

A DISCUSSION PAPER ON DELIVERING CANOPY PROJECTS FOR AUSTRALIAN COUNCIL DEVELOPMENTS



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INTRODUCTION: THE CHALLENGE OF DELIVERING AN URBAN FOREST - A TREE SUPPLY PERSPECTIVE

Over recent years there has been increasing recognition of the importance of trees and the critical role they play within the urban forest. While this awareness is driving demand, the tree supply chain is suffering from a progressive dilution of knowledge, uncoordinated flow and financial inefficiency. Navigating these issues is leaving the nursery industry, which underpins the entire urban forest, at crisis point - facing non-sustainable financial pressures.

In recent years many councils across Australia have been actively engaging in projects to bolster their municipalities urban forest - ultimately aiming to improve social health and wellbeing, maximise economic benefits and harness the potential outcomes that can be achieved in sustainability and climate change mitigation.

This increasing improved awareness recognition of the importance of trees and the critical role they play within the urban forest is certainly driving demand. However, coupled with this increased demand is the development of a "compliance" industry within the tree supply pathway, which overlooks some of the fundamentals of tree production - time, knowledge and quality.

Overall, the tree supply chain is suffering from progressive dilution of knowledge, uncoordinated flow and financial inefficiency. Navigating these issues is leaving the nursery industry, which underpins the entire urban forest, at crisis point facing non-sustainable financial pressures.

The purpose of this paper is to provide an overview of the current situation with the aim of stimulating discussion and collaboration to ensure our urban trees supply can be assured into the future.

THE URBAN FOREST

Today, it is generally accepted that the 'urban forest' encompasses all trees on public and private land within an urban area. Depending on the situation, it can also be extended to incorporate plants, regardless of size.

The benefits of a healthy urban forest are well researched, documented and widely accepted. While not the purpose of this discussion, a quick overview of the potential advantages includes:

1. ECONOMIC

- Increased property value
- Reduced heating and cooling costs

2. ENVIRONMENTAL

- Mitigation of urban heat island effect
- Increased biodiversity
- Improved air quality
- Reduction in stormwater runoff

3. SOCIAL

- Improved health outcomes
- Reduced crime rates
- Moderated traffic speeds
- Greater sense of community



URBAN FOREST DEVELOPMENT

The practicalities of urban forest development are quite site specific and vary depending on existing conditions. Within newly developing areas, with little to no infrastructure, there is potential to prioritise the urban forest. Within already urbanised areas, tree planting is significantly constrained by existing infrastructure.

Regardless of the site, the process of urban forest development can be broken into the following stages:

1. Development of aspirational goals and targets
2. Site specific design and specification
3. Tree production
4. Tree procurement
5. Tree delivery and planting
6. Tree Establishment





1. DEVELOPMENT OF ASPIRATIONAL GOALS AND TARGETS

The responsibility of setting big picture future goals and targets generally falls to local government. The development and implementation of Urban Forest Strategies (UFS) are becoming a key focus of local governments. Of the 79 Victorian cCouncils, 29 have a formalised Urban Forest Strategy (UFS). Those without, all address the importance of trees in other documents, such as an Urban Future Plan, Municipal Tree Strategy, Environmental Sustainability Strategy or more broadly a Vegetation Strategy.

A UFS generally outlines the existing conditions within the area and identifies targets and time frames for incremental enhancement of the urban forest, via both retention and management of existing vegetation and planned supplementary planting. Typically, this would also be coupled with the overview of the benefits that would be generated by achieving the goals (or the consequences of not achieving them).

Despite the broad goal of every strategy to be increasing the number of trees to maximise community benefits, there is no overarching state or federal government mandate relating to urban forests or the general increasing of canopy cover. The recent Victorian State Government's Plan for Victoria¹ does highlight the important role of canopy trees and acknowledges the need for water in establishing trees.

Each Local Government Area (LGA) starts their strategy from scratch and invests significantly in developing base lines and setting their own targets. These strategies are generally subject to rigorous public scrutiny and consultation prior to being endorsed by council. UFSs appear to be developed in isolation from other council policies and strategies, and it is not uncommon to find conflicting detail between documents within a particular council.

