

# Part B

# Tree Species Selection

## 1. How We Have Selected Our Street Trees

Trees selected for our streets may occupy their planting sites for 50 to 150 years, so tree selection is vitally important.

Most of our area's streets are already planted with established trees. If these trees are performing well, are in scale with the street and surroundings, and provide a consistent and distinctive streetscape character, then generally this Street Tree Master Plan will follow the existing pattern.

We endeavour, however, to adhere to the principle of the 'right tree for the right location'. Therefore, some exceptions to this general policy of continuation of the existing pattern will occur in the case of particular species that have either performed poorly, are not in scale with the street, or have proven themselves to be particularly damaging to pavements, kerbs, gutters or underground services.

This provides the opportunity to introduce additional tree species to our area and trial new tree cultivars that show promise as an urban street tree.

## 2. The Right Tree For The Right Location

One of our key tree selection objectives is to ensure the selection of the 'right tree for the right location'. In other words, to ensure that the selection of the species is appropriate to the local environmental conditions and the constraints of the planting location. The selection of species aims to ensure that the tree makes a positive contribution to environmental, amenity, aesthetic and heritage values of the area and any negative aspects are minimized.

There is no perfect street tree, so every selection has some compromise between positive and negative values.

The Street Tree Master Plan tree selection criteria is divided into three main categories :-

- Environmental tolerances;
- Functional requirements and;
- Aesthetic and design requirements.

Consideration of the criteria outlined in this section should ensure the selection of the species with the most desirable and appropriate characteristics, no matter what their origin or type.

In order to ensure the health and longevity of street trees, aesthetic and design considerations will be accommodated only where optimum conditions for plant growth are available.

The **proven performance** of the species in particular environmental conditions and functional requirements will be the prime considerations for street tree selection.

# Part B - Tree Species Selection

## 3. Environmental Selection Criteria

The capacity of trees to establish and grow successfully depends heavily on the environmental conditions at the planting location being within the tolerance range of the species selected.

We must remember trees, unlike other street infrastructure are living organisms. They need to grow to survive and their behaviour is not always predictable or consistent. Being a living thing they:-

- Will typically all need to shed leaves, bark, fruit, flowers;
- Need to, and will, respond to the natural prevailing conditions;
- Can be easily damaged and vandalised (particularly when young);
- Can be severely affected by pests and diseases that can kill or increase the stress on the trees.

Some of the environmental factors that affect tree selection are:-

### Climate

In general the climate experienced in our area is part of the subtropical east coast. We experience a warm, wet Summer and Autumn and a cool, drier Winter and Spring. The predominant wind in summer is north easterly and in winter is southerly with regular strong westerly winds during late winter & spring. Mean daily maximum temperatures (25°C) occur between December and March with mean daily minimum (<10°C) between June and August. Street trees selected will need to be able to tolerate our temperate and climatic conditions.

More importantly however is the consideration of micro climate for particular locations. In the CBD particularly, overshadowing caused by tall buildings, wind tunnel effects and reflected heat result in the need for tree species that are particularly hardy and resilient to these adverse conditions.

### Geology and soils

The underlying geology and soil provides nutrients and water as well as physical support for the tree. Soils differ in the conditions they provide in terms of quantities of nutrients, drainage characteristics and depth.

In our City the western area that includes Chippendale, St Peters, Erskineville, Newtown and parts of Glebe are situated on Wianamatta shales which produce heavy clay soils of moderate fertility and higher water holding capacity.

In Pyrmont and Ultimo and on the eastern side of the City in areas such as Woolloomooloo, Darlinghurst and Surry Hills the underlying geology is Hawkesbury Sandstone which typically produce sandy, shallow and low nutrient soils.

The southern area from Moore Park to Rosebery is covered in ancient dune sands blown inland from the coast. These soils consist of infertile, but typically deep and well drained sandy profiles.

Many areas are also extremely disturbed and have the original soil stripped and replaced by building debris and landfill materials including garbage. This is particularly common around the harbour foreshores and the industrial areas.



*Figure 17 - City high rise buildings and fully paved environments can present very difficult conditions for street trees. (Photo. Arterra)*



