

coming of age

Gordon Ikin, managing director, The Specimen Tree Company shares his extensive knowledge about transplanting semi-mature and mature trees.

The transplanting of semi-mature and mature trees is a relatively new phenomena in New Zealand only occurring in reasonable numbers since the mid to late 1980s. Transplanting of such trees had been undertaken prior to this but it was rather rare and there were no nurseries offering a range of trees at these larger grades.

For the purpose of this article a semi-mature tree or shrub can be defined as one at an advanced stage of growth which will be transplanted from the ground with an earth rootball or from a container of appropriate size. In either case the combined size and weight of the specimen will require special equipment to carry out the transplanting operation.

I became involved with the transplanting of semi-mature and mature trees during the 1980s at a time when many old villas in Auckland were being demolished/removed to make way for townhouse developments. These villas were often sited in established gardens containing trees or large shrubs. Unfortunately the new development on these sites often resulted in the entire section being disturbed during

construction, with virtually all vegetation being cleared in the early stages. I was keen to save and re-use some of these trees/large shrubs in new gardens. As there was a lack of relevant knowledge and experience available at the time I spent 18 months overseas investigating and working with those who were undertaking transplanting.

One of my key areas of interest was in the transplanting of New Zealand natives, but obviously this was experience that I was unable to gain overseas. Transplanting of native plants has continued to be of interest and our company has experimented with many different species.

KEY FACTORS TO CONSIDER BEFORE TRANSPLANTING

The tree that you are contemplating moving must be a specimen of sufficient quality to justify the expense involved. I often ask the question - is the tree a Rolls Royce or just an average specimen? In either case the cost of transplanting will be the same but the aesthetic impact and potential longevity of the superior

specimen will almost certainly exceed that of the average one. We tend to actively discourage clients from transplanting a tree of just average quality unless the tree has sentimental value.

Is the tree one that will transplant readily, or is it a species that is especially complicated or has a high likelihood of failure? From the client's perspective it may come down to the level of risk they are prepared to accept. At times we recommend that a tree should not be transplanted due to the potential risks involved, but of course it is the client's choice. I believe strongly a transplanted tree should thrive in its new location not just survive in it. The goal is to have the tree establish in its new location very quickly giving the appearance of having always been there.

Is the tree subject to a protective ordinance, and if so is a Resource Consent required for it to be transplanted either within the site or to a different location?

Does the soil type in which the tree is presently growing have the right qualities to hold a good rootball? This is very important as transplanting success, or lack of it, very often depends upon the degree of stress that a tree's root system is exposed to during the transplanting process. From our experience the optimal soil type is a clay-loam which holds together sufficiently to enable the rootball to be dug, transported and re-planted. The soil type should not be too heavy in structure or have the poor drainage or low fertility characteristic of clay soils.

Are there any underground services on the present site that would hinder the digging of the required rootball? If underground services are present it may be possible to avoid them by digging an odd-shaped rootball, or if the costs are warranted re-routing the service(s).

Is access for machinery or equipment going to be a problem during: the removal of the tree from its present location; transportation; the re-planting of the tree in its new location? Are the dimensions of the tree going to pose problems during the transplanting process? Part of this assessment must identify any obstacles that may be encountered along the route, the most significant normally being overhead electricity and

Left: Semi-mature puriri being transplanted into street berm.



*Mature Livistona palm
being loaded in the nursery
ready for delivery.*



telecommunications services. Road width and bridge restrictions must also be considered.

Is the proposed location suitable for a transplanted tree? For example is there sufficient natural drainage to dig a tree pit of 1-1.2m in depth, and if not is there provision on site to drain the pit into the public stormwater system? Nothing kills a tree faster than a rootball sitting in water. Is the soil type on the proposed site suitable for the tree being assessed, or can a replacement soil medium be successfully added to the planting pit?

It is very important that good planning is undertaken before commencing transplantation as once an operation is underway costs can accumulate rapidly. From our experience we find the best way to approach a transplantation is to prepare a complete methodology of how the exercise will be undertaken. Included in this will be such things as:

- Calculating the size and weight of the proposed rootball;
- Deciding how the tree will be dug (eg by hand, excavator, or a combination of both as is normally the case), lifted (eg Hiab truck, excavator, crane, helicopter, or winch), transported (eg by Hiab/flat-deck/low-loader truck, barge, helicopter, or towed by sled).
- Measuring access routes to ensure sufficient room for equipment plus tree.
- Assessing ground surfaces as to their ability to withstand vehicle loads and provide all weather access.
- Driving the intended route to identify any potential obstacles or hazards for an over-size load, recording and assessing any overhead services that may need to be temporarily lifted/dropped. It can be costly to temporarily move overhead services. If an over-dimensional load is to be carried on a public road then pilot vehicle(s) need to be allowed for and permits

obtained. Some transport companies which specialise in over-dimensional loads have standard permits up to a certain limit in place. Certain size loads can only be carried on major arterial roads and at restricted times of the day or night.