Increasingly, we are seeing the adoption of some consistently broad targets within UFSs. The first, and most common goal is based on canopy cover. This relies on some form of satellite imagery, a baseline assessment of the total land area that is covered with tree canopies, coupled with an aspirational target within a specified time frame. A common goal within strategies is 30% canopy cover by 2030. Depending on the LGA, this might have various qualify criteria including by land type (public or private) or by degree of urbanisation of a suburb or area within the LGA.

Diversity targets are frequently incorporated into Urban Forest Strategies, with the goal of building a more resilient forest. The logic being that the more diverse the canopy, the less likely it will be to suffer catastrophic loss in the event of a climate or pest incursion event. For example, Dutch Elm Disease (*Ophiostoma novo-ulmi*) is a fungal disease that causes infected trees to wilt and die. While this disease does not currently exist in Australia, its arrival could spell the end for most of our elm trees. In cities such as Melbourne, this would have a significant impact on the urban forest density. A diverse range of tree species could assist in mitigating this risk.

Of course, one way of managing the threat of potentially devastating diseases is to utilise cultivars that have been bred and tested to have natural resistance to the disease. Australia enjoys a privileged position in that we can draw from international breeding programs where historical disease incursions have occurred. There is now a Dutch Elm Disease resistant option commercially available in Australia.

The most frequently used diversity measure is the 10:20:30 rule. This specifies that no more than 10% of the trees in the urban forest will be of the same species, no more than 20% will be of the same genus and no more than 30% will be of the same family.

The significant diversity challenge for many councils is the dominance of the *Myrtaceae* family, incorporating *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon*, *Tristaniopsis*, *Agonis*, *Callistemon* and more. *Eucalyptus* as a genus also often represents more than 20% of the urban forest. This is in line with the native vegetation in most Australian forested regions.

To broaden the planting palette and address future climate considerations, some councils are aiming to trial “weird and wonderful” species that are not in production. This is creating tension and frustration for both council and suppliers: 1) Councils are disappointed that they cannot readily access plant material; and 2) Production nurseries cannot justify the investment in producing, maintaining and holding stock of such a broad range of plants on the remote chance that they might be required – a commercial reality.

With mounting global attention on climate change and the need for our urban trees to be able to withstand any future climate change, there is also emerging tensions debate as to the appropriate use of indigenous trees. While our native trees are generally considered drought tolerant within a forest setting, a knowledge gap remains for many species on how that tolerance translates to our highly modified urban space. Of course, drought tolerance is only one of many criteria required for urban trees – they also need to exhibit good structural integrity and fulfill size and performance expectations.

The role and need for utilising trees of local provenance is also attracting increased scrutiny. The argument for local provenance says that they are already adapted to local conditions. The projected climate change view would suggest that the current climate is unlikely to exist in the future. Planting from local provenance also limits the genetic diversity and arguably reduces resilience.

A more recently proposed target that is rapidly being adopted is the 3-30-300 rule. This rule, developed by Dutch urban forester Cecil Konijnendijk² in early 2021, focuses on human well-being. It sets the targets that every person should:

- 3** be able to see a minimum of three mature trees from their window
- 30** live in an area with 30% canopy cover
- 300** be able to access green space within 300 metres of their home

Research (Croeser *et al*, 2024³) found that both central Sydney and central Melbourne fall short on achieving these targets.

Refer to Table 1 for summary of results.

Place	No. of Buildings	3	30	300
Central Sydney	8 115	84%	17%	39%
Central Melbourne	37 750	44%	3%	51%

Table 1: Percentage of buildings passing the 3-30-300 assessment

Many councils are now also including some guidelines on preferred species lists within their strategies. These may be overlaid with some classifications of use, such as parks or streetscapes or even the dimensions of the planting space. These are enforced with varying degrees of rigour both within and between councils. Many councils now have both a diversity target encouraging the use of a broad range of species, as well as a preferred species list which actively narrows the palette of recommended trees. In some cases, these conflicting positions are presented within the same document.

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While all these goals and targets are admirable and justifiable, there is often significant disconnect between the vision and the practicality on the ground. Service providers, asset owners, physical constraints, safety considerations and human preferences are amongst the considerations that impact the ability to achieve the desired outcome.