## Part B - Tree Species Selection

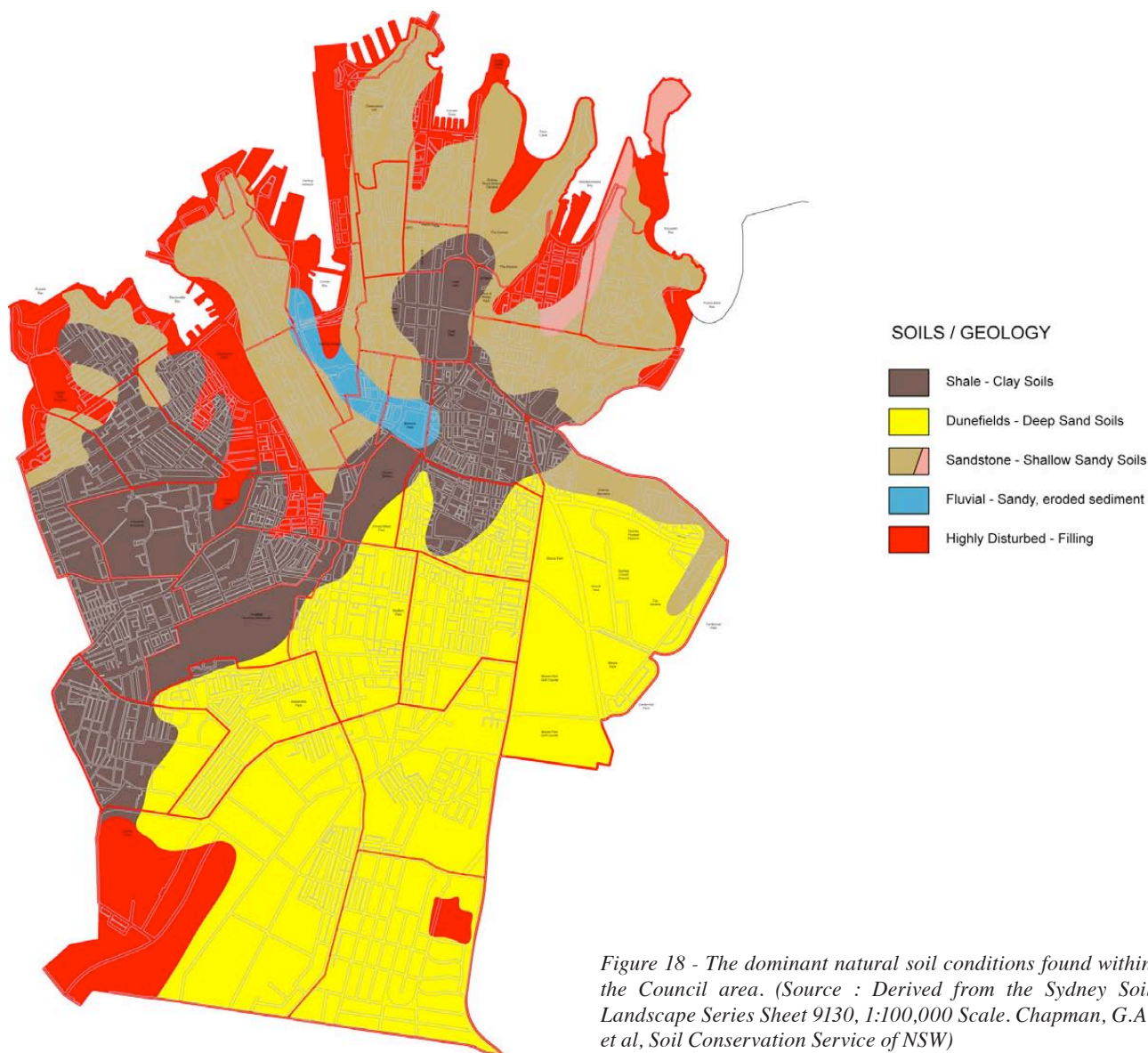


Figure 19 - Soils in urban and suburban environments are usually far from natural. Conditions are usually highly altered, topsoils may be missing, surfaces paved, service backfilling, lack of drainage, and altered chemistry all affecting the optimum growing conditions for trees. (Photo. Arterra)



# Part B - Tree Species Selection

## Topography

The topography is mostly gently undulating. Topographic features include significant ridgelines along Oxford Street, George Street, City Road / King Street, Harris Street, Glebe Point Road and Darlinghurst Road. Woolloomooloo is situated in a natural amphitheatre basin defined on the eastern and western sides by the elevated escarpments of Potts Point and the Domain Parklands.

At a local level, topography affects street tree establishment with steeper slopes being better drained than gentler ones, and slopes facing north and west receiving more sunlight and thus drying out faster than those facing south or east. Deeper soils also typically accumulate downslope, with upslope areas and ridge lines often having very thin soils.

## Tolerance in paved areas

The selected trees need to tolerate planting in hard paving areas and must have the ability to tolerate lower than optimum soil oxygen levels and often compacted and highly modified soil conditions.

## Drought tolerance and climate change

It is expected that the water use restrictions and lower than average rainfall Sydney has recently experienced will continue

into the long term. Street trees therefore need to be capable of surviving an average drought period in reasonable condition without irrigation or reliance on town water supplies. Passive irrigation through the use of Water Sensitive Urban Design may assist with additional water being available to trees but many existing streets are not able to be retrofitted without major infrastructure changes.

## Tolerance of pests and diseases

The selected tree species should be resistant to pests and disease. A diversity of species is also important in reducing the potential impact of any devastating diseases on specific tree species.

## Tolerance of atmospheric pollution

The CBD environment and areas traversed by busy arterial roads are subject to high levels of photochemical pollution produced by vehicle exhaust systems. Trees selected for these areas need to be able to tolerate vehicle emissions.

Deciduous trees are generally considerably more tolerant than evergreen species due to the duration over which different species retain their leaves. The longer the life of a leaf the greater the likelihood that the threshold levels for pollutant damage will be exceeded.

## Native Wildlife habitat

Trees provide shelter, food and other habitat resources for a range of fauna species.

Wherever possible, consideration will be given to planting trees which expand on and/or provide a connection between open spaces or other vegetated areas, particularly those identified as priority habitat areas in the City's Urban Ecology Strategic Action Plan, to increase the area of available habitat and assist in the movement of native fauna species between those areas. Although native trees are preferable in this regard, exotic species also have some habitat value. A mix of species will be used where appropriate.

## Balance between native and exotic street tree selection

There is much debate about the use of locally indigenous species, that is, species that originally grew within the area. Whilst locally indigenous species may be the most appropriate for local environmental conditions, the growing conditions within the urban environment are often now very different, particularly in a street situation. Disturbed soil profiles, compaction, higher nutrient status, altered drainage patterns and paved surfaces are just a few of the problems with which urban trees must contend.



*Figure 20 - Combinations of exotic and native trees can provide interest and variety to the streetscape and habitat for our native wildlife. (Photo. Arterra)*



# Part B - Tree Species Selection

When addressing this issue, a more useful division may be to view this point three ways :-

- Locally indigenous natives;
- Natives from other parts of Australia;
- Exotics.

