Literature Review - Culturally Significant Tree Project

Version 1

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Introduction

Historic (culturally significant) trees, streetscapes and avenues form significant landscape features and have a large impact on the landscape, both visually and environmentally. Historical trees are known as heritage or as it has been colloquially described 'the things we want to keep' (Dr Olsen 2006).

The tangible and visual history of our State, (South Australia) in the form of man-made monuments, will take us back no more than 150 years. But trees are living monuments capable of transporting us 400 years back into the past. (Ivens R 1980).

The aim of this report is to provide a theoretical background from the available literature. The report will review current approaches, ideas and considerations and investigate potential problems for the protection, care and management of this class of special-merit trees. It is the intention that this information will be used:

- To provide the tools necessary to systematically record and protect outstanding trees, native and exotic, under the care and control of local councils within South Australia;
- To create an awareness of the contribution that culturally significant trees make to aesthetic, cultural and historic fabric of the state; and
- To promote awareness of the value of culturally significant trees to the community, including local councils.

The review discusses the relevant charters and conventions, lists the fundamental standards and language, details identified assessment processes and discusses the issues of managing and maintaining this important group of urban trees.

Heritage charters and conventions

A number of heritage charters and conventions exist to help professionals and others to define and manage these items of cultural significance for present and future communities.

Heritage charters and conventions act as frameworks to help the decision making process when dealing with culturally significant items. From a review of the heritage charters it was determined to use the Australian ICOMOS, Burra Charter (Australian ICOMOS 1999) and the Australian Natural Heritage Charter for the places of natural heritage significance (Natural Heritage Charter 2002) as the primary charters with supporting reference to the Florence Charter for Historic Gardens (ICOMOS-IFLA 1982).

These charters appear to be the most applicable to trees. The Burra Charter provides guidance for the conservation and management of places of cultural significance (cultural heritage places), and is based on the knowledge and experience of Australia ICOMOS members (Australian ICOMOS 1999). The Burra Charter is the favoured Charter used by Australian professionals.

Trees create a unique challenge when one applies an architecturally driven approach to what is in essence a biological system. Trees have vastly different management needs to buildings.

Tree biology is dynamic, changing as the tree ages. Age-related changes to trees include decreased rates of net carbon assimilation, decreased rates of growth in all organs, increased susceptibility to disease, insect and other stresses and altered patterns of dry matter partitioning (Clark and Matheny 1991).

Heritage has often been perceived as a don't touch affair, so that to do "as little as possible, as much as necessary' translates as doing nothing at all. Arborists and related professionals know to do this is suicidal as a management practise. The principle purpose of planting and maintaining trees, streetscapes and avenues is at the very least to provide a better environment for human habitation. In contrast, heritage practitioners know it is suicidal as a management practice to ignore the abstract values, associations and meaning that we as humans bring to these environments" (Dr Olsen 2006).

Melding of these approaches will provide the best possible methodology to conserve and manage culturally significant trees. The conservation of trees and avenues really means the best appropriate care for the enjoyment of present and future communities. *Conservation* means all the processes of looking after a place so as to retain its cultural significance (Burra Charter Article 1.4).

The Burra Charter provides the fundamental standards and language for the practical management of cultural items. A major criticism of the Burra Charter has been its application to the management of vegetation and historical landscapes (Parker M 1988).

The Burra Charter lacks the recognition of natural processes that define what a tree is and how it grows. For these conservation processes to clearly be applicable to urban tree management certain terms and guidelines must reflect trees as biological (living) systems.

By adapting Article 2 from the Florence Charter, the unique characteristics of trees and other plants can be defined as: Trees are living, which means they are perishable and renewable. Thus their health and stability reflects the perpetual balance between the cycle of the seasons, the growth and decay of nature and the desire of the arborist/horticulturalist to keep them permanently unchanged once maturity has been reached.

Successful application of these Charters revolves around a clear understanding of the principles and terms used and if they can be applied to culturally significant trees.

Terms and guidelines

The Australian ICOMOS, Burra Charter uses the concept of cultural significance to justify the conserving of places, including trees. Cultural significance means aesthetic, historic, scientific or social value for past, present and future generations (Australian ICOMOS, Burra Charter Article 1.2 1981). The Charter describes the four values used in the definition as encompassing all other values.

Trees and avenues can be described and analysed as one of more than one of these values. These values vary from community to community, as well as having the potential to change within the same community over time. (Dr Olsen 2006)

A listing of the relevant conservation processes and terminology from the Burra Charter 1999, the Natural Heritage Charter 2002 and Florence Charter for Historic Gardens (1982) is provided below. Where appropriate, these processes and terminology have been adapted to culturally significant trees, therefore building on accepted conservation principles and practices.

Place: means site, area, land, landscape, building or other work, group of buildings or other works, and may include components, contents, spaces and views. The concept of place should be broadly interpreted. The elements described in Article 1.1 may include memorials, trees, gardens, parks, places of historical events, urban areas, towns, industrial places, archaeological sites and spiritual and religious places (Burra Charter Article 1.1).

Fabric: means all the physical material of the place including components, fixtures, contents, and objects (Burra Charter Article 1.3). Fabric may define spaces and these may be important elements of the significance of the place. Species, age, location, biology, growing zone are considered to be the fabric of a tree.

Protection: may include conservation management measures that are either direct or indirect. The aim of protection is to prevent or minimise impacts that may degrade the natural significance and to facilitate regeneration (Natural Heritage Charter Article 16). Any alteration to the physical environment which will endanger the ecological equilibrium must be prohibited. These applications are applicable to all aspects of the infrastructure, whether internal or external e.g. drainage works, irrigation systems, road, car parks, fences etc (Florence Charter 1982 Article 14).

Conservation: means all the processes of looking after a place so as to retain its cultural significance (Burra Charter Article 1.4). Conservation should include the provision for its security, its maintenance and its future Conservation is based on a respect for the existing fabric, use, associations and meanings (Burra Charter Article 2.2). It requires a cautious approach of changing as much as necessary but as little as possible (Burra Charter Article 3.1).

