

**Technical Note TN197**

# **Provision of shade along paths**

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## 1 Introduction and purpose

This Technical Note provides guidance relating to providing shade along paths and directs transport practitioners to the various publications the Queensland Government has produced, on providing shade, that will assist in planning and designing transport infrastructure projects. This Technical Note provides additional content to supplement the Department of Transport and Main Road's (department) *Road Planning and Design Manual* and *Road Landscape Manual* and is designed as a temporary placeholder for the content, until it can be integrated into the manual at the next scheduled update.

The sections of this Technical Note are tailored to different issues that need to be considered and addressed for providing shade along paths. There are several disciplines involved, as well as a range of different issues, requiring consideration when planning and designing paths. This Technical Note is structured into the following sections:

- Section 2 is aimed at practitioners involved in planning and design and identifies the planning considerations and benchmarks for providing shade along paths.
- Section 3 is aimed at practitioners involved in preparing landscaping and vegetation plans and identifies the vegetation considerations and characteristics for selecting appropriate shade tree species.
- Section 4 is aimed at practitioners involved in road safety and the risk assessment processes and identifies the road safety considerations that need to be assessed when considering safety treatments and shade trees along the road corridor.

## 2 Shade provisions

The department's *Road Planning and Design Manual* (Volume 3 Part 6B) identifies that, where practical and considering safety requirements, trees should be provided at regular intervals to provide shade to path users. Shade should be selected and designed based on site-specific characteristics, detailed risk evaluation and engineering judgement.

When proposing shade trees along paths, practitioners must consult with the relevant road asset manager to incorporate their planning and design requirements. This includes considering natural or built shade types to respond to local conditions.

For Queensland roads, subject to road safety and vegetation requirements, the recommended provision rate for shade on paths is at least one street tree every 15 metres, or the equivalent in built shade, where there is pedestrian demand and activity. The following Queensland Government departments and publications provide more detailed guidance on implementing shade within Queensland.

- Department of Health – provides advice and guidance relating to planning, design and implementing shade and sun safety in public facilities, including paths and areas of pedestrian activity:
  - types of shade – guidance on selecting, assessing and the characteristics of natural (vegetation) and built shade (awnings and structures) types
  - design of shade – guidance on the design requirements for creating shade at public facilities, and
  - assessment of shade – guidance on assessing shade provisions and design criteria for ultraviolet radiation protection.
- Department of State Development, Infrastructure, Local Government and Planning (DSDILGP) – the *Walkability Improvement Tool* provides a methodology to identify and prioritise walkability improvements, such as shade provisions, in existing neighbourhoods and roads, and the *Model Code for Neighbourhood Design and Walkable Neighbourhoods* identifies the technical information and details that support providing shade along paths.
- Department of Energy and Public Works – the *QDesign Manual*, prepared by the Office of the Queensland Government Architect, provides guidance on the design principles for built form in Queensland, including provisions of shade.
- Queensland Legislation – the Planning Regulation 2017 identifies the assessment benchmarks and standards that apply to new roads, paths and subdivisions.

The Institute of Public Works Engineering Australasia, Queensland has supported DSDILGP by publishing the *Street Design Manual: Walkable Neighbourhoods*, which identifies further planning and design guidelines for shaded streets and paths for people walking.

### 3 Vegetation design considerations

Austrroads' *Guide to Road Design* Part 6A provides guidance on the design of paths for safe and efficient walking and cycling within and outside the road corridor. Austrroads directs practitioners to consider landscaping and planting characteristics, such as maturity size, maintaining sight distances and maintenance, when considering the location of paths. Table 3 outlines the characteristics that should be considered when selecting vegetation to act as shade trees along paths. Specific species are not identified, as practitioners need to select vegetation that responds to the site's climatic and soil conditions, native vegetation significance and local requirements.

The vegetation design considerations and characteristics in Table 3 should only be applied after the road safety considerations in Section 4 have been addressed and appropriate safety treatments implemented.

Practitioners should also consider the following guidance when selecting vegetation for shade:

- the department's *Road Landscape Manual* provides guidance on the maintenance and asset management of vegetation
- the department's *Public Transport Infrastructure Manuals* when considering vegetation surrounding public transport infrastructure, and
- the relevant local government planning scheme identifies local planning requirements.