Council's increased focus on trees comes with a corresponding increase in regulation and compliance expectation. Trees are being inspected with more rigour at the point of supply, as well as during establishment. Frustratingly, these inspections are often completed by people with very limited knowledge or experience and with little awareness that trees are living products that change constantly. The current expectation is that the supplying production nursery will bear the additional costs associated with the time spent undertaking inspections, management of any shifting time frames of the planting project and ensuring quality is maintained.



2. SITE SPECIFIC DESIGN AND SPECIFICATION

The design of the public component of our urban forests is the, almost, exclusive domain of landscape architects. The landscape architect is required to balance the vision, needs and desires of their client, with the site infrastructure (whether existing or proposed) and the regulations of service providers (power, water, gas, optic fibre) and other asset owners (roads, rail), while also planning to achieve the goals of the council urban forest strategy UFS and adhere to Precinct Structure Plans as dictated by the Victorian Planning Authority (or equivalent in other states).

Furthermore, often it is a property developer who is employing the landscape architect. While property developers are ultimately wanting to achieve a business goal, they are increasingly recognising the value that trees and landscape add to the communities they are building. Good developers are constantly pushing for ways to extend landscaping beyond the typical to achieve improved outcomes and more liveable communities. The challenge arises when the plans must be endorsed by council who will ultimately be responsible for managing the public spaces and trees. Frequently visionary plans, creative designs and diverse plantings must be scaled back more in line with business-as-usual basics.

It is the landscape architect who is responsible for adding circles, representing trees, to plans that will in time become a component of the urban forest. While this seems logical, the incomprehensible part is that most landscape architects are largely generally untrained in plants and trees (there are of course some notable exceptions to this generalisation). The modern tertiary syllabus for landscape architects typically contains a single optional unit focussed on plants and horticulture.

As a result, this lack of plant knowledge has significant knock-on consequences, including:

- a. Inappropriate tree selection. This can range from simply being the wrong tree for the location from a tolerance perspective, to being the wrong form for the site (eg. broad spreading trees in confined narrow spaces). It is also not uncommon to see plans that specify trees that are not in production and in some cases not even available within Australia.
- b. The same installation size specifications for every tree, coupled with dogged determination that supply should match the specification.
- c. Trend plantings. Often a species seems to become popular with landscape architects, and it is specified in a quantity that is out of sync with the supply chain.
- d. A desire for an easy the easy pathway to council endorsement. Many landscape architects will not propose trees that are not on council approved species list. This results in extremely slow adoption of innovation.

The lack of training in plants and horticulture is compounded when plans are reviewed by council. Often the person assessing the plan has little- to- no field or hands-on experience, so defaults to an approved species list.

Collaboration between the landscape architect, council and a nursery supplier, could significantly streamline this process. Nurseries are extremely well placed and willing to share knowledge on tree performance, site suitability and future availability. Discussions at this stage, could dramatically improve the landscape outcomes and assist in generating more efficient nursery production planning.

3. TREE PRODUCTION

Propagation and growing of trees typically occur independently from the rest of the pathway. The result is means that there is a significant disconnect between production nurseries, development of appropriate species lists and what/how the landscape architects tree specifies a tree/plant.

There is an expectation that nurseries will simply grow and have all specified trees available when required, often with little notice. Despite trees being a living product (that take considerable time to produce) there is the additional expectation that supply size, and quality will be consistent across the year, and in line with the specifications on the landscape plan.

Quality trees take time and expert skill to produce. Most trees that are planted into Australian streetscapes are between three and six years old. This means that tree production commences well before a project or planting site exists. In a bid to try and meet demand, nurseries need to plan their crops and future sales, by making an estimated 'guess' as to what future requirements may be, resulting in over production of some lines and under production of others - an inefficient and largely unsustainable system. This does not include the time it may take to get the propagation method and success rate of the tree up to 'production' levels.