Maintenance: means the continuous protective care of the fabric, contents and settings of a place. For a tree this may include minor pruning, weeding, mulching, fertilising and watering undertaken to prolong the vigour and life expectancy of a tree (Burra Charter Article 1.5). Culturally significant trees must be preserved in appropriate surroundings.

Reinstatement: is appropriate only if (Natural Heritage Charter Article 20):

- There is evidence that the tree or tree avenue that is to be reintroduced has existed there at a previous time.
- Returning the tree contributes to the cultural significance of that place.
- Processes that may threaten their existence at that place have been discontinued.

Restoration: is appropriate only if there is sufficient evidence of an earlier state to guide the conservation process and if returning an avenue of trees or an individual tree planting is consistent with a previous time (Burra Charter Article 13). An illustration of restoration for a culturally significant tree is major pruning to regain a tree's structural integrity or the interplanting of new trees of the dominant species to complete an avenue planting.

Reconstruction: is appropriate only where a place is incomplete through damage or alteration, and only where there is sufficient evidence to reproduce an earlier state of fabric (Burra Charter Article 20). This is the most applicable of the conservation terms for culturally significant trees, along with the idea of maintenance (Olsen 2001). Reconstruction most accurately reflects the ongoing nature of scheduled arboricutlural practices given the ongoing continually changing nature of living trees. Tree replacement most readily approximates this process (Olsen 2001). It can include the introduction of a new species to replace the old if sufficient justification exists and no or minimal impact to the significance of the place occurs.

Use: While any culturally significant tree is designed to be seen, access to it must be restricted to the extent demanded by its size and vulnerability, so that its physical fabric and cultural message may be preserved (Florence Charter 1982 Article 18). The application of a fenced tree protection zone would illustrate best the intention of this term.

Cultural significance

Part of the assessment for cultural significance includes understanding historical and other evidence according to a range of values of significance (Dr Olsen 2001).

The concept of cultural significance in the context of culturally significant trees has been adapted from a publication by the NSW, Dept of Planning 1990, guidelines for the conservation and management of street trees in NSW:

Cultural/social/health value: Trees play an important role in elements of towns and cities such as approach roads, showgrounds, transport links, residential areas, important buildings, access roads, parks and strips. The definition distinguishes between country towns and metropolitan areas by planting styles, locations and associations with various built form. Trees help recognize special places. Trees contribute to society's health and physical wellbeing.

Historical value: Trees are often of historical significance when associated with important eras, buildings, events or people. Trees/gardens may reflect specific epochs in garden design/landscape architecture.

Scientific/environmental value: Trees are often valuable for a range of scientific reasons. Species which are rare, vulnerable or endangered, of a great age or provide important habitat for wildlife can be considered under this definition.

Aesthetic value: Trees are of aesthetic value if they reflect important features in townscapes, screen unattractive buildings or are exceptionally beautiful, provide shade, or act as a wind breaks.

Also needed for heritage is a range of detailed management approaches which are specific to each value of significance, so that heritage value itself; rather than just the physical specimen, is maintained and continued appropriately over time (Dr Olsen 2006).

Defining a culturally significant tree

A number of definitions have been proposed to describe what a culturally significant tree is. In most cases the term 'significant tree' has been used to describe this class of trees.

The Significant Tree Steering Committee for the National Trust of South Australia (Heath and Tamblyn 2008) defines culturally or heritage trees as a class of special-merit trees. Heritage trees are classes of trees which warrant special consideration. They provide a wide range of historical, cultural and scientific benefits over and above the accepted values of everyday trees as such their extraordinary values need to be retained for as long as possible.

City of Rydes has adopted the following definition:

> *Trees can be either a single tree or a larger grouping of trees that may possess values relating to their visual, historic, botanical, cultural, commemorative or other significances as defined in their approved category list.*

The City of Sydney defines culturally significant trees in the following way (Significant trees register, part 1 of 4 2005):

> *Significant (culturally) trees are commonly the last vestiges of former natural and cultural landscapes. These trees retain exceptional values in terms of their contribution to our urban environment. They have a recognisable range of values– natural, cultural, aesthetic, visual, social and historic. These trees can be symbols of great spiritual power, they may have associations with individual people and communities or tell stories of other times and places, or the historic development of a place, trade routes, connections and communications. Significant trees often visually dominate a place by their sheer size, scale and visual impact. Remnant trees from former natural ecological communities may retain valuable habitat and faunal corridors for other endangered and dependent species. These trees also offer a valuable gene pool for future scientific research, conservation and restoration.*
>
> *In recognising the significant trees within a local area, greater meaning can be brought to the past, allowing a richer understanding of the present. This in turn can provide the basis for better methods of protection, care and management for the future. The assessment of heritage significance is a dynamic process, changing with the passage of time and reflecting the way people interact and perceive the relative importance of places and items, particularly as parts of this collective heritage are lost.*

The Victorian Planning Department in its planning bulletin 'Vegetation Protection in Urban Areas' (August 1999) defines significant vegetation including trees as follows:

> *Vegetation can make an important contribution to the urban environment. It may be of botanical or scientific significance or have environmental, historical, aesthetic or cultural value. Vegetation may also be important to the community in defining and contributing to the character of a city, suburb or township.*

Avenues are a unique landscape feature requiring a slightly different approach when defining their characteristics. Tree avenues are a double row of regularly spaced trees, usually lining an entrance or road, creating a walkway or vista. Generally an avenue consists of only one or a limited number of species (Dickins 1985).

Avenues as a group can have a recognisable range of values including natural, cultural, aesthetic, visual, social and historic. Avenues can be categorised as either a town or street avenue, private avenue and memorial or commemorative.

Therefore, trees and avenue plantings can be culturally significant and worthy of conserving. Their value can be, historic, aesthetic, scientific, or social; generally they are a combination of some of these values.

Assessment criteria

Generally the criteria used to evaluate culturally significant trees reflects the values expressed in the definition of cultural significance; aesthetics, historic, scientific or social.

