REVEGETATION PROJECTS

best practice guide for tasmania

Contents:

Disclaimer:

This document is only intended to be a quick reference guide. Ideal methods will vary from site to site. It is recommended to seek advice from someone experienced for your specific site characteristics and requirements.
Some projects may need to consider local planning regulations and/or The Tasmanian Forest Practices Code. Projects on vulnerable land or 10 ha or more in size may require a Forest Practices Plan. Check with your local council and the Forest Practices Authority.

This publication has been prepared with all due care and diligence, using the best information available at the time of publication. NRM North holds no legal responsibility for any errors or omissions within the document. Any decisions made by other parties based on this report are the responsibility of those parties.

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Planning

A well planned revegetation project will reap the greatest rewards in the long run. Plan at least 12 months in advance to allow for thorough site preparation and to order appropriate seedling stock from a nursery.

- Identify the planting area, number of plants required and species mix.
- Identify the most appropriate planting time, method of site preparation and management of threats to the young seedlings.
- Place an order with a plant nursery for the seedlings by spring in the year before planting and nominate an approximate date for the collection of seedlings.

If uncertain at any stage of your project seek professional advice.

Plant selection

Many factors impact on the plant mix chosen for a revegetation project. Native plant selection will be guided by the original vegetation type however it is important to consider the following before finalising the selection:

- Purpose of the revegetation project e.g. for wildlife habitat, windbreak or aesthetics.
- Site characteristics such as soil type and depth, aspect, current vegetative cover and microclimate (e.g. exposure to elements such as frost, wind, sea spray).

Once a plant list is defined, the final consideration is what species provenance is most suitable. The species provenance refers to the geographic source of that species. Many plant species have adapted to grow in a wide range of locations and conditions. Revegetation projects usually attempt to use locally sourced plant material however it may not be the most suitable if the site conditions have altered significantly (for example due to land clearing and cultivation or climate change). Use the current conditions of the site to guide which species provenance may be most successful.

Weed control

The aim of weed control is to reduce or remove competition for water, nutrients and light from the establishing plants. In this context the term “weed” refers to any plant other than the seedling, including grasses.
Weed control is the most significant site preparation work to be undertaken. The effectiveness of weed control prior to planting and for at least the first 12 months after planting often determines the success or failure of a revegetation project.

Basic principles:

Prior to planting seedlings, reduce weed cover as much as possible from the planting area.

- Ideally weed control should begin in the spring prior to planting, whilst weeds are actively growing and prior to seed-set.
- For the first one to two years after planting, minimise weed competition in a strip 1.5-2 metres wide along rows, or a radius of 1–1.5 metres around each plant.

There are a variety of weed control methods. The appropriate method and the order and timing of weed control is site specific. Some of the methods along with the advantages and disadvantages are listed in the following table. Use the table to determine the right method(s) and timing for your site. If not confident, seek professional advice.

Weed control method	Advantages	Disadvantages
Chemical	• Most weeds can be controlled in short and longer term • Relatively easy to apply • Cost competitive	• Environmental risk if not done properly • Often requires specialist equipment • Risk of damage to seedlings • Not an option for certified organic properties
Mulches	• May avoid the need for residual chemical use • Can utilise a waste product from elsewhere • May be a nutrient benefit to trees • Can improve the water holding capacity around the trees	• May be expensive and difficult to apply • Poorly composted mulches can compete with trees for nitrogen • Bark mulches can be a significant fire risk • Some mulches can cause physical damage to tree stems, or produce favourable conditions for disease
Burning*	• Removes large quantities of vegetation • Cheap	• Risk of fire escaping from target area • Does not provide long term control • Stimulates germination of soil-stored seed • Not suitable after planting

*These methods do not replace chemical weed control or heavy mulching to control weeds for the first two years.