Local natives have the advantage of being climatically suited and live in some degree of equilibrium with pest organisms such as insects and fungi. Use of local natives promotes biodiversity and creation of wildlife corridors, reinforces an 'Australian' sense of place, and can be very drought resistant.

Natives from other regions are less likely to be climatically adapted and they may enjoy freedom from local pest organisms but if they become infested are likely to succumb faster. Exotics may be almost completely free of native pests and diseases but run the risk of being devastated if others are accidentally introduced.

Regarding local, or at least NSW east coast native species, and their suitability as inner urban street trees, the species best adapted are usually from drier rainforest and rainforest margins, particularly littoral rainforests where most trees are long lived, shade tolerant or from freshwater swamps and other

areas that are poorly drained and aerated. Species from these environments are highly resistant to root rot organisms and their root systems are well adapted to adverse soil conditions.

Many of the familiar natives such as Eucalypt trees are from the more open and drier vegetation communities. These species seem to perform poorly as street trees in inner urban areas due to more specialised physiology. They are often adapted to soils of very low nutrient status but with perfect drainage where rot organisms are at a disadvantage. Consequently these species are less tolerant to interference with the root system, including compaction, waterlogging and damage. Depending on the design principles sought, natives can also display a variable habit or form which makes it difficult to establish and maintain a planted avenue.

Also they are highly adapted to fire and a consequence is that they often 'bolt' in growth for brief periods when post-fire soil nutrients are temporarily higher. As this bolting of growth continues in a high nutrient, fire free environment the tree may become structurally weak and the foliage and bark becomes susceptible to attack by insects and other pests.



*Figure 21- Where space and conditions allow, Eucalypts can provide useful street trees but they are not suitable for many locations. (Photo. Arterra)*

# Part B - Tree Species Selection

An important advantage of exotics in the inner urban context is that they include all the useful deciduous trees which provide greater sun access to the streets through the winter months. Some natives are deciduous but generally in spring or early summer (an inheritance of their monsoonal origins). The red and white cedars (*Toona ciliata*, *Melia azedarach*) are the closest native trees we have to winter deciduous but both suffer from severe pest problems under urban conditions and are unreliable performers.

Many exotic deciduous species have the advantage of hundreds of years of selective breeding which ensures quality stock. They are pollution tolerant, are more resilient to cope with interference with roots or damage during construction works. The canopy shape and architecture of many exotics are able to tolerate the pruning and shaping required for urban infrastructure.

In summary both natives and exotics have their strengths and weaknesses for use as street trees. The Street Tree Master Plan will aim to plant the right tree for the right location, for the right reason and strike an appropriate balance.



Figure 22- Great streets are often defined by equally great trees.  
(Photo. Arterra)

## 4. Functional Criteria

Species selected for street tree planting also need to fulfil certain functional criteria to ensure successful establishment and reduced ongoing maintenance and management issues.

### Proven performance record

Proven performance of the species under the environmental conditions of the locality is vitally important. Trees are a long term investment and substantial amounts of money are often invested in their purchase, planting and maintenance. New species should be trialled on a smaller scale before implementing their widespread use.

### Readily available and transplantable at advanced sizes

The selected plant species must be able to be commercially grown and available in a suitable size for street planting. Generally the tree nursery stock used will be super advanced stock to provide high initial impact and adequate resistance to casual or intentional vandalism.

### Acceptable leaf and fruit fall characteristics

The selected species must have an acceptable level of nuisance created by the shedding of leaves and fruit for a street environment. Those with large or heavy seed pods, excessive leaf drop, or fleshy fruit or flowers which may lead to slip hazards will typically be avoided.

### Low risk of becoming an environmental weed

Some species are known to be, or have the potential to be serious environmental weeds due to their ability to self propagate and invade bushland areas.

### Not prone to major limb shear

Limb loss occurs on an occasional basis for most trees due to wind induced mechanical breakage. Trees that are renowned for having brittle branches and regular branch drop will be avoided for use as street trees.

### Long lived

Many of the costs associated with the management of trees in the urban environment are associated with the early establishment and then the overmaturity phase. Using long lived species that require replacement as infrequently as possible will help minimise tree management costs.



# Part B - Tree Species Selection

## Capacity to lift pavements and kerbing

Although no guarantees can be given that any particular street tree species will not interact with kerbs and pavements, species that are renowned for vigorous root systems causing pavement uplift will be avoided. The City will also investigate the use of alternative footpath materials and design to minimise tree root and bitumen interaction.

## Low maintenance

All trees selected will require minimal maintenance subsequent to establishment.



*Figure 23 - Pitt Street Mall - Tree selection needs to consider many competing interests and factors such as supply, tree form, ultimate size, deciduous or evergreen (Photo. Arterra)*

## 5. Aesthetic / Design Criteria

Our City is a constructed cultural and urban landscape consisting of streets, buildings and parks. Trees play an important role in enriching the cultural experience of a place and so the aesthetic characteristics of the trees need to be an important selection consideration.

### Relationship with distinctive landscape characters

The selection of species may be made to reinforce historical, cultural or natural associations from our past, particularly Victorian era landscape planting.



*Figure 24- Victorian era planting in Redfern Park provides strong historic and cultural associations and contribute significantly to the street character (Photo. Arterra)*

### Ultimate size tree canopies

Very large trees in confined spaces often result in unacceptably high management costs. Conversely small growing trees in broad streets rarely contribute significantly to visual quality or canopy coverage.