Dr Greg Moore (n.d.) states in his paper 'Ancient and Significant Trees - Protecting Community Assets and Heritage':

There is no simple approach to identifying significant trees and selecting criteria that are objective, meaningful and broadly understood, which has been essential to the success of the Victoria Register of Significant Trees. In general, nominations can be made and assessed under one or more of the categories listed below.

- *Horticultural and/or Genetic Value*
- *Rare or Localised Distribution*
- *Outstanding Size (Girth, Height or Spread)*
- *Curious Growth Habit*
- *Connection To Aboriginal Culture*
- *Unique Location or Context*
- *Particularly Old Specimen*
- *Aesthetic Value*
- *Historical Significance*
- *Outstanding Example of Species*

For each of these categories a number of sub-categories exist to assist in making decisions about the worthiness of specimens for classification. Some of these sub-categories are listed below:

Outstanding Size	**Historic Value**	**Rare or Localised**
Height	Cultural Group	Only Known Specimen
Circumference (Girth)	Public Feature	1-10 Known Specimens
Canopy Spread	World War I	10-50 Known Specimens
Height x Girth	World War II	In the Wild
Spread x Girth	British Royalty	End of Natural Range
Height x Girth x Spread	Other Royalty	Disjunct Community
	Visiting Dignitary	
	Australian Public Figure	
	Victorian (South Australian) Public Figure	

Note: There are no sub-categories for the horticultural, aesthetic, age or outstanding specimen categories. A key to the above criteria for classification has been provided in Appendix A.

Dr Moore then goes on to highlight the categories used for the nomination form for Registering Significant Trees for the Victorian National Trust Tree register. These categories include:

- Any tree which is of horticultural or genetic value and could be an important source of propagating stock, including specimens that are particularly resistant to disease or exposure.
- Any tree which occurs in a unique location or context and so provides a contribution to the landscape, including remnant native vegetation, important landmarks, and trees which form part of an historic garden, park or town.
- Any tree of a species or variety that is rare or a very localised distribution.
- Any tree that is particularly old or venerable.
- Any tree outstanding for its large height, trunk circumference or canopy spread.
- Any tree of outstanding aesthetic significance.
- Any tree which exhibits a curious growth form or physical feature such as abnormal outgrowths, natural fusion of branches, severe lightning damage or unusually pruned forms.
- Any tree commemorating a particular occasion (including plantings by Royalty) or having associated with an important historical event.
- Any tree associated with Aboriginal activities.

The City of Sydney (Significant Trees, part 1 of 4 2005) has adapted criteria from The Register of the National Estate, in accordance with the Burra Charter. These criteria are applied to all types of heritage places and items including natural, cultural and Indigenous. The collected tree data is evaluated on the basis of each tree's contextual relationship to other similar trees and its relative importance in terms of the following criteria:

Historic and/or natural value (i.e. indigenous/ cultivated origin)

- Determination of origin as a component of natural ecological community or cultivated/planted as part of historic development of the place;
  including influences by historic figures, events and patterns of development.

Botanic/ scientific value

- Associated with research and educational values, based on integrity, rarity and representative values.

Social, cultural and commemorative value

- Focusing on qualities such as the spiritual, political, national and cultural sentiment reflected by the broader population or smaller community groups;
  including commemorative events.

Visual and aesthetic value

- Must be based on existing physical fabric: its health and structural integrity.
- Relates to qualities of bulk, scale and contribution to defining local character and the 'spirit' or sense of place.

The heritage values for each listed tree or group of trees is encapsulated in a Statement of Significance which involves interpretation and analysis of comparative points of importance as follows:

- rarity value;
- biodiversity value;
- individual and/or group value;
- landmark value;
- representative value;
- integrity value;
- research, teaching and understanding;
- social, cultural or spiritual associations; and
- associations with significant individuals.

The criteria relate to both cultural and natural significance of an item and place. Some have a specific cultural or natural bias. Nevertheless, the heritage values of a significant tree or group of trees are almost always multi-layered.

The National Trust of South Australia has adopted the following criteria to assess the cultural/heritage significance of trees. The nominated tree(s) should be significant for one or more of the following reasons:

1. Natural value (remnant vegetation, habitat, maintain biodiversity)

   (R) - An isolated remnant of native vegetation or is a species or variety that is rated Rare, Endangered or Vulnerable

   (F) - Provides valuable fauna habitat (e.g. hollows suitable for possums or a range of bird species)

   (X) - Other (please describe)

2. Historic/cultural value (Aboriginal, colonial, post-colonial, association with person or event, ethnic, community)

   (H) - Commemorates or has associations with an important historical event

   (V) - Significantly associated with a VIP or well known public figure, (eg planted by Royalty or prominent person)

   (E) - Significantly associated with an aboriginal or ethnic group

   (P) - Part of a private or public historic garden or park or town

   (C) - Is or has been of importance in the life of the local community

   (X) - Other (please describe)

3. Aesthetic value (dimensions, age, character, physical features, landmark/landscape qualities)

(B) - Outstanding aesthetic beauty

(D) - Outstanding dimensions in height, or trunk circumference, or canopy spread

(O) - Very old or venerable

(L) - Occurs in a unique location or context, and thus provides a special contribution to the landscape, or is a landmark

(T) - Excellent example of topiary

(Q) - Curious growth forms or physical features either from natural causes, or pruning

(X) - Other (please describe)

4. Endangered/rare (International, national, state, local, horticultural)

(R) - Isolated remnant of native vegetation or is a species or variety that is rated Rare, Endangered or Vulnerable, or is of very localised distribution

(G) - Horticultural or genetic value, possibly important as propagating stock, or cultivars particularly resistant to disease or exposure

(J) - Preserves the genetic stock of a listed tree (eg a seedling or cutting of a tree which is nearing the end of its lifespan), a juvenile of possible future significance

(X) - Other (please describe)

City of Ryde has adopted similar criteria to assess the cultural/heritage significance of trees.