Weed control method	Advantages	Disadvantages
Grazing*(Pre-planting only)	• May keep grass in check	• Stock are selective in what they eat • Potential for soil damage if not managed
Weed mats*	• Control weeds closest to the plant stem • Assist with moisture retention in the top soil	• Higher cost than other options, and time-consuming • Only useful in conjunction with another pre-planting weed control methods
Slashing*	• Reduces weed height • Improves access for spraying • Reduces fire risk • Reduces chemical use • Reduces woody weeds	• Has little effect on competition for water and nutrients • Requires a site that is accessible and safe for vehicle/slasher
Cultivation*	• Removes the more difficult woody weeds • Reduces chemical use, particularly in pasture situations	• Stimulates dormant seed to germinate • May create a soil erosion risk • Can damage tree roots if done after planting or if planting near established vegetation

*These methods do not replace chemical weed control or heavy mulching to control weeds for the first two years.

Chemical weed control

The best weed control will include multiple applications over a 6-9 month period prior to planting, or, as a minimum, an application before and after cultivation.

It is advisable to seek professional advice before embarking on weed control.
Select herbicides according to weed species and always follow the label instructions.

Chemical basics

Herbicides are commonly grouped by their mode of action into two categories “knockdown” and “residual”.

Knockdown chemicals (e.g. glyphosate products) are absorbed by the plant foliage and translocated (systemically) throughout the plant.

Residual herbicides (also known as germination inhibitors, e.g. oxyfluorfen products or Simazine) are applied to the soil surface and kill seedlings as they germinate. They require moist, bare soil to work effectively and can remain active in the ground for long periods.

Remember the chemical label is a legal document and must be followed when using any agricultural chemical. It is illegal to use a chemical for a purpose that is not described on the label, unless a permit has been obtained through the National Registration Authority.

Pre-planting chemical application

At least one application of knockdown herbicide is recommended before cultivation; ideally in late spring of the year before planting. Repeat application in early autumn may be necessary. Allow at least 3 weeks from herbicide application to allow for root release of the soil before cultivating. Herbicide application should be done again after cultivation and at least 2 weeks before planting. A knockdown herbicide can be used again, but a combination of a residual and a knockdown herbicide is a very effective option at this point.

Herbicides can be applied either using a boom (suitable for spraying out the whole planting area or for spraying rows only) or by hand spot-spraying (particularly if spot cultivation is to be used, or if the site is not suitable for any cultivation).

Soil preparation

The aim is to create good tilth (loose friable soil) in which to plant your seedlings. The benefits of this include:

- Plant roots are encouraged to grow and spread
- Increases water penetration and storage
- Concentrates nutrients into the root zone
- Keeps plants out of saline and/or water-logged zones during early establishment
- Maximises the effectiveness of weed control
- Makes planting significantly easier and faster

The most suitable method of preparation depends on the site and soil type (including previous use and existing vegetation). The first consideration is the physical characteristics and restrictions of the site. For example, a shelterbelt planting site in an ex-cultivation paddock will obviously allow greater mechanical input and soil disturbance than a stream bank with variable slope and soil depth and issues such as flooding, rock and difficult access. Ensure that your method of soil preparation will not cause more damage than good e.g. soil erosion.

If the site allows, the best method is mound ploughing or ripping followed by mounding. Do not cultivate wet/heavy soils as the soil structure will be compromised. Timing is important; allow time for soil to settle after cultivation and before planting.

Ripping:

Ripping (30 - 60cm deep) is beneficial on most soil types to reduce compaction. A winged ripper increases the volume of soil shattering. With a wingless ripper a similar effect can be achieved by making parallel lines 50 cm apart and planting between lines.

Single ripper mounted on tractor

"Winged" rippers

Mounding:

Mounding is particularly valuable on heavier soils that may lay wet during the planting season. Mounding and ripping can be done in one pass with a mound plough. Old pasture may benefit from disc ploughing before mounding to reduce lumps and create better tilth.

Mounding is not recommended on light, sandy soils.

Smudging:

May be beneficial after mounding to further improve tilth by breaking up clods in the mounds in certain soil types. Also assists with the effectiveness of residual herbicides and ease of tree planting.

Ex pasture sites

Ex pasture sites are often very cloddy when ripped/mounded.