Trees selected will be in scale with the streetscape and if allowed, we will utilise the largest growing species possible for the area.

Species should still be selected such that the ultimate mature size of the tree is in scale with the street giving consideration of the site constraints, such as nature strip widths, overhead powerlines, building alignments and vehicle clearances. The optimum range is not so small that it does not make a significant contribution to the amenity of the street, and not so large as to dominate and cause significant problems. In some instances the constraints imposed by the street environment will limit the optimum size of street trees or even restrict tree planting altogether. This is the case with the majority of narrow laneways and footpaths throughout the area.

# Part B - Tree Species Selection

## Historic / cultural associations

The selection of species may have natural, historical or cultural associations within the particular street or locality. New plantings should consider the historical context of the locality.

## Form of tree canopies

Selected species should have an appropriate and predictable form, usually with an upright trunk and stable branch structure. Street trees need to have a form that allows traffic and pedestrian movements around and under the tree. In the CBD desirable tree forms include trees with a single straight main trunk supporting a domed crown, or columnar form.

## Deciduous versus evergreen

The street tree list includes both evergreen and deciduous trees. Evergreen species provide year round screening, greenery and shelter from winds. Deciduous trees provide stimulating seasonal events whilst maximising winter light.

In residential areas deciduous trees are useful to maximise summer shading and winter light particularly for buildings located on the southern side of a street.

## Eora Journey

The City of Sydney recognises the importance of acknowledging the first people of this land. As the City develops the Eora Journey project, proposed in the Sustainable Sydney 2030 Strategy, the planting of indigenous trees and plants within the public domain will be considered for the nominated sites.



*Figure 25- Pruning to facilitate overhead services can substantially impact on the form and long term health of a tree (Photo Arterra)*

## 6. Other Factors Impacting on Street Tree Selection and Establishment

### Overhead Power Lines

Most significant of all the factors that limit the benefits trees can contribute to a streetscape is the conflict between overhead power cables and tree canopies.

A solution to this problem could be to select smaller tree species. This could be viable for narrow streets, however with wide streets these small trees are inevitably out of scale with the streetscape and present a poor environmental, social and aesthetic outcome.

The City has been co-ordinating with Ausgrid in the roll out of Aerial Bundled Conductors (ABC). These consist of a number of insulated wires bundled into a single cable which eliminates the need for the wide stringing assemblies that are the greatest problem from a street tree perspective. ABC allows for reduced line clearance codes to be employed resulting in less impact on established tree canopies.

The City will review existing tree performance and the nominated species within this plan, following ABC installation, in order to maximise the benefits received from ABC.

Underground power cables are also an option particularly for new urban developments such as at Green Square. In established areas, costs at this stage could be prohibitive, however this high cost may in fact be a practical option when compared with the projected cost of repeated pruning, the risk that this work involves to operators, the negative impact on trees and loss of public amenity.

### Underground services and structures

High pressure gas mains and electricity easements sometimes prohibit establishment of trees due to the depth of the service and potential liabilities if the service is damaged. Similarly underground structures, wall footings and the like may also limit the ability of a tree to be planted and successfully grow. Each planting site will be assessed on its merits to determine the feasibility of establishing trees in relation to underground services and structures.

### Narrow footpaths

An essential factor in species selection is the width of the footway or verge proposed for street tree planting. Trees planted in footways less than 1300mm wide (from building line to the back of the kerb) force pedestrians, particularly those with strollers, to walk on the road. As it is far safer to encourage pedestrians to stay on the footway, trees will not be planted in footways less than 1300mm in width.



# Part B - Tree Species Selection

In streets with footpaths less than 1300mm, that already support tree planting, in-road or shared zone options will be explored for new trees

Where site constraints limit the optimum size of street plantings, consideration may be given to mechanisms which minimise or remove the impact of these constraints. These could include for example, replacing overhead powerlines with Aerial Bundle Conductors, planting trees within the median or road carriageway (where footpaths are narrow and streets are sufficiently wide) and increasing the root zone soil volume by use of structural soils or similar technologies.



Figure 26- Aerial Bundled Cable can reduce the need for pruning allowing healthy trees with typical forms to be maintained. (Photo Arterra)



Figure 27- Shallow soils or too larger trees can lead to pavement damage and the associated risks. (Photo Arterra)

## 7. No Street Tree is Perfect

There is no such thing as the street tree that will fulfil perfectly all aspects of our selection criteria. Trees are living entities that can present a variety of forms and habit even within the one species type and within the one street.

It must be remembered that we are planting trees in an artificial, constructed environment that is far removed from their natural habitat. In this situation there are bound to be some negative aspects associated with trees in an urban environment, however it is generally considered that the benefits trees contribute to our environment far outweigh many of the more negative aspects.

Frequent negatives raised about street trees include the following.

### Allergies

Concern is sometimes raised that particular tree species cause allergies/irritation and respiratory problems. It is important to note there is a difference between an allergic reaction to an irritation.

All flowering plants including grasses produce pollen. Generally species that rely on wind pollination create a greater pollen load to ensure continuation of the species. Pollen in the air can contribute to hayfever, eye allergies and other respiratory problems.

Grass species are by far the most prevalent pollen producers and have a long pollen season. Grasses rely on wind to disperse their microscopic pollens, which are produced in vast quantities. In Sydney the grass pollen season goes from September into January or February depending on the weather.

Plane Trees are often cited as the main culprit for causing allergies or irritations however it is difficult to isolate its contribution to urban pollen levels when there are many different species including grasses producing pollen at the same time.