Primary selection categories are to be listed as:

- Heritage
- Botanical/Horticultural
- Urban Forest Community
- Other

Sub categories will be used for a more detailed assessment either supported by Council searches or as supplementary information provided by the nominee or other interested persons.

Heritage Planting

- Aboriginal significance
- European significance
- Historical significance
- Commemorative significance

Botanic/ Horticultural

- Significant contribution to a flora/fauna habitat or corridor
- Rare or uncommon species
- Unusual growth form
- Visual or aesthetic qualities

Urban Forest Community

- Local and/or verge groupings

Other category that may apply

- Landmark importance
- Scientific values
- Potential future heritage value

The City of Prahran in its study 'Significant tree and garden study' (Looker and Hubbard 1992) adopted the following criteria adapted from the Significant Trees Register prepared by the Royal Melbourne Botanic Gardens and the National Trust.

L	Landscape	An important individual feature or group, frames or screens view, or acts as a landmark
S	Size	Outstanding dimensions measured by the height, diameter (referred to as the DBH – diameter of trunk at 1.4 metres) and spread
A	Age	The relative age of the tree, especially if the tree is old for its species or venerable
Rw	Rare	A tree which is rarely found in the wild
Rc	Rare	A tree which is rarely found in cultivation
H	Historic	A tree with specific historic association such as a commemorative planting
F	Form	A tree with outstanding or unusual form compared with others of its species
V	Remnant	Vegetation which survives from the pre-European period

A tree may be significant according one or several of these criteria.

Criteria provide a guide to help the user identify what could be considered valuable. Criteria can be used as a standard against which a place can be evaluated. (Johnston 1987).

The Process

Cultural significance is understood and assessed through a series of steps often summarised by a document called a *conservation analysis/plan.* The Burra Charter provides a clear & concise process which can be used as a guide when assessing culturally significant trees. The stages of this process have been reproduced in Appendix B.

The Burra Charter defines conservation as all the processes of looking after a place so as to retain its cultural significance (Burra Charter Article 1.4). The relevant processes suitable for culturally significant trees are: maintenance, protection, reinstatement, restoration, and reconstruction.

Other processes listed as part of this charter have limited application to protection, care and management of culturally significant trees and are better suited to architectural conservation practices. These processes include change, new works, preservation, adaptation and compatibility.

The key conservation principles identified by Planning Victoria (Planning Bulletin 1999) in the process of assessing and listing these trees includes:

- Identify the value of vegetation to the community and the factors that contribute to its value.
- Establish a reliable and consistent methodology to evaluate vegetation.
- Identify criteria for assessing vegetation for its natural and cultural value.
- Protect vegetation for its contribution to the character of an area.
- Identify the best methods of protecting vegetation.
- Balance the protection of vegetation with the practical considerations of vegetation.
- Management and safety.
- manage change in the urban environment where increases in development densities result in the cumulative loss of vegetation.
- Control vegetation removal before development approval is granted.

The stages in conserving culturally significant trees can be summarised in four key verbs: identify, assess, manage and monitor. These form and inform the process outlined in both the Burra and Natural Heritage charters. The key is to gather all the relevant information before taking a decision or action so that the right one is taken for the actual place, tree, or collection of trees, and they survive and thrive (Reed 2005).

The City of Sydney (Significant Trees, part 1 of 4 2005) has summarised the conservation steps as significant trees are assessed through systematic research, field work and documentation. A thorough physical examination of trees in relation to their natural occurrence or cultural history is conducted and supported through reports, photographs, archival material and oral evidence.

The following sequence has been adapted from Planning Victoria (Planning Bulletin 1999):

1. Undertake a vegetation survey
2. Determine vegetation significance
3. Prepare a local policy (MSS and local policy)
4. Apply overlay provisions, where appropriate
5. Enforce the planning scheme where necessary
6. Monitor outcomes

Depending on the circumstances and the level of detail sought, the analysis of physical evidence and development of supporting strategies, may involve (Planning Bulletin 1999):

1. Gathering information

    - Undertake a broad survey to identify areas likely to contain important or significant trees. A number of information sources are available to assist in this process.
    - Check if any trees have been formally recognised on the Register of the National Estate, National Trust Register or listed under specific local government or state registers.
    - Focus on specific areas or sites of interest.
    - Undertake a vegetation survey of specific areas or sites. Vegetation surveys must be undertaken by suitably qualified arboricultural consultants, botanists, landscape architects or other experienced environmental scientists.
    - Involve the public in the survey and assessment process, whether the assessment method has an objective (scientific) or subjective (aesthetic) basis.

    Useful sources of information have been listed by Hawker J (1992). These sources include: the National Trust, historical societies, public libraries, local government and conservation groups. Local histories, conservation studies, student theses, photographs, journals, books and other archives are also useful. Oral histories from elderly members of the community and part owners may also be able to provide valuable information.

    Once the historical information, physical description and features of the tree are collated an assessment as to the tree's significance can be conducted (Hawker J 1992).

2. Assessing significance

    Assessment methods must be rigorous as they provide strategic justification for protection through the planning scheme and will be the basis of decisions. Recognised assessment criteria should be used.

    Useful criteria include:

    - National Trust (Victoria), Register of Significant Trees of Victoria criteria. This has been developed to be applied to trees or a group of trees.
    - Australian Natural Heritage Charter (Australian Committee for IUCN 1997). This contains standards and principles for the conservation of places of natural heritage significance.
    - Other criteria have been developed for individual studies, for example, the NEROC study may be acceptable.

    These criteria may also provide a framework to assess the aesthetic or cultural value of vegetation.

3. Statement of significance

    A statement of significance is a succinct statement expressing what vegetation is significant or important and why. It should be written with reference to the assessment criteria and based on the survey results and, if relevant, reliable secondary data.

    It should not restate the survey or documentary evidence but be cross-referenced to it. The level of significance will enable the development of appropriate policies. Statements of significance may be prepared for individual trees or groups of trees.