While increasing emphasis on trees should be a positive for nurseries, with increased demand for their products, the reality is somewhat different. A more prominent profile for trees comes with increased regulation and compliance requirements, including:

- a. Domestic biosecurity. There is increasing movement of trees between nurseries nationally as everyone endeavours to meet supply demand. Each state manages their own biosecurity program that changes according to changes in risk profiles between states. Nurseries must manage and maintain accreditation, compliance, undertake prescribed treatments and be on top of regulation changes. As new pests emerge in various parts of Australia this is becoming an increasingly difficult.
- b. Environmental stewardship - a critical, but increasingly demanding component of tree production. Pots, labels, potting media, water, pesticides and fertilisers are all facing increasing scrutiny by third parties with the expectation that nurseries will absorb all costs associated with compliance and accreditation as required.
- c. Classification of weeds is a constantly changing space. Plants that are declared weeds in one region of Australia are desirable and demanded in other regions. Nurseries are required to monitor and comply with these classifications.



Further financial pressures arise with the increasing costs of inputs such as pots, potting media, fertilisers and pesticides. As the areas around traditional nursery locations become more urbanised there is also an increasing challenge in managing losses associated with pests such as rabbits, kangaroos and deer. The cost of logistics and delivering trees is also increasing relative to tree prices.

Refer table below:

Item	Percentage Cost Increase 2015-2025	Source
Wages	40.2% (average)	Nursery Industry Award
Superannuation	26%	Australian Government
Pots	20%	Pot Manufacture (40cm pot)
Potting Mix	29%	Potting Mix Supplier
Fertiliser	41%	Fertiliser Supplier
Insurance	200% (relative to revenue)	Fleming's Nurseries
Work Cover	205% (relative to wages)	Fleming's Nurseries
Gas and Electricity	45%	Fleming's Nurseries
Diesel	52%	Listed prices

Table 2: Percentage increase in costs from 2015 to 2025

An informal survey of advanced tree nurseries quickly highlights that tree prices are not increasing at the same rate as input costs. Since 2015 alone, tree supply prices for the most common planting sizes prices have increased by between 2% and 15%, depending on the tree and the supplier.

Annually the Greenlife Industry Australia commissions a 'state of the industry' report. The most recent report Nursery Industry Statistics 2023/24⁴ shows that the number of wholesale production nurseries nationally has declined by 3.8% since 2017/18. While this seems a small number, coupled with the profitability data, the situation is far more dire. Of the 224 wholesale nurseries with a reported annual turnover of \$2-4M only 70.3% reported being profitable in 2023/24. For the 221 nurseries with a \$4M plus turnover 85.7% reported being profitable. This translates to 20% of Australia's largest nurseries being unprofitable and unsustainable.

Currently, the burden of innovation in tree production rests entirely with the nursery industry, and realistically with limited businesses within the broader industry. This includes the development of new varieties, improved production methods and the associated IP management.

Development of new tree varieties takes considerable time, as they need to be grown to at least a semi-mature size before their form and structural traits can be assessed. Within Australia there are very few breeding programs, so we have historically been heavily reliant on importing new genetics from international breeding programs. In recent years, changing government policy has seen the cost of importation increase by almost 750% essentially eliminating this as an option.

Coinciding with the increase in importation costs, IP Australia has also increased the costs associated with Plant Breeders Rights (by a minimum of 45.5% for a tree) to a level that makes it barely viable, which will in turn discourage breeding of new tree varieties.



4. TREE PROCUREMENT

Tree procurement typically happens occurs relatively late in the process and is generally done achieved through some form of competitive tender – either direct to the client (council or developer), via a plant broker, planting contractor or landscape architect .

Regardless of who is managing the tender there are some consistent features including onerous documentation (details on work force, insurances, previous contract details, references, accreditations and so on) and the emphasis on the bottom-line price. Most nurseries will have similar if not the same details in the documentation. The differences will generally be limited to price, with the lowest tenderer being awarded the contract. This price focused tendering model is forcing discounting or price matching by nurseries which is having a major detrimental impact on the financial sustainability of the nursery industry.

Another by-product of the tendering process is an inflated representation of the demand for individual varieties. When a significant tender is out for supply of a specific variety, multiple contractors and plant brokers will be seeking prices, creating a false demand for the product. A responsive nursery would increase their production of this variety to meet future demand, which may not eventuate.