- Checking on underground services using available service plans or a 'CAT' scanner. The proposed rootball is probed to assess the soil structure and determine if any obstacles are present such as rock or buried building materials.

- Determining the exact relocation site and final planting levels. If existing levels need to be adjusted then these should be undertaken prior to the transplant process commencing. If the tree is to be mound planted then calculations need to be made regarding whether additional topsoil needs to be supplied to the site. Decisions regarding drainage of the planting pit need to be made at this time.

If, having completed this methodology assessment, transplantation is feasible and I haven't yet scared you off its time to get into some specific details.

In the majority of instances tree root systems grow laterally rather than vertically. They very rarely look like the carrot-type root systems seen in high school biology text books. Usually tree roots spread well beyond the drip-line and depending upon soil type, the majority are confined within the top 1.5m of the soil strata. With semi-mature trees there is normally no significant roots below a depth of 1m. We plan our transplants so as to extract and keep intact the optimal amount of root system.

The shapes of the rootballs that we dig reflect the way root systems grow. For semi-mature trees we normally dig broad plugs of root systems/earth that are roughly round on the ground surface and extend to a depth of 0.7-1.5 m depending upon tree size and species. We lift

the rootballs out of the ground primarily using a series of different sized tree frames (dependent upon rootball size) with all lift weight being taken by these frames rather than by the trunk. These tree frames remain firmly attached to the rootball until the tree is positioned correctly in its new location. With mature trees we use different lifting techniques and normally dig square rootballs which we lift from the ground using cranes after having first inserted a series of steel beams beneath the rootball.

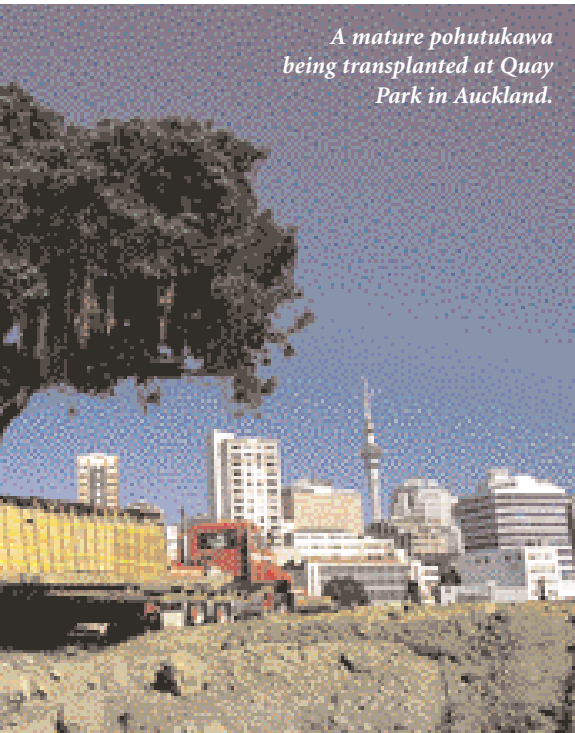
Some companies use a tree spade during transplanting. Although this equipment can be fast and relatively low in cost, tree spades dig a rootball that is cone-shaped, with a small ground surface diameter relative to the depth of cone that is dug when the multiple blades converge at anywhere between 1.2-2.5m in depth. It is my belief a rootball of this shape leaves behind many important lateral roots while digging to a depth where there are no significant roots present.

We frequently plant into heavy soils and my concern is that such soils are easily damaged and glazed by the steel blades of the tree spade being forced into the ground under hydraulic pressure. This glazing can reduce the development and establishment of new roots into the surrounding soil. Another negative aspect of this transplanting approach is the lack of natural drainage that often occurs at depths of 1.2-2.5m, with the consequence that recently transplanted trees can be placed under stress from water-logging, as water is not able to freely drain away from the planting pit.

PREPARATION

Historically it was normal for a semi-mature or mature tree to be prepared for transplanting over a period of months if not years by systematic wrenching of sections of the rootball. It was

A mature pohutukawa being transplanted at Quay Park in Auckland.