4. Developing a strategic vision

   If it is proposed to protect a tree/s via a planning scheme, this must be supported by strategic justification and identified within Council's strategic policies and strategies. These policies should clearly articulate objectives for protecting trees, strategies for achieving the objectives and practical implementation measures. The objectives should state why these trees should be protected, what level of protection is being sought and what the desired outcomes are for protecting trees drawing on strategic work.

   The community should have ownership of the objective by being involved in formulating the strategic vision. If the community is involved, there is a greater likelihood that the outcomes sought by the planning scheme will be understood and supported.

   Objectives for protecting trees may be related to other objectives such as protecting significant landscapes, valuable habitats or the character of a place or area and the Significant Tree Legislation 1991.

   Local policies should explain and inform planning decisions. They should reinforce and emphasise broader strategic objectives.

   In some areas, where tree protection is important to Council's broader planning objectives, the preparation of a specific policy for vegetation protection may be preferred (such as a land management agreement). Typical local policies may reinforce the need to protect remnant vegetation, emphasise the significance of mature vegetation or the need to actively eradicate environmental weeds. In some instances, a local policy may be all that is required to achieve a particular objective.

5. Enforcement

   Protecting significant vegetation using the planning scheme places an obligation on councils to carry out enforcement. Gaining support for the principle of vegetation protection and improving knowledge of the planning provisions, their objectives and how they work should assist in reducing the need for formal enforcement action. Enforcement strategies should, therefore, focus on community education and participation in order to gain broad support for vegetation and management policies rather than relying only on enforcement measures under the Planning and Environment Act.

   The availability of advice and assistance and the efficient handling of applications may also minimise cases of unlawful vegetation clearance. Enforcement methods can be supported by:

   - Periodic review of the vegetation inventory as part of the normal planning process.
   - The appraisal of the effectiveness of the vegetation provisions and permit conditions in practice.
   - Regular inspections of work sites.
   - Enforceable permit conditions and agreements.

   A list of various relevant South Australian legislative requirements and regulations that relate to trees under the care and control of councils has been provided as part of Appendix C.

6. Monitoring

   Ongoing monitoring is a key feature of the tree protection program. To determine whether planning policy and provisions are successfully protecting vegetation, Council must develop a monitoring program. Monitoring is critical as it can provide information that enables current practices to be reviewed. In developing a monitoring program for vegetation protection, Council should:

   - Be clear about what key elements of the planning scheme and planning system it wants to monitor.
   - Identify indicators of Council's performance in relation to these key elements.
   - Establish performance targets for particular indicators to guide the assessment of success.

   An obvious glaring omission is the on-going management and maintenance trees typically require.

Mcphee (1999) includes in her approach in the management of historical gardens which includes trees two additional steps:

- The preparation of an implementation program which identifies and prioritises what works are required to conserve the trees; and
- Implement the program in stages as funds are made available.

In summary, the conservation of culturally significant trees falls naturally into two stages. The first covers the gathering and analysis of evidence and the assessment of significance. The second is concerned with developing policies and setting out strategies to maintain, monitor, protect and as required replace these important trees.

Data Requirements

The City of Sydney collects the following data for each tree or group of trees that is listed within its register:

Summary Data:

- Precinct number and description.
- Digital photographic record and precinct map references.
- Date, location and full property description, ownership/ management, control/responsibilities and references to other listings where applicable.
- Origin (cultural planting or indigenous remnant).
- Cultural type (e.g. single specimen, row plantation, group planting, etc).
- Level of significance (e.g. LOCAL, CITY/ LGA or REGIONAL levels).
- Number of scheduled items for property description.
- Summary of other tree and palm components/associates (i.e. important contextual elements within the property description).

Tree Attributes (as applicable):

- Full botanical description including botanical and common names, other local/historic names, if applicable.
- Significance attributes of scheduled item; origin (e.g. ornamental/cultivated – geographic place of origin/ cultivars).
- Location – detailed description of site location within property listing.
- Extent of influence – reference to canopy cover and possible extent of root zone.
- Estimated age, height, canopy spread and trunk diameter @ 1.0 metre above ground level/extent of any buttressing, etc.
- Visual tree assessment including condition, status, health, evidence of any physical or structural damage, insect attack and pathogens (refer to notes).
- Comments on existing or potential threats and other relevant issues affecting the status of the tree(s) and recommendations for management and/or remedial treatment (including priority scheduling).
- Statement of Significance – description outlining the reasons for significance of scheduled items.

The National Trust of Victoria collects the following data for each tree. The following is the assessment form used by the Trust:

Family				Category (s) recommended:
Botanical name:				
Common name:				
Number of trees:				
Location:				Condition:
Municipality:				Classified:
Ownership:				State / Regional
Circumference:	m	height:	(m)	Photographs:
Spread:	m	estimated age:	(yrs)	Longitude:
Date measured:				Latitude:
Description & background:				

Also included is any potential or immediate threat to the specimen. Citations are prepared for each tree considered worthy of retention. National Trust of Victoria conducts comparative assessments using photographs of the tree which are evaluated by a Committee of selected experts. Each nominated tree is then assessed in comparison to know specimens in similar categories. The importance of individual trees or stands is also considered.

The City of Ryde collects similar data. The City of Ryde within its register includes the following verifiable assessment details for each tree listing:

- Date, tree location (preferably by GPS co-ordinates) and a full property description (public or private lands), ownership/management and references to other listings (e.g. National Trust of NSW), where applicable.
- Photographic record linked to an appropriate scaled map reference.
- Detailed description of location, with references to tree canopy extent and root zone in relation to neighbouring properties especially where development on adjoining property could affect the tree.
- Number of listed trees and significance attributes.
- Full botanical description including botanical and common names.
- Local names if applicable.
- Origin, height, canopy spread and trunk diameter.
- Horticultural condition/health report and estimated age.

Also to be included is a Statement of Significance. This is a description outlining the reasons for significance which is a brief summary and should, where possible include;

- Identification of possible threats and problems; (e.g. road widening, ETSA overhead line clearance), and
- Recommendations for management and/or remedial treatment.