Although Plane trees are pollen producers, these species have a limited season of pollen production of a few weeks only in Spring compared with longer season for grass species. The young leaves of Plane Trees do have fine pointed hairs which are gradually lost as the leaves mature. Similarly the round fruits tend to drop and shatter in autumn. The seeds have some hairs associated with them which may cause allergic reactions with some people although there is no mention of this being a problem in the texts reviewed on this issue.

# Part B - Tree Species Selection

As noted above there is no such thing as the perfect street tree. On balance the structural and other characteristics of the Plane tree, its tolerance to difficult conditions and the benefits it provides as a large street tree far out-weigh the negative attributes.

Strategies that council can undertake to manage the pollen and fruit drops from Plane trees will be to increase the frequency of street cleaning at the appropriate times of the year.

Many people can reduce eye allergy symptoms associated with air pollen by wearing wrap around sun glasses and a hat which can exclude the majority of pollen grains actually landing in the conjunctival sac.

## Leaf and fruit droppings

All trees, including evergreens, drop leaves. Strategies to reduce the impact of leaf litter in our streets will be the coordination of our street sweeping resources to target problem areas.

Species with fleshy fruits or leaves that become slippery on decomposition will be avoided for selection.

## Damage to pavements

Many old established trees in our area can cause footpath uplift and cracking. These trees generally are the vigorous and large growing species.

In adhering to the principle of the 'right tree for the right location' future tree selection will be mindful of the potential of various tree species to cause pavement damage.

Also an important consideration is the site preparation and establishment techniques used for tree planting. The use of nature strips, median planting, and in-road blisters where possible, maximising the size of the planting 'cut outs' in pavements and the use of flexible pavements will help minimise future instances of pavement damage and associated risk management issues.



Figure 28- Precinct based planting such as the palms of Phillip Street in the CBD. (Photo Arterra)

## 8. Streetscape Design Principles

As a collective, street trees are considered and planted to reinforce public realm and landscape design principles, in particular to:-

- Provide consistency and visual uniformity for each street;
- Enhance the local character of distinct streets or areas by introducing a precinct planting approach;
- Reinforce and celebrate the gateways and key nodal intersections;
- Reinforce major boulevards and avenues;
- Reinforce the harbour edge;
- Enhance key cultural and commercial sites;
- Permit solar access and;
- Allow the adjoining landscape to take precedence over street tree planting where existing parks adjoin the street.

In adhering to these design principles consideration must be given to site specific conditions that will determine individual tree placements. These include footpath widths, sight line clearances, underground utilities, overhead wires etc. These are fully outlined in Part D - Technical Guidelines.

### Consistency and visual uniformity for each street

The intention of this principle is to establish a uniform visual character for each street, a sense of identity or 'sense of place' that compliments architectural forms and provides streets with a distinctive and recognisable character. Inconsistent street plantings with a multiplicity of different species can add interest to some streetscapes, but they are also more difficult to manage, they may be inappropriate to the location, or may have a negative impact on the amenity of the street.

In most cases the proposed species is an extension of the dominant existing species if that species has been deemed to be suitable in scale and growth habit.

### Precinct based approach

Related to the principle of a consistent and coordinated theme for individual streets is the concept of 'precinct' planting. All new planting will be based on a precinct approach where tree species selection and planting will reinforce the distinct physical character of each area and be responsive to its unique environmental conditions.

The precincts defined in our area are demarcated by physical boundaries such as landform, streets and built context.



# Part B - Tree Species Selection

The precincts are: -

1. King Street Wharf and Walsh Bay
2. The Rocks and Millers Point
3. Northern Financial and Alfred Street
4. Western Commercial
5. Retail Centre and Martin Place
6. Town Hall and Mid City
7. Haymarket
8. Southern CBD
9. Surry Hills North
10. Surry Hills South
11. Redfern West
12. Redfern East
13. Chippendale
14. Ultimo
15. Pyrmont
16. Darlington
17. Camperdown and Forest Lodge
18. Glebe West
19. Glebe East
20. Glebe Point
21. Darlinghurst
22. Elizabeth Bay
23. Woolloomooloo
24. Moore Park and Paddington
25. Rosebery
26. Green Square
27. Newtown
28. Erskineville
29. Alexandria
30. Southern Industrial

Section C of this Master Plan addresses each precinct in detail.

## Reinforce and celebrate gateways to CBD

The City's linear CBD gateways consist of Oxford Street, William Street and Broadway. These gateways have already or will be acknowledged and celebrated by public domain improvements such as footway widening, which together with new mature tree plantings, will create great tree lined avenues that highlight their importance.

## Reinforce major boulevards and avenues

The State and Regional roads in our area include some of the major roads in Sydney. Connections from north, south, east and west to the CBD as well as most traffic to the airport pass through our area on major roads such as Anzac Parade, George Street, Broadway, William Street, South Dowling Street, Harris Street, Botany Road, Abercrombie Street, Regent Street and Cleveland Street.

These major roads form corridors of movement through our area and are considered as separate in character to the precincts and suburbs they divide or bound. These streets will be strengthened with consistent and unified tree planting schemes.

## Reinforce the harbour edge

A key feature of our City is the extent of harbour foreshore edge that extends from Rushcutters Bay through to Glebe Harbour.

One principle is to establish, where appropriate, fig and palm trees and other indigenous trees such as the Sydney Red Gum (*Angophora costata*) along the harbour foreshore to provide a strong edge definition and sense of place. Palm trees will be used in clusters or avenues to identify key nodes or axes.