- Allow at least 3 weeks after spraying for soil to be released from the roots of weeds.
- Cultivation with agri-discs or a rotary hoe prior to mounding will help create a better tilth.
- A second pass with the mound plough will also improve tilth.

Spot cultivation

Spot cultivation is used where a site is not suitable for any of the above cultivation methods.

Swampy ground, creek banks, drainage lines, erodible areas and those prone to flooding may be better spot cultivated or left uncultivated to protect soil and water.

Large-scale projects can use excavators with implements such as the 'Rotree' or 'Wilco' Spot Cultivator. They cultivate the soil to a depth of 60-100 cm and provide a fine tilth on the surface. Small scale projects can use a small excavator with a single tyne ripper. This should ideally be done when soils are dry to moist, but not wet. Care must be taken not to mix the sub soil with the top soil. In moist, clay soils care must also be taken to avoid making a smooth or 'smeared' wall around the planting hole as this can restrict root growth and create a 'pot-bound' effect.

Protection and guarding

Newly planted seedlings may need protection from browsing or trampling from domestic or native animals or from harsh climatic conditions (e.g. wind or direct sun) the young seedling is unaccustomed to. Many options are expensive and time consuming so careful consideration of the risks of the site and attention to hardening seedlings in the nursery before planting can save investing money and effort in the wrong method.

Fencing

- Fencing is an obvious necessity for the exclusion of livestock from areas of tree establishment.
- Consideration should be given to the possibility of establishing wildlife-proof fences to protect seedlings from local wildlife, which may avoid the need for individual seedling guards.
- Leave an appropriate distance (1.5 to 2m) from each fence line to the first row of planting to facilitate maintenance and reduce branches falling on fences. Consider planting understorey and smaller shrubs in the outer rows to further reduce this issue.
- Consider the timing of the fencing phase, which may need to be well in advance of planting, for example to avoid driving tractors backwards and forwards over ground that has been ploughed.
- Livestock should be excluded from cultivated ground.

Guards

Types	Advantages	Disadvantages
Sock guards 	• Very cheap • Minimal labour to install	• Require maintenance to ensure plants do not 'curl' within the socks • Less browsing protection than other guards • No weather protection
Plastic bags 	• Cost-effective • Re-usable to some extent • Provide some weather protection and a microclimate which promotes growth • May enable spot-spraying to be done (carefully) around the seedling to suppress competition	• Negative effect on the environment, neighbours and waterways if blown/washed away • Need three stakes to hold in place or an expensive metal frame • Can be difficult to install correctly • May not stand up to significant browsing pressure

Types	Advantages	Disadvantages
Milk cartons 	• Sustainable product • Cheaper than plastic options • Provide some weather protection • Will decompose “in situ” without hindering plant growth which avoids the task of having to remove them • Ideal for riparian projects	• Less browsing protection than plastic options, and do not last as long (in some conditions less than 12 months)
Corflute 	• Can be re-used multiple times • Sturdy; protect from most browsing species (depending on height) • Provide some weather protection and a microclimate which promotes growth • Enable spot-spraying to be done (carefully) around the seedling to suppress competition	• Higher initial cost • May have to be broken if not removed while the plant is small enough

Types	Advantages	Disadvantages
Browsing repellant	• Cheap • Minimal labour	• Only protects the leaves that it is applied to; new growth is not protected • May require additional wildlife control measures
Wooden stakes	• Strong • Re-usable	• Target for vandals for camp fires • More expensive • Heavy/bulky to handle
Cane stakes	• Cheap • Not generally re-usable	• Not as strong as hard wood • Not suitable for windy/exposed sites
Weed mats (jute or recycled rag)	• Chemical-free weed suppression immediately around plant for 1-2 years	• Additional cost • Require a guard or pins to hold in place

Fertilising

Nutrient availability has a significant effect on plant growth. Although many native plants grow in low-nutrient environments, the addition of fertiliser is still a consideration in revegetation projects. Which nutrients may be deficient on a site can be determined by soil analysis or to some extent by experience/observation.

