

Australian Standard[®]

Protection of trees on development sites



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- Australian Council of National Trusts
- Australian Institute of Building Surveyors
- Australian Institute of Horticulture
- Australian Institute of Landscape Architects
- Australian Local Government Association
- Australian Pipeline Industry Association
- Australian Property Institute
- Energy Networks Association
- Institute of Australian Consulting Arboriculturists
- International Society of Arboriculture (Australia Chapter)
- Local Government Tree Resources Association
- National Arborists Association of Australia
- Nursery and Garden Industry Australia
- Parks and Leisure Australia
- TAFE NSW
- The University of Melbourne
- Water Services Association of Australia

Additional Interests:

- National Trusts of Australia NSW
 - Wollongong City Council
-

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PREFACE

This Standard was prepared by the Standards Australia Committee EV-018, Arboriculture.

This Standard incorporates Amendment No. 1 (March 2010). The changes required by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.

This Standard provides guidance for arborists, architects, builders, engineers, land managers, landscape architects and contractors, planners, building surveyors, those concerned with the care and protection of trees, and all others interested in integration between trees and construction.

This document describes the best practices for the planning and protection of trees on development sites. The procedures described are based on plant biology and current best practices as covered in recently published literature.

The assistance obtained from the 1991 and 2005 editions of BS 5837, *Trees in relation to construction—Recommendation*, along with Matheny and Clark (1998)* and Mattheck and Breloer (1994)* is acknowledged.

The term ‘informative’ has been used in this Standard to define the application of the appendix to which it applies. An ‘informative’ appendix is only for information and guidance.

* See bibliography in Appendix E for details.

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FOREWORD

Landscape design is an important component of most development. Established trees of appropriate species and sound structure are beneficial components of the built environment and a potential asset to any development site. Trees may be retained because of their—

- (a) aesthetic qualities;
- (b) heritage values;
- (c) ecosystem benefits, including—
 - (i) stormwater management;
 - (ii) shade and heat reduction qualities;
 - (iii) wildlife habitat and biodiversity;
 - (iv) carbon dioxide absorption;
 - (v) particulate pollution capture;
 - (vi) salt wind protection; and
- (d) social and psychological values.

A living tree is a dynamic organism that needs specific environmental conditions to continue healthy, stable growth. It is rarely possible to repair stressed and injured trees, so substantial injury needs to be avoided during all stages of development and construction. For trees to be retained and their requirements met, procedures must be in place to protect trees at every stage of the development process. This should be taken into account at the earliest planning stage of any outdoor event or design of a development project where trees are involved.

Trees and their root systems may occupy a substantial part of any development site and because of their potential size, can have a major influence on planning the use of the site.

Existing trees of appropriate species and sound structure can significantly enhance new development by providing immediate benefits such as shade and stormwater reduction as well as complementing new development.

Most trees will take many years and possibly decades to establish but can be injured or killed in a very short time as their vulnerability is commonly not understood. This is especially so in relation to tree root systems which cannot usually be seen. Irreparable injury frequently occurs in the early stages of site occupation and remedial measures routinely fail.

Early identification and protection of important trees on development sites is essential from the outset and will minimize the problems of retaining inappropriate trees.

Successful long term retention of trees on development sites depends on an acceptance and acknowledgment of the constraints and benefits that existing trees generate. Protecting trees in accordance with this Standard may influence design and construction costs and this should be considered in project budgets and contracts. The gains and benefits of retaining trees will accrue if the measures detailed in this Standard are applied.

STANDARDS AUSTRALIA

Australian Standard **Protection of trees on development sites**

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard provides guidance on the principles for protecting trees on land subject to development. It follows, in sequence, the stages of development from planning to implementation.

This Standard aims to assist those concerned with trees in relation to development. Where development is to occur, the Standard provides guidance on how to decide which trees are appropriate for retention, and on the means of protecting those trees during construction work. It does not argue for or against development, or for the removal or retention of trees nor does it consider the monetary value of trees. The Standard does not apply to the establishment of new trees.

1.2 APPLICATION

This Standard gives guidance to horticulturists, arborists, architects, builders, engineers, land managers, landscape architects, contractors, planners, determining authorities, building surveyors, certifiers, those concerned with the care and protection of trees, and all others involved in the management of trees and development.

1.3 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

1319 Safety signs for the occupational environment

4373 Pruning of amenity trees

4454 Composts, soil conditioners and mulches

4687 Temporary fencing and hoardings

1.4 DEFINITIONS

For the purpose of this Standard, the following definitions apply:

1.4.1 Determining authority

Those bodies responsible for issuing approvals.

1.4.2 Development

Includes the following:

- (a) The use of land (e.g. festival events, use of park areas and other events) that requires approval.
- (b) The subdivision of land.
- (c) The erection of a building.
- (d) The carrying out of a work.