Figure 29- William Street; one of the gateways and grand boulevards created for the city with consistent Plane Tree planting. (Photo Arterra)



Figure 30- Anzac Parade; one of the grand Fig Avenues leading to the city. These suitably large trees are planted in the adjoining open spaces but form the streetscape. Additional tree planting within the street verges would simply detract from these grand statements and will typically be avoided. (Photo Arterra)

# Part B - Tree Species Selection

## Enhance key cultural and commercial areas

The City has numerous key commercial strips and cultural areas such as Glebe Point Road, King Street Newtown, Crown Street Darlinghurst, Redfern Street Redfern, and special commercial areas in the CBD such as the Spanish Quarter, Chinatown and the upmarket retail nodes along Castlereagh Street.

These commercial strips will be enhanced and distinguished through special tree planting.

## Permit solar access

Species should be selected, where appropriate, that will provide an appropriate level of solar access to dwellings on the southern side of the carriage way during winter. In meeting this objective, consideration is given to other principles in regards to species diversity and the existing street character.

## Allow the borrowed landscape to take precedence around existing parks

Many of the City's parks, such as Hyde Park, Redfern Park, Prince Alfred Park and Victoria Park have remnant Victorian boundary tree canopies that extend over the street. Street tree planting along these streets is discouraged in order to minimise canopy conflicts. This also allows major trees along the park edges to 'read' from the street.

## Heritage associations

Many areas in the City area such as Glebe, Surry Hills and Chippendale contain intact period architecture particularly from the Victorian era. If appropriate, street tree planting will be sympathetic to the heritage values of the built environment to further strengthen the sense of place for these areas.

## 9. In-road Planting Opportunities

Many streets throughout our area were constructed in a time when road reserves were automatically created very wide. As a result the road carriageway is now a great deal wider than is typically needed for local vehicle use or considered desirable.

An opportunity therefore exists in many of our streets to implement new in-road style planting to:-

- Increase the numbers of trees in our urban environment;
- Increase the canopy coverage of the city;
- Provide improved habitat opportunities and;
- Allow bigger trees to be planted than would otherwise be considered.

Given that most underground and overhead services run in the existing footways and verges, providing new planting blisters, mid-road islands or median strips within the road carriage way



Figure 31 - Prominent Fig planting often defines the harbour foreshores and extends into surrounding park and reserves. (Photo Arterra)



Figure 32- The locally indigenous Smooth-barked Apple (*Angophora costata*) is proposed to supplement the harbour side Fig planting and provide biodiversity and habitat values (Photo Arterra)



Figure 33- Historically significant planting such as the Figs in Georgina St Newtown will be retained where appropriate space is available. (Photo Arterra)



# Part B - Tree Species Selection

can provide better opportunities for improved tree growth.

This Master Plan has identified numerous potential in-road planting sites. A full listing of potential sites is included in Appendix E.

The exact details of these planting opportunities will be dictated by more detailed design and analysis that will include drainage, soil depth and volume, services, parking and traffic analysis and budget prioritisation. They have been listed, however, and the proposed species that would be planted if they occur detailed in the precinct plans.

In many streets either blister style planting along the edges of the carriage ways or median strip planting may both be possible options. The decision of which style treatment is to be used will be subject to individual street assessments and consultation with the immediate local community.

The proposed species to be planted in-road shall be as per the precinct maps contained in Part C unless special circumstances or design constraints dictate otherwise.



*Figure 34- An artists impression of potential median planting in Windmill St, Millers Point (Source: Arterra Design)*



*Figure 35- An artists impression of potential median planting in City Road, Darlington (Source: Arterra Design)*



*Figure 36- An artists impression of potential median planting in Garden Street, Eveleigh (Source: Arterra Design)*



*Figure 37- An artists impression of potential blister style planting in Boundary Street, Darlington (Source: Arterra Design)*



## Part B - Tree Species Selection



Figure 38- An artists impression of potential median planting in Bridge Street in the CBD (Source: Arterra Design)



Figure 39- An artists impression of potential median planting in Elizabeth Street in the CBD (Source: Arterra Design)



## Part B - Tree Species Selection



*Figure 40- An artists impression of potential intersection blister planting in Tweedmouth Ave, Rosebery with Smooth-barked Apple that will give shade and create a unique identity for the suburb. (Source: Arterra Design)*



*Figure 41- An artists impression of potential blister style planting in Ripon Way, Rosebery (Source: Arterra Design)*



# Part B - Tree Species Selection

## 10. Mixed Species Street Planting

Some streets have been designed to have a mixture of species. This may be in the form of one side of the street being a smaller species to fit under overhead wires and a larger species on the other side where absence of services and verge space permit.

Some streets are also shown as an alternating mix of species. These are usually designed to cater for the continuation of pre-existing street conditions and importantly to balance the provision of native and exotic trees and deciduous and evergreen trees.

Attempts will be made to alternate the two (or more) species to provide for the designed intention of the mixed street.

The selection of which of the species to plant and the exact location within the street shall be at the sole discretion of the City of Sydney. Individual requests by adjoining residents for one or other of the species will typically not be accommodated. The number of alternating species streets has been limited as management of single or double avenues is far more efficient for the City. Issues such as tree supply, tree planting, tree maintenance and street cleaning frequency are all more difficult with mixed species streets.

## 11. Urban Renewal Areas

The Draft Sydney DCP 2010 identifies the location of new streets and lanes throughout the Local Government Area. New streets are identified in the urban renewal areas, including Green Square, Rosebery, Harold Park, Ashmore Estate and the Southern Industrial Area.