A tree frame in use on a semi-mature pohutukawa.

believed that this would allow the cut roots to re-establish prior to the tree being transplanted. Our experience shows that new roots formed in the loose soil medium used to backfill the wrenching trench are in fact often destroyed when the tree is transplanted because the loose soil tends to drop free leaving the fresh roots

exposed and prone to crushing.

Our approach is to carry out the transplanting and replanting in as short a time as possible, with the intention of minimising the stress on the tree. A normal timeframe might involve digging the tree on Day 1, and lifting, transporting, replanting, mulching and watering it in on Day 2.

With this approach none of the tree's stored energy is exerted and then wasted on producing replacement roots that are subsequently destroyed. Although the transplanting process is in itself very stressful for a tree the sooner that these stress levels are reduced and normal functioning allowed to resume the better. We do however use pre-wrenching on some palms and other monocotyledons at certain times of the year, as this can be beneficial for them as their roots form and develop differently from trees (dicotyledons).

The way in which roots are cut affects transplanting success. Roots must be cut cleanly (ie so as not to tear any of the remaining root tissue) and where possible cut to a root collar in much the same way as a branch is cut to a branch collar. Poorly cut or torn roots can encourage decay.

It is very important that the rootball is not subjected to undue compaction during the digging process. This compaction can occur as much from excessive foot traffic as from machinery. It is important that activity across a rootball is kept to a minimum when soil moisture levels are high as compaction can occur very easily under these conditions.

CANOPY REDUCTION

Historically the tree canopy (or crown) was systematically reduced as part of the transplanting process in the same relative proportion as the roots were reduced. Our approach, which has been proved to be successful, is to allow the tree to be the judge of how much canopy it can support post-transplanting.

The leaves, as the food factory of the tree, have a very important role in the days, weeks and months immediately following transplanting, and a reduction in their number can impact greatly on a tree's ability to establish quickly in its new location. In most instances the only foliage that we remove during transplanting is

taking trees seriously

Street gardens have the potential to make a really positive contribution to the urban public environment by: enhancing the character of an area; contributing to the city's image and identity; improving safety in the street environment; and assisting with orientation and way finding.

Manukau City, recognising the large number of street gardens it was inheriting as a result of the increasing number of new subdivisions, engaged Boffa Miskell to work with Council to establish a series of design guidelines. As a result a set of user friendly guidelines was developed to assist subdivision designers and Council officers ensure that appropriate gardens are created having maximum impact while requiring minimum levels of maintenance. The guidelines provide a series of objectives, criteria and suggested standards for meeting those criteria in relation to a number of design factors including: location; scale; frequency; shape; and species selection. The second section of the guidelines provides details of technical requirements and recommended plant species and combinations.

It was decided that the guidelines would be used in conjunction with the Council's existing tree policy but that at sometime in the future the Tree Policy would be reviewed. Manukau City has now engaged Boffa Miskell to review and prepare a new Tree Policy.

Manukau City currently owns around: 48,000 street trees; 63,000 park trees; and 4,500 trees in civic areas within the City. In addition Manukau City plants some 2,000 new street trees and 2,200 new park trees each year.

The brief for the Tree Policy project identifies the overall purpose of the review as: to ensure that funding is spent in a way that maximises the impact tree planting has on amenity and its ability to reinforce the different identities and characteristics of areas within the City.

An important aspect of the project will be the identification of special character areas within the City and the exploration of innovative ways by which trees can reinforce these differing characters.

Trees also have the potential to make a significant contribution to the City environment at a number of other levels including: recreational, ecological systems, soil and water conservation, atmospheric purification, climate control, food production, noise abatement, wayfinding and traffic control. *Rebecca Skidmore, Boffa Miskell*

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that removed during formative pruning or remedial pruning. This includes the removal of secondary or weak branches, normally a crown-lift (removal of the lowest branches primarily to facilitate access for transplanting operations), the removal of deadwood, and following re-planting the tidying of any branches that may have been accidentally damaged during the transplanting process. So what is being removed is foliage that will improve the structural form and aesthetic presence of the tree. It would be unusual for more than 10% of foliage to be removed by this pruning, with 5% the norm.

In the weeks and months following transplantation a tree will make its own adjustments to its canopy to achieve a level of equilibrium between its roots and foliage by shedding leaves that it cannot support. Deadwood that appears following transplanting can be removed during routine post-transplant aftercare.

To reduce stress during transplanting we use an anti-transpirant spray, applied to the foliage just prior to the tree being lifted from the ground. This spray coats the leaves with a waxy film which slows stomatal activity and hence reduces moisture loss.

TRANSPORTATION

Height constraints can often be overcome if a tree is laid horizontally during transportation. The lateral spread of branches can preclude some species from being laid horizontally. Soft materials such as hay bales or bags of compost are used to support the trunk/branches while being transported. Normally extensive tying of branches is required to reduce width.