The City of Prahran in its study of significant trees (Looker and Hubbard 1992) collected the following information: Location, Species and Diameter at Breast Height, Height, Spread, Age, Condition, Life Expectancy and Statement of Significance.

Management programming and action

The best conservation studies are extended to provide management guidelines to ensure the long term significance is safeguarded. Management plans assure a continuity of direction throughout a period of time, although they should be seen as dynamic rather than a static instrument, responding to new information as it becomes available (Hitchmough J 1994).

The cultural significance of a place, including its value and level of significance should play a pivotal role in what management programming and action is chosen (Olsen 2001). This would help determine the level of protection and therefore maintenance input and other conservation measures a particular tree/s requires.

The tree's fabric - species, age and biology will determine the selection of a particular conservation action/s. Such programs or plans commonly include a combination of general aims or objectives and/or specific strategies and detailed actions.

These works have various labels including schedule of conservation works, a works program, implementation program etc. The whole of the process, often including a conservation analysis, will also be called the conservation management plan (Olsen 2001).

Good tree management programs/plans integrate species and site differences into both general approaches and specific actions. These actions must be clear, logical and straight forward.

Good plans tend to be both unambiguous and precise since if confusing or vague, they run the risk of the place and its significance being misunderstood and mismanaged (Olsen 2001).

Having a basic knowledge of species history, an arborist may approach the care and management of aging trees by focusing preventative care on two objectives: avoiding entry into mortality spiral and preventing death from acute causes. Arborists play an active role in optimising tree longevity, using two strategies: developing a stable physical structure and developing a stable environment (Clark and Matheny 1991).

Arboricultural maintenance

The management of mature trees involves the application of cultural treatments in the context of tree biology which change with time. Since the biology of a tree changes overtime, so must its management. Arborists can play a central role in the maintenance of mature, stable conditions. They identify routine and remedial treatments, as well as assess the ability of a tree to respond to such treatments. However the capacity of an arborist to restore a declining tree to a stable condition is questionable (Clark and Matheny 1991).

The Burra Charter defines maintenance as the continuous protective care of a place. For trees this may include minor pruning, weeding, mulching, fertilising and watering undertaken to prolong the vigour and life expectancy of a tree (Burra Charter Article 1.5, Draper D and Richards P 2009).

The growth, development, appearance and success of a plant (including a tree) on any site will be dependent on three factors (Parker M 1998):

- The first is the physiological make up of the species which includes its tolerance of environmental conditions e.g. drought and its response to physiological stimuli, for example, day length or extended periods of cold.
- The second is the environmental conditions of the site, which range from pH to wind patterns.
- The third factor being the maintenance or horticultural (arboricultural) inputs which aims to strike a balance between the other influences and to produce an attractive and healthy specimen.

There are arboricultural practices that can help with maintaining the health of a tree and to slow its decline, although one must question how much tree work is acceptable (Taylor 1990). The form and reasons for significance need to be considered when contemplating tree surgery (Parker M 1998).

The maintenance procedures involved must be clearly identified and scheduled as part of an overall, management plan. It must be viewed in the long term with preventative maintenance being the main focus.

A few of the important maintenance techniques that will create a strong, stable tree structure, minimise unfavourable environmental changes and minimise insect and disease attack for culturally significant trees includes (Clark and Matheny 1991):

- Prune mature trees conservatively to avoid excessive thinning and wounding.
- Observe target pruning to minimise decay development.
- Irrigate and fertilise judiciously considering the trees natural environment and part culture.
- Protect the tree from environmental degradation, such as soil compaction, root damage, mechanical damage etc.

- Develop species-appropriate programs for pest management.

Maintenance programs for aging trees need to be considered carefully with a focus on preventative not reactive maintenance. As a tree matures it becomes increasingly affected by stress and responds slowly to treatment. Problems observed must be treated quickly.

The tree's growing environment must be maintained to protect it from undue stress and the structural integrity of the tree in public locations must be maintained to ensure public safety.

Tree replacement

Tree replacement is one of the most complex, emotive and pressing issues of managing culturally significant trees.

Tree death and stress can be attributed to a number external factors including unforseen damage from extreme weather events, infections from fungi, bacteria, virus-like organisms, insect attack, root damage and irreparable changes to the tree's growing environment. Trees are living organisms and have a finite life span and senescence and death is inevitable.

Over-mature trees can represent a risk should they be in decline or stressed. The potential hazard of older trees, and in particular those that start to drop branches, demand that managers ask the questions (Parker M 1999):

- When are trees too hazardous to be tolerated?
- When should they be removed?

The difficulty for managers comes as culturally significant trees age and decline and decisions need to be made on their future (Parker M 1999).

Hitchmough (1990) compares the aesthetic return with that of the management inputs for the life of a tree. Aesthetic returns increase with age, levelling off at maturity and then falling as the tree declines. Management costs on the other hand increase as the tree ages. Tree removal before the completion of the tree's natural life span can be justified on the grounds of decreasing aesthetics and increasing management cost, although determining where a particular tree lies on the hypothetical curves is no easy task. However, aesthetic costs are not the only consideration; the historical and social significance of the tree both individually and as a component of the entire landscape needs to assessed and taken into account. Hitchmough (1990) goes on to pose the following question: Should a tree be sustained for as long as possible because there is significance in the planting?

I believe the response to this question generally is yes. It may be necessary to retain a tree beyond its peak aesthetics because of its age, dimensions, rarity or association with a particular historical event or person. However this is subject to risk, historical and social significance, aesthetics and cost.

Should it be decided to replace the tree the problem then lies in continuing the significance with a new tree. Hitchmough (1990) suggests the following approach: Is this significance undone when the tree is replaced if the replacement is of identical genetic constitution to the original, as is the case if the new tree has been derived from the original by vegetative propagation?

In this respect the replacement tree would simply be a smaller version of the original. Should this technique become acceptable then cyclic renewal of plants would be possible and the only constraints being aesthetics and management costs (Hitchmough 1990). However, not all trees can be propagated vegetatively. This then raises the question on how these trees would be replaced.