- (e) The demolition of a building or works.
- (f) Road works.
- (g) The installation of utilities and services.
- (h) Any other act, matter or thing as defined by the relevant legislation.

1.4.3 Diameter at breast height (DBH)

The nominal trunk diameter at 1.4 m above ground level determined from the circumference of the trunk divided by π (π) (see Appendix A).

1.4.4 Project arborist

The person responsible for carrying out the tree assessment, report preparation, consultation with designers, specifying tree protection measures, monitoring and certification. The project arborist will be suitably experienced and competent in arboriculture, having acquired through training, qualification (minimum Australian Qualification Framework (AQF) Level 5, Diploma of Horticulture (Arboriculture)) and/or equivalent experience, the knowledge and skills enabling that person to perform the tasks required by this Standard.

1.4.5 Structural root zone (SRZ)

The area around the base of a tree required for the tree's stability in the ground. The woody root growth and soil cohesion in this area are necessary to hold the tree upright. The SRZ is nominally circular with the trunk at its centre and is expressed by its radius in metres.

This zone considers a tree's structural stability only, not the root zone required for a tree's vigour and long-term viability, which will usually be a much larger area.

1.4.6 Tree

Long lived woody perennial plant greater than (or usually greater than) 3 m in height with one or relatively few main stems or trunks (or as defined by the determining authority).

1.4.7 Tree protection zone (TPZ)

A specified area above and below ground and at a given distance from the trunk set aside for the protection of a tree's roots and crown to provide for the viability and stability of a tree to be retained where it is potentially subject to damage by development.

1.4.8 Vigour

Ability of a tree to sustain its life processes.

The term 'vigour' in this document is synonymous with commonly used terms such as 'health' and 'vitality'.

1.4.9 Work

Any physical activity in relation to land that is specified by the determining authority.

SECTION 2 PLANNING AND THE TREE MANAGEMENT PROCESS

2.1 TREE MANAGEMENT PROCESS

The success of the tree management process will depend on the cooperation of all involved in the design and development team. In particular, it is essential for those involved in site works to appreciate the need for maintaining the area of protection around the trees.

An example of the tree management process in relation to the stages of a typical development is set out in Table 1.

NOTE: Appendix B outlines potential damage to trees on development sites.

2.2 DETERMINING AUTHORITIES

Legal controls and liabilities under common law should be considered at the earliest stages of potential site development.

NOTE: Trees may be subject to legislation. Where development is proposed, additional protection may be appropriate and may be enforced by a determining authority.

Determining authorities have an important role in encouraging and enforcing the development process. Table 1 indicates the common stages in the development process and typical considerations and actions applicable to trees.

When development has been approved, planning conditions may be imposed for the management of trees.

TABLE 1
**INDICATIVE STAGES IN DEVELOPMENT AND THE TREE MANAGEMENT
PROCESS**

Stage in development	Tree management process	
	Matters for consideration	Actions and certification
Planning (Sections 2 and 3)		
Site acquisition	Legal constraints	
Detail surveys	Council plans and policies Planning instruments and controls Heritage Threatened species	Existing trees accurately plotted on survey plan
Preliminary tree assessment	Hazard/risks Tree retention value	Evaluate trees suitable for retention and mark on plan Provide preliminary arboricultural report and indicative TPZs to guide development layout
Preliminary development design	Condition of trees Proximity to buildings Location of services Roads Level changes Building operations space Long-term management	Planning selection of trees for retention Design review by proponent Design modifications to minimize impact to trees

(continued)

TABLE 1 (continued)

Stage in development	Tree management process	
	Matters for consideration	Actions and certification
Development submission	Identify trees for retention through comprehensive arboricultural impact assessment of proposed construction. Determine tree protection measures Landscape design	Provide arboricultural impact assessment including tree protection plan (drawing) and specification
Development approval	Development controls Conditions of consent	Review consent conditions relating to trees
Pre-construction (Sections 4 and 5)		
Initial site preparation	State based OHS requirements for tree work Approved retention/removal Refer to AS 4373 for the requirements on the pruning of amenity trees Specifications for tree protection measures	Compliance with conditions of consent Tree removal/tree retention/transplanting Tree pruning Certification of tree removal and pruning Establish/delineate TPZ Install protective measures Certification of tree protection measures
Construction (Sections 4 and 5)		
Site establishment	Temporary infrastructure Demolition, bulk earthworks, hydrology	Locate temporary infrastructure to minimize impact on retained trees Maintain protective measures Certification of tree protection measures
Construction work	Liaison with site manager, compliance Deviation from approved plan	Maintain or amend protective measures Supervision and monitoring
Implement hard and soft landscape works	Installation of irrigation services Control of compaction work Installation of pavement and retaining walls	Remove selected protective measures as necessary Remedial tree works Supervision and monitoring
Practical completion	Tree vigour and structure	Remove all remaining tree protection measures Certification of tree protection
Post construction (Section 5)		
Defects liability/maintenance period	Tree vigour and structure	Maintenance and monitoring Final remedial tree works Final certification of tree condition

NOTES:

- 1 Owing to variations in planning legislation this table is a general indication of the process only.
- 2 Certification of tree protection and condition should be carried out by the project arborist.