*Figure 42- Cadigal St, Pyrmont - Some select streets can accommodate both higher level native trees such as Spotted Gum and under planting of feature trees such as Jacarandas (Photo Arterra)*

These Urban Renewal Areas have been shown in the relevant precincts within this plan. The species will be determined following further information of the renewal which may impact species selection, such as building heights / configuration, soil conditions, underground constraints etc. Their selection will be based upon the palette of trees nominated within the relevant precinct area, or those immediately surrounding.



*Figure 43- Forbes Street, Darlinghurst illustrating a good use of mixed avenue planting - offering good visual interest and a pleasing mix of native and evergreen trees and exotic and deciduous trees. (Photo Arterra)*



# Part B - Tree Species Selection

## 12. Future Pest and Disease Impacts

At the time of drafting this 2011 Master Plan, several major pest and disease threats hang over the City's tree population. These are typically introduced pests and diseases that can potentially have devastating impacts on certain species of trees.

Specifically this includes pests such as:-

- Sycamore Lace Bug
- Myrtle Rust
- Fusarium Wilt

Overseas precedents show that widespread infestations of harmful pests and diseases can have devastating consequences on parts of our urban tree populations.

### Sycamore Lace Bug

Sycamore Lace Bug (*Corythucha ciliata*) is an insect pest introduced from North America that mostly affects Plane Trees. It was most probably introduced to NSW in 2006 and prefers to feed on Plane Trees (*Platanus acerifolia*). The tiny adults and nymphs feed on the underside of the leaves, causing bronzing, chlorosis and premature leaf drop. Severe infestations can cause complete defoliation. Several consecutive years of infestation may kill affected trees. Control is difficult and expensive.

It is now widespread in the Sydney basin and evidence suggests it is spreading along major transport routes. Establishment of young trees in affected areas is proving to be particularly difficult.

The ultimate affect of this pest on Sydney's Plane Tree population is still unknown but attempts have been made in this 2011 Master Plan to reduce the reliance on Plane Trees and continue to investigate the efficiency of treatments such as insecticide injections to affected trees.



Figure 44- Sycamore Lace Bug - Adult Stage  
(Source : [www.flickr.com/photos/xx\\_chaton\\_xx/5139448467/sizes/l/in/photostream/](http://www.flickr.com/photos/xx_chaton_xx/5139448467/sizes/l/in/photostream/) - accessed 5/3/11)



Figure 45- Sycamore Lace Bug damage to London Plane Tree illustrating the premature death of some leaves, the attempt by the tree at secondary foliage growth late in the season and the subsequent chlorosis occurring also to those new leaves as a result of the pest. (Photo Arterra)



Figure 46- Tree injections with insecticide is costly and time consuming but trials currently underway by the City may prove useful in limited areas to help control the impact of the pest. (Photo Arterra)

# Part B - Tree Species Selection

## Myrtle Rust

Myrtle Rust (*Uredo rangellii*) is a particularly serious fungal disease native to South America. It was first detected in Australia on the Central Coast of NSW in April 2010. This fungus can affect plants belonging to the family Myrtaceae which includes many of the very common native species such as Eucalypts, Paperbarks, Myrtles, Lilly Pillies, Bottlebrush and Water Gums. These trees represent a very large proportion of the City's street trees and native vegetation communities.

It is very easily spread and the NSW Department of Agriculture, Fisheries and Forestry have now advised that they do not believe it can be effectively contained or eradicated. It has recently been listed as a Key Threatening Process under the NSW Threatened Species Act 1995.

When severely infected, young plants and new growth may become stunted and in worst case the plant may die. Little is currently known about the disease and its impacts to plants under Australian conditions.

Treatment using various fungicides may be possible, but this will usually prove unviable on large trees in public areas. Control will really only apply to small plants and controlled nursery environments and the like.

The ultimate affect of this disease is currently unknown.

## Possible Consequences to the 2011 Master Plan

If either of the above pests or diseases, or other such outbreaks, prove to substantially alter the viability of any of the existing or proposed street tree species, then the Council shall reserve the right to alter the species shown for planting on any given street to a species that is either immune or less susceptible to the pest or disease.

All attempts shall be made to match the species with that of a similar form, size and habit.

## 13. Street Tree Species Listing

The following schedules list the proposed species to be used as street trees with the City of Sydney. The listing is divided into native tree species and exotic tree species and also lists deciduous trees separately to evergreen species in each of those categories. There are a total of 70 species proposed, 39 (or 55%) are native species and 31 (or 45%) are exotic species. There are a variety of small, medium and larger trees to suit individual street planting requirements.



Figure 47 - Illustration of the purple discolouration and distortion of the leaves and the prominent yellow fruiting spores of the Myrtle Rust.

(Source : [www.flickr.com/photos/48395196@N05/5402288905/sizes/o/in/photostream/](http://www.flickr.com/photos/48395196@N05/5402288905/sizes/o/in/photostream/) - accessed 5/3/11)