The emphasis throughout the whole replacement process should be on planning. Any tree removal or replacement needs to be planned to ensure a staged process that does not detract from the quality of the place (Parker M 1999).

Layering, coppicing and self-seeding are some of the common methods that can be used to regenerate trees. However these are subject to tree health and species response to these techniques.

Should these techniques not be possible then it may be necessary to clear fell and replant with a young tree (Hitchmough 1990). The decision then needs to be made at what stage in a tree's life cycle they should be replaced.

A number of tree replacement approaches have been identified and are summarised below.

- Single tree rotation – Clear fell and replace before or as the tree enters decline.
- Prop up for as long as possible then fell when the tree is no longer safe or attractive and replace. It is necessary to consider that arboricultural techniques aimed at prolonging the life of trees will improve vigour and slow the rate of senescence by providing an ideal growing environment, however they cannot halt or reverse decline.
- Dual tree rotation – Plant a young replacement tree adjacent to the existing tree as close as practical a number of years prior to removal. If successful this will allow one to soften both the aesthetics and functional blow of mature tree replacement.
- Continuous tree rotation – The process is applicable for extensive features such as woodlands, it may be possible to develop a mix classes by carrying out a continual replacement program.
- Identify external factors that may be contributing to a tree's slow decline, such as compaction and then attempt to eliminate these factors via management.

Depending on the specifics of the tree, its level of significance, location and resources will determine the method of replacement that can be applied to a specific situation.

Culturally significant trees in public places are managed by Council's on behalf of the community and are recognised as important living assets. As such the community should be consulted (in accordance with the Local Government Act) in all major tree replacement projects.

Avenues and rows

The aesthetic effect of avenues and rows is created by the symmetry of equal aged, sized trees of the same species. The problem is created when a single tree dies or requires removal, as a gap forms. If a replacement tree is introduced it will be at a different stage of maturity drastically altering the avenue (Parker M 1999).

There are a number of approaches that be applied to avenues and rows of trees if replacement is required. These approaches are summarised below.

- Clear fell and replant the entire avenue.
- Clear fell and replace sections at a time.
- Replace each tree as it dies.
- Remove and replace every second or third tree.
- Planting a new row of trees either side of the existing.

Each of these methods has positive and negative implications and is not always suited to all planting situations.

No matter what method of replacement is selected it is important that the chosen method retains the fundamental characteristics of an avenue-symmetry created by consistency of age, species and size and key stakeholders are consultant and encouraged to participate.

Storage of information

Once individual trees have been assessed and required information collected it needs to be stored and maintained. This should be achieved through computerised database.

Key requirements of these systems include:

- Storage of information,
- Data manipulation – generating lists, summarising data,
- Computer Mapping (GIS) – visually display the location of the tree, useful for future referencing.

The system should be user friendly, have good documentation and support and permit easy updating of data. General or specific software packages are available to fulfil these requirements.

Conclusion

This report has been prepared to summarise the available literature that is intended to be used to develop a series of clear concise (policy statements) principles and supporting guidelines that will assist South Australian councils to identify and manage culturally significant trees in an urban or rural setting.

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Appendix A

NATIONAL TRUST OF AUSTRALIA (VICTORIA) REGISTER OF SIGNIFICANT TREES

KEY to Criteria for Classification

1. Horticultural Value
Any tree which is of horticultural or genetic value and could be an important source of propagating stock, including specimens that are particularly resistant to disease or exposure.
- No sub-categories

2. Location or Context
Any tree which occurs in a unique location or context and so provides a contribution to the landscape, including remnant native vegetation, important landmarks, and trees which form part of an historic garden, park or town.
2.1 - Location or Context
2.2 - Historic Garden or Park
2.3 - Historic Cemetery
2.4 - Important Landmark
2.5 - Remnant Native Vegetation
2.6 - End of Natural Range
2.7 - Contribution to Landscape
2.8 - Historic Town
2.9 - Historic Planting Style

3. Rare or Localised
Any tree of a species or variety that is rare or of very localised distribution.
3.1 - Rare or Localised
3.2 - Only Known Specimen
3.3 - 1 to 10 Known Specimens
3.4 - 10 to 50 Known Specimens
3.5 - In the Wild
3.6 - End of Natural Range
3.7 - Disjunct Community

4. Particularly Old
Any tree that is particularly old or venerable.
- No sub-categories

5. Outstanding Size
Any tree outstanding for its large height, trunk circumference or canopy spread.
5.1 - Outstanding Size
5.2 - Height
5.3 -Circumference
5.4 - Canopy Spread
5.5 - Height x Circumference
5.6 - Spread x Circumference
5.7 - Height x Circumference x Spread

6. Aesthetic Value
Any tree of outstanding aesthetic significance.
- No sub-categories

7. Curious Growth Form
Any tree which exhibits a curious growth form or physical feature such as abnormal outgrowths, natural fusion of branches, severe lightning damage or unusually pruned forms.
7.1 - Curious Growth Form
7.2 - Abnormal Outgrowths
7.3 - Fusion of Branches
7.4 - Unusually Pruned
7.5 - Unusually Damaged