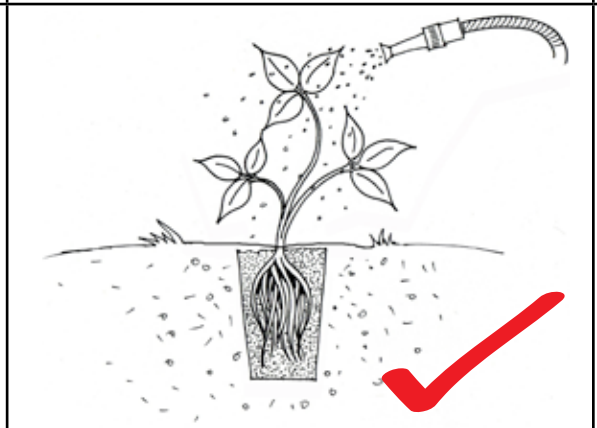
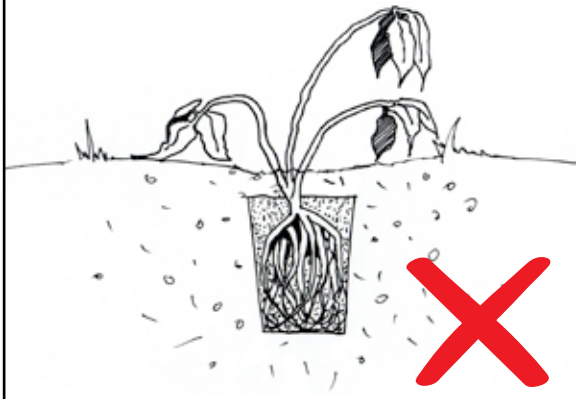
- If your site is ex-agricultural and the existing vegetation looks good/lush/healthy (in spring when it's moist and plants are actively growing) then there are probably sufficient nutrients available for your seedlings to thrive. If cultivation and weed control are done well, the existing nutrients will be available for your plants. If weed control is substandard, weeds/grasses will use the available nutrients and water at the expense of your plants and additional fertilising can exacerbate this problem.
- If your site is nutrient poor/impoverished and the existing vegetation looks poor/sparse/starved (even in spring) then your plants will probably benefit from an application of fertiliser.
    - Use a 'Slow Release' or 'Controlled Release' fertiliser (suitable for native plants) at the recommended rate.
    - Some plant species, particularly members of the Protea and Legume family can be phosphorus (P) sensitive. For example some Acacia, Banksia, Bossiaea, Hakea, Pultenaea species. Use a low/no P fertiliser for these.
    - Place fertiliser 5-10cm away from the root ball, and 5-10cm below the surface.
- Too much fertiliser can lead to plants that grow too fast and become 'soft' and/or unstable.
- Extra growth needs extra water. Keep in mind, particularly during the first summer, that the flush of spring growth on top needs to be supported by a root system that can supply the necessary water.
- Incorrect fertiliser use can lead to soil nutrient imbalance, water pollution and is a waste of money.

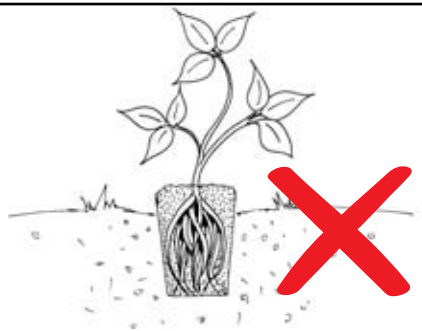
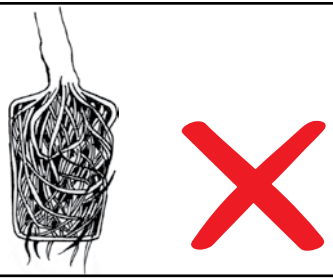
How to plant

1. Thoroughly water your plants a few hours before planting ensuring the potting mix is fully saturated. Soaking the pots in water (in buckets or a tub) for 30 minutes will help moisten any dried out potting mix.
2. Scrape a shallow bowl (50cm wide x 5cm deep). Place the scrapings on the downside of your bowl to build a small dam.
3. Dig a hole in the centre of the bowl (spade width). Break up any soil clumps before placing the excavated soil right next to the hole for back filling.
4. Place water in the hole for planting if the conditions are dry. Large scale plantings into prepared ground are generally done only when there is sufficient soil moisture. If properly timed, follow-up watering is not required and unless followed by an exceptionally dry season.
5. Remove the plant from its pot.

