantly reduces infiltration rates.

Avoid disturbing plant foliage immediately after rain as plant diseases are more easily transmitted into damaged leaf tissue when moist.

Check for soil erosion, and repair erosion points before they magnify. Identify the cause and undertake corrective measures (redirect drainage, disperse flow and reduce velocity). Check for sediment build-up in vegetated filter strips, drainage swales, soak areas and ponds. Collect sediment and stabilise in areas that are less prone to erosion.

Weeding

Regularly control weeds to reduce competition for both soil moisture and nutrients. Hand-pull or hoe weeds when they are young. Remove weeds before they set seed for the next generation.

Avoid broad-scale herbicide application as this may wash-off into water courses and affect aquatic fauna. If persistent woody weeds do not respond to manual methods, cleanly cut near the stem base stem and paint with herbicide on the fresh wound. Use herbicides only in accordance with the manufacturer's instructions.

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Watering

Newly planted areas will require more water than established plants. The first growing season is the most crucial for good root establishment. New plants need to be monitored, especially in weather extremes. Use the following guidelines to help ensure efficient and effective watering.

- Apply slow waterings to encourage deep root penetration
- Decrease watering frequency as plants settle in.
- For maximum watering efficiency, group plants together that have similar watering needs together ('hydrozoning').
- Take care that the underlying subsoil is not saturated as this can be a cause of wilting leaves. Rectify by improving subsoil drainage or using species that can cope with the conditions.
- Water according to soil moisture and plant needs rather than to a fixed schedule. Test the soil 50 mm below the mulch to see if it is dry before applying water.
- Divide garden beds into sections and alternate between them at watering times, concentrating on one with deep soakings.
- Minimise evaporation by watering in the early morning or late afternoon. Apply water to the roots rather than the foliage, as some plants are susceptible to pest and fungal diseases if left with damp leaves, especially overnight.
- Avoid watering in windy conditions as much water is lost to spray drift.
- If using a handheld hose, use a trigger-operated nozzle to control flow whilst moving between plants.

Care of plants

Protect young plants, especially ornamentals that have large or soft leaves, by shading from strong sun or wind. Use shade cloth or a tee-pee of branches cut from prunings. This reduces moisture loss from their leaves.

Thin out fruit on deciduous trees. Thin apples, peaches, plums to about 20-30 cm apart.

Let cane berries and fruit trees go dry after harvest and water only if the leaves wilt. Well-established and mulched plants should be able to withstand this regime. Let roses develop hips by not dead-heading flowers.

Avoid excessive use of nitrogen-rich fertilisers as this stimulates leaf growth and increases water demand.

Pruning

Minimise pruning by not forcing plants with lush lengthy growth that becomes wayward. This soft growth is more prone to drying out in hot winds and, if not hardened by the end of the growing season, can be damaged in the colder months.

Pruning may be necessary for shaping, crown lifting or the removal of dead or diseased limbs on trees. For a useful guide, see Australian Standard AS 4373 *Pruning of Amenity Trees*.

Recycle any disease-free prunings back into the landscape as mulch so as to return the stored nutrients to the soil.

Grassed areas - watering

Grassed areas are the biggest user of water. Consider reducing size of lawns, substituting with other groundcovers or converting to a less water-dependent garden bed. For further details, see *Practice Note 7: Landscape Measures* in this series.

Give lawn areas a good soaking rather than frequent shallow waterings. During prolonged dry

periods it may be necessary to water every third day to the equivalent of 15 mm of rain. Use a cup to measure how much water has been applied.

For summer-dormant turf species, restrict foot traffic whilst the turf is dormant.

Grassed areas - mowing

Mow less often. Where possible, use a hand-pushed mower—a great incentive to reduce lawn areas!

Set mower blades higher. Aim to cut only the top one-third of the grass. Mowing too low weakens the grass, increases susceptibility to weeds and pest damage, and increases evaporation from the soil.

Use a mulching mower to recut the grass finely, self-mulch the lawn and return soil nutrients.

Mow when the grass is dry to allow clippings to filter down to the soil for self-mulching without clumping.

Avoid fertiliser application as this stimulates leaf growth, increasing moisture loss and nutrient-enriched run-off. It also requires more frequent mowing.

Grassed areas - maintenance

- Aeration helps water penetrate to the root zone. This can be done by inserting the prongs of a garden fork to a depth of at least 10 cm in a regular pattern over the surface of the lawn, or use a motorised roller with spikes.
- De-thatch the lawn. Lawns that grow by creeping stems sometimes form a thick layer of stems and leaves under the green parts, called thatch. Remove this layer using a special mower (available for hire) to improve water penetration. This is best done between spring and early summer or in autumn.
- Organic fertilisers, such as fishmeal, seaweed extracts and pelletised poultry manure help stimulate microbial activity that removes thatch naturally.

Other issues

Swimming pools

Swimming pools lose an enormous quantity of water through evaporation. In a shaded wind-protected setting evaporative loss may be about 15 mm per week over the surface. For a 60 m² pool this is about 3700 litres per month! The same sized pool in a hot, sunny, windy site loses about four times that amount. A pool cover can cut potential losses by more than 90%, and reduce the need for chemical additions and pump and filter use. Pool covers are commercially available as either floating or fixed covers that satisfy budget, use and safety needs.

Gutters

Prune back overhanging branches and remove leaf and other debris from roofs and gutters to reduce possible contamination of water collection tanks and systems.

Car washing

Washing cars or boats on lawns prevents water and detergent from entering the stormwater drainage system. Lawns and garden beds have a limited ability to absorb nutrients contained in detergents. Wash the car in a different location each time. If the lawn deteriorates or becomes water-logged, your vehicle may be compacting the soil or the nutrient levels may be too high. Aerate the soil and rest it by taking the car to a commercial car wash for a few months. Select a car wash that recycles water and detergent.

Regular maintenance

Sweep paths and driveways rather than using a hose. Maintain and repair leaking taps, hoses and other fittings of watering systems.

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Useful websites

Environment Australia (2001). *Your Home: Technical Manual and Consumer Guide*:

www.greenhouse.gov.au/yourhome

Friends of the Earth (Sydney):

www.homepages.tig.com.au/~foesyd/

SustainableConsumption/garden/gardenhome

Australian web site dedicated to promoting better water conservation: www.savewater.com.au

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Other practice notes

Other WaterSmart Practice Notes are available in this series:

- No. 1 The WaterSmart Home
- No. 2 Site Planning
- No. 3 Drainage Design
- No. 4 Rainwater Tanks
- No. 5 Infiltration Devices
- No. 6 Paving
- No. 7 Landscape Measures
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