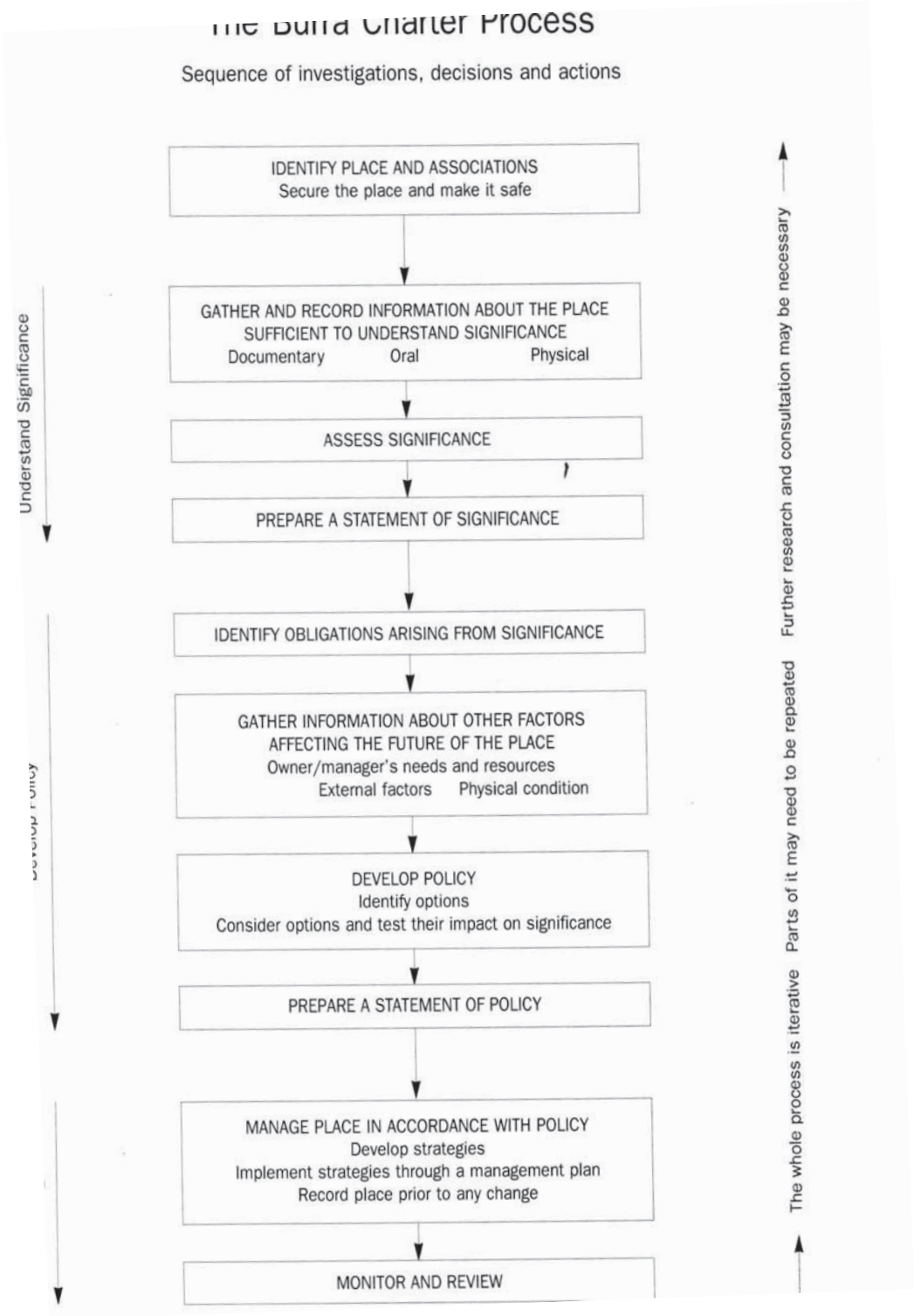
8. Historical Value
Any tree commemorating a particular occasion (including plantings by Royalty) or having an association with an important historical event.
8.1 - Historical Value
8.2 - Cultural Group
8.3 - Public Feature
8.4 - World War I
8.5 - World War II
8.6 - British Royalty
8.7 - Non-British Royalty
8.8 - Visiting Dignitary
8.9 - Australian Public Figure
8.10-Victorian Public Figure

9. Aboriginal Culture
Any tree associated with Aboriginal activities.
9.1 - Scarred Tree
9.2 - Corroboree Tree

10. Outstanding Example of Species
Any tree that is an outstanding example of its species
- No sub-categories

If you would like further details on a particular tree, go to www.nattrust.com.au and click "The Trust Register", enter the file number of the tree, then click "find". If the tree is in one municipality scroll down to "Advanced Search", select "Tree" in Category, select the Municipality, and then click "find".

Appendix B


The Burra Charter Process
Sequence of investigations, decisions and actions
IDENTIFY PLACE AND ASSOCIATIONS
Secure the place and make it safe
GATHER AND RECORD INFORMATION ABOUT THE PLACE
SUFFICIENT TO UNDERSTAND SIGNIFICANCE
Documentary
Oral
Physical
ASSESS SIGNIFICANCE
PREPARE A STATEMENT OF SIGNIFICANCE
IDENTIFY OBLIGATIONS ARISING FROM SIGNIFICANCE
GATHER INFORMATION ABOUT OTHER FACTORS
AFFECTING THE FUTURE OF THE PLACE
Owner/manager's needs and resources
External factors
Physical condition
DEVELOP POLICY
Identify options
Consider options and test their impact on significance
PREPARE A STATEMENT OF POLICY
MANAGE PLACE IN ACCORDANCE WITH POLICY
Develop strategies
Implement strategies through a management plan
Record place prior to any change
MONITOR AND REVIEW
Understand Significance
Develop Policy
Further research and consultation may be necessary
Parts of it may need to be repeated
The whole process is iterative

Appendix C

Legislative Requirements

The management and care of Urban Trees is subject to various Legislative requirements and regulations.

Local Government Act 1999

- Sections 196 to 199 Community land management plans
- Section 213 Recovery of costs of roadwork
- Section 221 Alteration of road
- Section 232 Trees
- Section 233 Damage
- Section 244 Liability for injury, damage or loss on community land
- Section 245 Liability for injury, damage or loss by certain trees
- Section 299 Vegetation clearance
- Councils existing Policies including Public Consultation which reflects the requirements of the Local Government Act 1999

State and Federal Acts

- Development Act 1993
- Commonwealth Environment Protection and Biodiversity Conservation Act 1999
- Electricity Act 1996
- Heritage Act 1993
- Water Resources Act 1997
- Environment Protection Act 1993
- Animal and Pest plant Control (Agricultural Protection and Other Purposes) Act 1986
- Sewerage Act 1929.
- Aboriginal Heritage Act 1988