   Note: Do not pull the plant out of the pot by its stem

   Turn the pot on its side. Gently squeeze the end of the pot to loosen the plant and tap it on a solid object e.g. mattock handle, steel capped boot. The plant should slide out and rest in your hand.
6. If the plant is root-bound, cut off the offending roots or loosen the roots.
7. Plant the seedling into the centre of the hole so that the top of the root ball ends up 1-2 cm below ground level. Make sure all the roots are pointing down.
8. Backfill with loose material dug from your hole, pressing it down with your fingers (not too hard!) so to eliminate any air pockets and achieve good root-soil contact.
9. Gently water the plant with a few litres of water. If planting in dry weather, water immediately after planting.

Outcome	Image	Points
Desired outcome		1. Seedling is in the centre of a shallow depression which holds some water 2. Top of root ball is just below finished ground level 3. The hole is a good size 4. The hole is back-filled firmly with loose soil creating good root-soil contact 5. Watered in
Too low		1. Root ball buried too deep 2. Stem can be affected by collar rot

Outcome	Image	Points
Too high		1. Root ball above finished ground level 2. The plant will become unstable in the wind and be prone to breakage and drying out
Mulch too close to the stem		1. Can cause collar rot
Root bound seedling		1. Loosen root ball 2. Make two opposing cuts down the root ball (1cm deep) to sever circling roots

Commonly used planting tools

Hamilton planter

- Friable soil
- Cultivated soil
- Soft ground
- No rocks

Potti putki

- Cultivated soil
- Moist soil

Shovel

- All situations

Mattock

- All situations

Maintenance

Monitoring and actions

- Visit the site regularly and act swiftly to address any issues (spray weeds or pests, organise shooting program etc.).
- Water as required in the first 12 months – but not too often as the roots need to be encouraged to go deep for water.
- Weed control to reduce competition close to the plants is important for the first 2 years. General weed control across the site should be ongoing.
- Browsing – maintain tree guards until trees are of sufficient size; use other game management methods as required.
- Insect pests and disease - ongoing.
- Livestock access - ongoing.
- Monitor growth rates – ongoing.
- Removal of guards – In situations where browsing pressure is high or the plants are subject to toppling there may be merit in leaving the guards in place for 2-3 years until the plants are well established.
- Infill planting is important to maintain the integrity of the planting design.
- Infill planting should be untertaken in the following planting season.

Revegetation Timetable

Operation	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Weed Management	Pre cultivation spray (Knock down only)					Pre cultivation spray (may commence in previous Spring) (Knock down only)		Post cultivation spray 1, if required (Knock down)		Post cultivation spray 2 (Include residual herbicide such as Simazine or Oxyfluorfen)		Monitor Post plant weed control if required			
Cultivation						Disc, rip & mound or spot cultivate		Smudge if required							
Browsing Management	Assess browsing threats							Begin Control Program		Control Program and Monitoring		Control Program and Monitoring			
Planting	Order Seedlings									Plant when soil is moist		Apply fertiliser if required			

Top Tips

For a successful revegetation project

- **Planning (12 months at least) in advance is the key to long term success.**
- **Weed control, weed control and weed control!**
- **Control wildlife and livestock.**
- **Cultivate the soil with the right tools that suit the site conditions.**
- **Ongoing maintenance.**
- **Always seek professional help for your project if unsure.**

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Natural Resource Management in Northern Tasmania

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HABITAT PLANTS