2.3 PLANNING**2.3.1 Site survey**

A detailed topographical survey should be made showing all existing site features.

NOTE: This should be made by a registered surveyor.

The survey plans should include—

- (a) location of all individual trees or groups of trees and other vegetation;

- (b) location of trees on land adjacent to the development site that may be impacted by the development;
- (c) crown spread, measured and drawn to scale, defining the actual crown spread;
- (d) other features, such as streams, creeks, watercourses, buildings and above and below ground services; and
- (e) spot heights of ground level throughout the development site and specifically including level at the base of individual trees as a basis for evaluating changes in soil level around retained trees.

NOTES:

- 1 Before commencing this survey, advice should be sought from the project arborist to confirm relevant items for inclusion in the survey.
- 2 Other vegetation may need to be surveyed to meet specific provisions of the determining authority or legislation.

2.3.2 Preliminary tree assessment

The preliminary assessment of the trees should take place at the beginning of the project, once any site surveys have been completed. The purpose of this assessment is to provide quantitative and qualitative information on the trees. All trees included in the site survey should be numbered and assessed by the project arborist as the basis for deciding which trees are suitable for retention. For each tree consideration should be given to—

- (a) correct botanical identification and common name;
- (b) vigour;
- (c) structure;
- (d) dimensions, height, crown spread and DBH;
- (e) age class;
- (f) estimated life expectancy;
- (g) heritage and/or cultural matters (refer Note 3);
- (h) ecological and habitat matters (refer Note 3);
- (i) the location relative to existing site features, e.g. its function as a screen or as a landmark feature;
- (j) other matters relevant to the site, e.g. surface roots; and
- (k) retention value.

NOTES:

- 1 These criteria should also be recorded for trees surveyed on adjacent properties.
- 2 Accuracy of the survey data to be verified by the arborist.
- 3 Input from other specialists may be required.
- 4 If trees require tagging use a temporary, non-injurious method.
- 5 A number of commonly used assessment methods are contained in documents listed in Appendix E.

2.3.3 Preliminary arboricultural report

Tree protection is most effective when considered at the earliest stage of development planning. The process will require reports at different stages. The most crucial reports are the Preliminary Arboricultural Report and the Arboricultural Impact Assessment.

The preliminary report is not intended to be the comprehensive tree protection report. This information is to be used by planners, architects and designers, in conjunction with any planning controls and other legislation, to develop the design layout in such a way that trees selected for retention are provided with enough space.

The report should list all the trees, providing all the details collected in the tree assessment (see Clause 2.3.2). Trees (or groups of trees) should be placed into categories based on their suitability for retention (for examples refer to documents listed in Appendix E).

Trees suitable for retention should be identified and marked on the detailed survey plan. This plan should also show the location of TPZs, trees to be transplanted and trees to be removed. TPZs are to be calculated as shown in Section 3.

2.3.4 Development design and review

The preliminary arboricultural report should guide the development layout. During the design and documentation stages, the project arborist should be involved in ongoing review of architectural, engineering (e.g. bulk earth works and construction drawings), services and landscape drawings. The purpose of this is to determine the potential impact on trees proposed to be retained.

Consideration should be given to tree sensitive measures such as pier and beam, suspended slabs, cantilevered building sections, screw piles and contiguous piling.

Service corridors should be established at the planning stage to avoid their redirection after works have commenced. It is essential that detailed plans show the routing of all services (above and below ground) in the proximity of trees.

Consideration should be given to activities required during the construction stage, such as over-excavation, scaffolding, temporary access roads, stockpiling materials, site sheds, temporary services and sediment control measures as well as the permanent elements of the development such as onsite water detention and storage.

2.3.5 Arboricultural impact assessment

The arboricultural impact assessment will be prepared once the final layout is complete. The report will identify trees to be removed, retained or transplanted. The report will identify possible impacts on trees to be retained. The report will explain design and construction methods proposed to minimize impacts on retained trees where there is encroachment into the calculated TPZ (refer to Clause 3.3.2). It will recommend measures necessary to protect the trees throughout all demolition and construction stages. Review of architectural, services and landscape plans should be included to provide an accurate impact assessment. If these plans are not available for review, it should be clearly stated in the report. Specification of tree protection measures will be included in construction documentation (refer to Section 4).

The report will include a tree protection plan (drawing) showing the TPZs for trees being retained taking into account the matters referred to in Section 3 and other protection measures. Groups of trees with overlapping TPZs may be included within a single protection area. A copy of this plan will form part of the development plans.

The tree protection plan should be included in subsequent construction documentation. The location of tree protection measures should also be shown on other documents such as demolition, bulk earth works, construction and landscape plans.