Once a tender has been awarded and an order for trees placed, the nursery is then required to manage any shifting project timelines. Construction delays are very common, and project timelines can stretch for many months and sometimes years. There is little regard given for the fact that trees are living products and will not remain static during extended delays.

In 2015, Standards Australia released a standard for trees. This was subsequently updated to be AS 2303:2018 Tree stock for landscape use. The intention of this standard was to discourage use of poor-quality trees in the landscape, particularly in commercial projects and public spaces. Most quality nurseries easily complied with the standard. In the years since its release there has been an increasing trend for the requirement of independent arborists to inspect trees in nurseries prior to supply. Typically, this will include tagging of trees and a report being generated that includes details such as height and calliper.

More recently, there has been a tendency for various parties to engage an arborist inspection on the same trees e.g. landscape architect and planting contractor. While all arborists use the same standard, interpretation varies considerably and most have the expectation that the stock in the nursery remains static. Anecdotal evidence suggests each inspection can cost up to \$20 per tree. Multiple inspections add time, effort and management of trees and opinions for nurseries. When the costs of these inspections are factored into the overall procurement cost, the price per tree increases significantly.

Arborists are without doubt the professionals when it comes to mature tree pruning and care. However, they receive minimal training in young tree production, and most have little-to-no firsthand experience. The value that multiple third-party inspections adds to the success of trees in the landscapes needs to be questioned, particularly in the context of the supply cost of the tree.

5. TREE DELIVERY AND PLANTING

With increasing frequency, when trees are delivered to site for planting, they are again subjected to an inspection – either by a council representative and/or a contractor’s arborist. Again, opinions may differ from previous inspections, with changes in the tree attributable to the time since being inspected in the nursery. This often becomes the role of the nursery to negotiate the solution amongst all parties.

Despite best efforts during the planning stages, this is often the point where infrastructure conflicts are found, resulting in plan changes and/or tree deletions.

Delivery is a significant milestone for the nursery as this is the point where an invoice can be generated and some income can be obtained after several years of growing the tree.

Tree planting is often largely a price sensitive process, with contractors under pressure to achieve daily targets, often with relying on staff with limited horticultural skills. On site, the contractor must prepare the planting hole, the root ball of the tree for planting, and add any specified amendments or work around site specifications such as root barriers/services and/or curb. At this stage, there is a vast array of allied products that may be specified – fertilisers, staking systems, watering aids, soil amendments and conditioners, mulches, wetting agents among others.

In a recent example, trees were supplied to site (at a cost of around \$120 each for tree and delivery). The staking and guarding infrastructure that was installed to protect the trees from vandalism was purchased for approximately \$950 per tree. While this may be an extreme example, it demonstrates well the value that is placed on the tree as an asset but also highlights the disproportionately low cost of the tree purchase.

Once the trees are planted, usually they are again inspected by council. This inspection is a further assessment of the tree, but also includes the broader review of the planting, staking and other relevant steps that were specified. In the event of time delays between planting and this inspection, the blame for changes in tree quality are often expected to be addressed by the supplying nursery.



6. TREE ESTABLISHMENT

Successful tree establishment is the critical process of encouraging the trees roots engaging to move into the site soil, enabling the tree to be able to perform on its own, without supplementary irrigation. The general rule of thumb amongst horticulturalists is that takes 1 year for every inch (2.5cm) of calliper to see a tree successfully established a tree. For most urban plantings in Southeastern Australia, the local government requirement is that trees should be established within two years (longer if planted as more mature specimens) from planting.

Critical to the successful establishment of trees is the method of staking, regular and appropriate irrigation. Pests and diseases, vandalism and other physical damage also need to be monitored and managed. During the establishment period that trees are typically routinely inspected by several parties, which could include the council, landscape architect and developer. The contractor responsible for the trees needs to balance the presentation of the tree (fresh mulch, straight stakes, etc) with the critical needs of the tree, particularly water.

Documenting and reporting on the tasks undertaken for every tree during establishment is becoming a more significant requirement. As is the reporting of water usage. The key focus for contractors establishing trees is to avoid having to replace trees. Replacement trees quickly become expensive. Dead or damaged trees need to be removed, replacements procured and planted, followed by a more individualised establishment regime.