In order to protect the tree from stresses such as wind, we cover both the canopy and rootball including the underside to prevent drying out. In

order to avoid crushing delicate foliage we use light polypropylene or alternatively hessian covers which allow the tree to breathe. We do not cover the canopy where it could be extensively damaged by the process of covering or by the weight of the cover itself (eg *Dracaena draco*).

REPLANTING

This is one of the most important steps and one that needs to be done correctly if a tree is to sit naturally within its new environment. In order to achieve this, correct rootball height in relation to ground level needs to be attained. Very slightly raised above ground level is how nature intended it. Allowance needs to be made for settling that normally occurs post re-planting. If the tree has a single leader, for example a Norfolk Island Pine, it is essential that the trunk be planted perpendicular. With a multi-leadered tree, achieving overall canopy balance is more important.

I am often asked whether a tree should be replanted in the same orientation to the sun as it was in its previous location. Ideally this is preferable, as long as other important factors such as the best positioning for aesthetic value are considered as well. A tree can adjust to a new sun orientation if it has to, but this obviously introduces a degree of stress and the use of stored energy that could be used elsewhere if this change in orientation was not required.

The type and quality of the backfill material that is used can have quite an impact upon tree establishment. Where it is of poor quality, we often discard the excavated material and replace it with fresh topsoil. We use fertiliser very sparingly, if at all, instead preferring to use compost which we keep to the upper 300mm of the pit. We normally utilise composted mulch

valuable auckland resource

The Tree Council's Guide and Directory to Auckland Region Tree Services 2003/2004 edition will be available in early June.

This 36 page free booklet (A5) provides educational information on the importance and value of trees, and urban trees in particular, as well as a directory to tree services in the Auckland region. It aims to have something of interest for a variety of people and occasions, as well as providing a user friendly networking tool for the industry. This is the 5th edition since 1993.

This updated edition will include:

- Tree Protection Guidelines, tree policies and contact details from all local authorities in the region
- Adverts and listings of commercial and professional services along with voluntary groups and professional organisations
- Editorial articles: the need for tree protection; the Auckland context; timber and sustainable development; values and functions of trees and their products; the value of an arborist; practical section from seed to death (sowing, planting, pruning, disease, management); community tree advisor scheme; farm forestry; Tane's Tree Trust; urban forestry and urban design in Manukau City; legal issues and advice.

Contact the Tree Council for a copy or for details of your nearest stockist: c/- secretary, 91 Perry Road, RD3, Warkworth ph 09 425 9246.

extensively to a depth of 100mm to cover both the rootball and the adjacent soil.

Staking or guying needs to be installed when it is required but normally the substantial weight of the rootball, unlike that of specimen grade stock, makes it unnecessary. Our preference is to use no staking at all. If some is required and hidden underground staking is practicable, we utilise this technique to secure the rootball.

If more extensive staking is required such as in an exposed location, we install 3-4 aerial steel wire cables. These cables are attached to the tree using a webbing tree tie and connected to the ground via screw anchors or fully driven steel stakes.

Thorough watering of a transplant is essential. This is best done at periodic intervals during backfilling and completed once the mulch has been watered in. As with all plant watering, it should not be applied at high pressure. The use of a rosette type hose fitting is recommended.

AFTERCARE

This is an essential, although often over looked, part of the transplanting process. I think the key point to remember is that although a client may be purchasing a transplanted tree, what they ultimately want is an established tree in the location. Good aftercare is fundamental to successful tree establishment.

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All entries must be received by 11 July, 2003.

The winner will be announced in the July/August issue of Landscape New Zealand

Aftercare maintenance should include such things as watering, mulch top up, fertilising, remedial pruning, dead-wooding and checking/adjusting staking. Our experience is that this aftercare period can run between 1-2 years with semi-mature trees, 2-5 years with mature trees. We average 20-23 visits in the first year, dropping to 15-18 visits in the second year.

Our company has developed a process of containerisation that we use especially with some semi-mature and mature trees that are perhaps difficult to transplant directly. We lift the tree from the ground and containerise it in our nursery for a period of 9-18 months. This allows

the tree to adjust to the stress of uplifting in a more favourable environment and to replace some of the roots and foliage lost in the lifting process. We have found that when the tree is re-planted it is able to establish into its new location more quickly.

Overall we have a success rate of approximately 95% for transplanting semi-mature and mature trees and we are more than happy with this achievement given that we are constantly trialling the procedure with new and more difficult species. ■■

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