# Part B - Tree Species Selection

EXOTIC TREE SPECIES		
EVERGREEN TREES		
Botanic Name	Common Name	Potential Height in Street Environment
<i>Ficus benjamina</i>	Weeping Fig	15-20m
<i>Fraxinus griffithii</i>	Evergreen Ash	7-10m
<i>Gordonia axillaris</i>	Gordonia	5-8m
<i>Magnolia grandiflora</i> 'Exmouth'	Bull-bay Magnolia	12-15m
<i>Michelia x alba</i>	White Sandalwood	5-8m
<i>Phoenix dactylifera</i>	Date Palm	8-12m
<i>Quercus ilex</i>	Holm Oak	12-15m
<i>Schinus areira</i>	Peppercorn Tree	10-12m
<i>Washingtonia robusta</i>	Mexican Fan Palm	20-25m
DECIDUOUS TREES		
<i>Acer buergeranum</i>	Trident Maple	8-12m
<i>Acer negundo</i>	Box Elder	8-12m
<i>Celtis australis</i>	Southern Hackberry	10-15m
<i>Fraxinus oxycarpa</i> 'Raywood'	Claret Ash	10-15m
<i>Fraxinus pennsylvanica</i>	Green Ash	12-18m
<i>Ginkgo biloba</i>	Maidenhair Tree	12-18m
<i>Jacaranda mimosifolia</i>	Jacaranda	10-15m
<i>Koelreutaria bipinnata</i>	Chinese Rain Tree	10-15m
<i>Koelreutaria paniculata</i>	Golden Rain Tree	8-12m
<i>Lagerstroemia indica</i>	Crepe Myrtle	8-10m
<i>Liquidambar styraciflua</i>	Liquidambar	15-22m
<i>Liriodendron tulipifera</i>	Tulip Tree	15-20m
<i>Pistacia chinensis</i>	Chinese Pistachio	7-12m
<i>Platanus x acerifolia</i> (syn. <i>P.hybrida</i> )	London Plane	18-25m
<i>Populus alba</i> 'Pyramidalis'	Upright White Poplar	15-20m
<i>Populus deltoides</i>	Cottonwood	20-25m
<i>Populus simonii</i>	Simon Poplar	15-20m
<i>Prunus cerasifera</i> 'Nigra'	Purple-leaf Cherry Plum	6-8m
<i>Pyrus calleryana</i> 'Chanticleer'	Callery Pear	6-8m
<i>Robinia pseudoacacia</i> 'Frisia'	Golden Robinia / Black Locust	10-12m
<i>Sapium sebiferum</i>	Chinese Tallow Tree	10-12m
<i>Ulmus parvifolia</i> 'Todd'	Chinese Elm	10-12m
<i>Zelkova serrata</i> 'Green Vase'	Japanese Zelkova	10-12m

# Part B - Tree Species Selection

AUSTRALIAN NATIVE TREE SPECIES		
EVERGREEN TREES		
Botanic Name	Common Name	Potential Height in Street Environment
<i>Acacia binervia</i>	Coastal Myall	8-12m
<i>Agathis robusta</i>	Queensland Kauri	20-25m
<i>Alectryon tomentosus</i>	Woolly Rambutan	10-15m
<i>Angophora costata</i>	Smooth-barked Apple	12-20m
<i>Angophora floribunda</i>	Rough-barked Apple	12-20m
<i>Araucaria heterophylla</i>	Norfolk Island Pine	20-25m
<i>Backhousia citriodora</i>	Lemon-scented Myrtle	7-10m
<i>Banksia integrifolia</i>	Coast Banksia	7-10m
<i>Callistemon viminalis</i>	Bottlebrush	7-10m
<i>Corymbia citriodora</i>	Lemon-Scented Gum	18-25m
<i>Corymbia eximia</i>	Yellow Bloodwood	10-18m
<i>Corymbia gummifera</i>	Red Bloodwood	15-20m
<i>Corymbia maculata</i>	Spotted Gum	18-25m
<i>Cupaniopsis anacardioides</i>	Tuckeroo	8-15m
<i>Elaeocarpus eumundi</i>	Eumundi Quondong	10-20m
<i>Elaeocarpus reticulatus</i>	Blueberry Ash	8-12m
<i>Eucalyptus microcorys</i>	Tallowwood	20-25m
<i>Eucalyptus punctata</i>	Grey Gum	18-25m
<i>Eucalyptus robusta</i>	Swamp Mahogany	10-15m
<i>Eucalyptus saligna</i>	Sydney Bluegum	20-28m
<i>Eucalyptus sideroxylon</i>	Red Ironbark	18-25m
<i>Ficus macrophylla</i>	Morton Bay Fig	20-25m
<i>Ficus microcarpa</i> var. <i>hillii</i>	Hills Weeping Fig	20-25m
<i>Ficus rubiginosa</i>	Port Jackson Fig	15-20m
<i>Flindersia australis</i>	Crows Ash	15-20m
<i>Glochidion ferdinandi</i>	Cheese Tree	8-12m
<i>Harpulia pendula</i>	Tulipwood	8-12m
<i>Hibiscus tiliaceus</i>	Coast Cottonwood	8-10m
<i>Livistona australis</i>	Cabbage Tree Palm	15-20m
<i>Lophostemon confertus</i>	Brush Box	20-25m
<i>Melaleuca quinquinervia</i>	Broad-Leaf Paperbark	18-20m
<i>Melaleuca styphelioides</i>	Prickly Paperbark	8-12m
<i>Stenocarpus sinuatus</i>	Firewheel Tree	8-12m
<i>Syzygium leuhmannii</i>	Riberry	8-12m
<i>Syzygium paniculatum</i>	Brush Cherry	8-12m
<i>Tristaniopsis laurina</i>	Water Gum	7-10m
<i>Waterhousea floribunda</i> "Green Avenue"	Weeping Lilly Pilly	18-25m
DECIDUOUS TREES		
<i>Brachychiton acerifolia</i>	Illawarra Flame Tree	15-20m
<i>Brachychiton discolor</i>	Queensland Lacebark	15-20m





櫃  
卡拉  
OK  
酒家

四海同鄉會

川菜火鍋

宵夜  
晚飯  
火鍋

COMING SOON

Hingara

Ocean Avenue

RENOV

善慶中酒

Pub

Blue bus stop shelter with logo