Ultimately the establishment process is subject to some form of contractual obligation that can vary from as little as 12 weeks, through to five years for larger trees. At the end of this establishment period, trees are typically handed to council for ongoing management.

Despite the rigorous inspection and approval process, often if trees fail to establish there is blame apportioned to the supplying nursery, and an associated expectation that replacement trees will be provided at low or now cost.



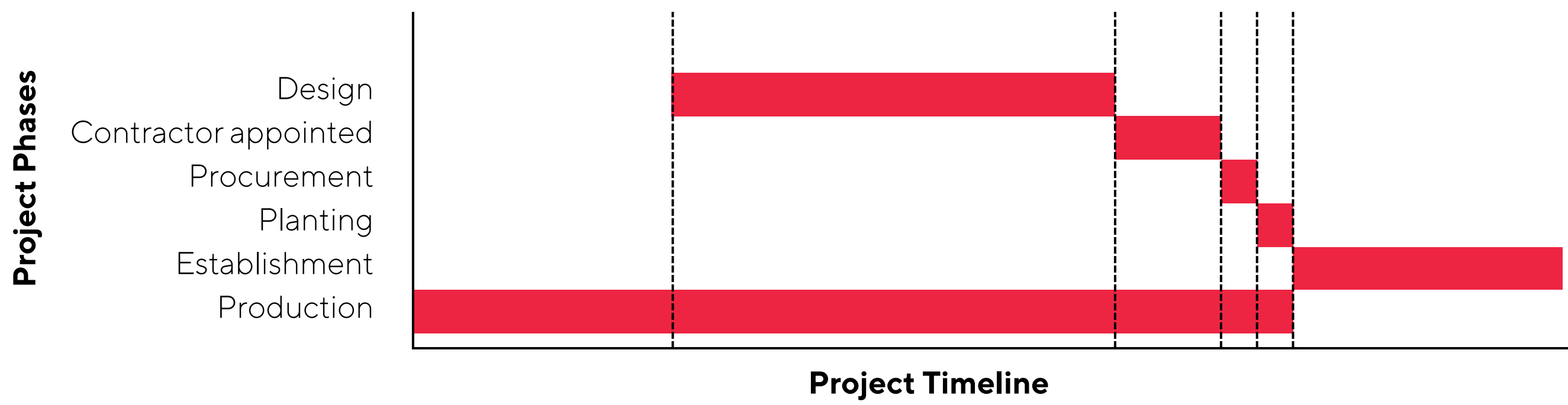


Table 3: Project timelines showing relative timing of stages

Stage	Who is Responsible	Formal Tree Education	On-job Training
Urban forest strategy	Council (with public consultation)	No	Some
Design and specification	Landscape architect (with council and client approval)	No	Some
Production	Nursery	Yes	Yes
Procurement	Landscape architect and/or contractor	No	Some
Planting	Contractor	Some	Yes
Establishment	Contractor (council and client inspection)	No	Yes
Maintenance	Arborist	Yes	Yes

Table 4: Typical training at each stage of the process

*Training on mature trees not young trees





WHERE TO FROM HERE?

Firstly, it should be noted that the nursery industry has been advocating the importance of trees for several decades and welcomes the increased focus being placed on trees.

Specifically, tree growers want to continue supplying quality trees for our public spaces. However, without a significant shift in pricing, review of the supply pathways and better education and recognition of the vital role that nurseries play Australia's urban forest, it is almost inevitable that we will soon be faced with a critical shortage of trees.

To combat the current challenges, imagine if:

All disciplines had mutual respect for the skills of others, were able to concentrate on their individual strengths and worked collaboratively.

Education systems were reviewed to allow landscape architects to be trained in horticulture.

Tree supply was considered and coordinated early in project planning.

Arborists were freed from writing reports on nursery trees and allowed to concentrate on caring for our mature trees.

Nursery supplied trees were valued as an asset and priced accordingly.

Our urban forests would be the beneficiary of these relatively minor changes, ultimately making our urban areas better places to live.

If you are interested in visiting Fleming's to discuss this discussion paper or for more information please contact Leanne Gillies or Daniel Jansen.

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