**Table 3 – Characteristics for selecting shade trees**

Size category	Nominal mature height	Nominal mature spread	Nominal spacings	Nominal calliper diameter
Small trees	5-7 m	5 m	7.5 m	15-20 cm
Medium trees	8-15 m	10 m	10 m	25-50 cm
Large spreading trees	15+ m	15+ m	15 m	50-100+ cm
Tall narrow trees	20+ m	5-15 m	10 m	50-100 cm
Design and selection considerations				
Tree type	Size	<p>Tree species selection and installation must also take into consideration the anticipated mature size, canopy diameter and form to ensure branches do not conflict with and affect adjacent structures, buildings and infrastructure elements (for example, light poles, overhead electrical lines, power poles, Intelligent Transport System infrastructure and towers).</p> <p>Tree selection shall ensure species can provide appropriate clearance to services at maturity and/or are capable of being formatively pruned to ensure compliance.</p>		
	Height	<p>Tree selection shall ensure species provide appropriate vertical clearance over paths and roads at maturity and/or are capable of being formatively pruned to ensure clearway to paths and roads. Small trees may be suitable for use under powerlines, while still providing adequate vertical clearance for pedestrians and cyclists. Typically, small trees will not provide adequate vertical clearance for vehicles on the road and should be set back adequately from the outer edge line-marking of the carriageway.</p>		
	Drought resistant	<p>Ensure species are drought hardy, pest and disease resistant, have a proven performance under similar environmental conditions and will tolerate a reduced need for supplementary irrigation environment once established. Refer to local strategies for species to the region or, where strategies are not in place, consult the regional environmental officer or departmental landscape architects.</p> <p>Consult relevant local authorities, as several provide watersmart infrastructure to capture and reuse stormwater collected from kerbsides. Such infrastructure reduces the need for drought-resistant tree species to be selected, thereby allowing more lush, tropical species to be selected.</p>		
	Waterwise	<p>Where appropriate, consider waterwise street trees and landscaping along the road corridor, that incorporate water sensitive urban design. This approach will assist with vegetation maintenance, reduce tree-watering requirements and reduce the effects of stormwater. Refer to the road asset manager for further guidance on the design aspects of waterwise infrastructure, as it could require adjustments to kerbing and road drainage.</p>		
	Climate resilient	<p>In addition to selecting drought resistant tree species, consideration should also be given to tree species which can tolerate future climate conditions, including hotter temperatures and extremes of drought and flooding rains.</p>		

Design and selection considerations		
Planting	Trunk growth	Species planted near road pavements, structures and paths, should be adequately offset to make allowance for future trunk growth. Refer to Appendix 4 of the department's <i>Road Landscape Manual</i> for typical minimum offset requirements.
	Invasive root system	Tree plantings used near pavements or private properties, should not comprise species with known buttressing or invasive root systems (for example, <i>Ficus</i> , <i>Delonix (Poinciana)</i> and <i>Melaleuca</i> species). Exceptions may be approved by the relevant road authority where the proposed tree plantings are an extension to, reinforcement of, or replacement within an existing avenue of species, particularly with cultural heritage significance, or where identified in local street strategy plans. In such instances, the inclusion of root barrier systems and/or altering the engineering design of the pavement (for example, thicker concrete path and/or thickening beams to path) to mitigate the risk of damage, may need to be given consideration.
	Root zone	Where planting in contained concrete and pavement areas, consideration should be given to integrating permeable surfaces, such as structural soil cells and tree grates, as necessary, to promote increased root zone volume to ensure establishment and long-term health of the tree.
Safety	Fruit / seed drop	Species used near road pavements and pedestrian environments, should not have large or excessive seasonal fruit and seeds drop, or large quantities of flower, bark, or leaf drop. Exceptions may be approved by the region, where proposed tree plantings are an extension to, reinforcement of, or replacement within an existing avenue of species, particularly with significance to cultural heritage. In general, such species require a minimum 5 m clearance (unless noted otherwise) from the outer edge line-marking of the carriageway, to reduce potential surface (slip / skid) hazards / road pavement performance.
	Limb and nut drop	Species known to be prone to limb drop (for example, particular <i>Eucalyptus</i> , <i>Corymbia</i> and <i>Angophora</i> species), should be avoided near paths or road pavements, to mitigate the risk of falling branches directly affecting pedestrian or road users, or affecting network efficiency by creating non-traversable obstacles within trafficable lanes. Similarly, consideration should be given to the potential hazard risks of using species that may drop large nuts, pods and cones from height (for example, <i>Agathis</i> , <i>Araucaria</i> ) into pedestrian environments.
	Crime Prevention Through Environmental Design (CPTED)	In locations where CPTED concerns are an important design consideration (for example, retention of CCTV and passive surveillance viewsheds, retention of lighting illumination patterns), species selection should prioritise tall, narrow trees with clear trunk and high canopy clearances, to promote clear sight lines and visibility throughout the location and canopies above luminaires.
	Public Utility Plant (PUP) offsets	Where trees are proposed in proximity to underground services, offset requirements should be observed. Consideration may be given to reducing required offsets, by incorporating a root barrier system, or other integrated solution, to protect the service. Refer specific PUP providers minimum offset requirements and Appendix 4 of the <i>Road Landscape Manual</i> for typical minimum offset requirements.

## **4 Road safety**

### **4.1 Safe System integration**

The Safe System approach to road safety acknowledges that people will inevitably make mistakes and the network should be managed and designed to minimise the occurrence of crashes that result in fatal or serious injuries to people. The Safe System pillars and principles are described by Austroads in the *Guide to Road Safety and Guide to Road Design*.

Shade trees are appropriate for roads with walking infrastructure, higher pedestrian activity and lower speed environments. Section 3.3.2 of Austroads' *Guide to Road Design* Part 6B identified how planting vegetation can contribute to a Safe System approach to road design.

Similar to PUP, trees in high-speed environments can reduce road safety by introducing a hazard within the road reserve. Practitioners must determine the risk associated with trees in the speed environment and demonstrate the need for the tree to be located within the road reserve.

### **4.2 Detailed risk evaluation**

The department's *Road Planning and Design Manual* (Volume 3 Part 6), provides guidance on completing a detailed risk evaluation of roadside hazards along the road reserve and the treatment of potential hazards. This supports the guidance detailed in Austroads' *Guide to Road Design* Part 6.

Practitioners must consult with the relevant road authority, to establish the Network Roadside Risk Intervention Threshold (NRRIT) through a 'Risk Score', as part of the detailed risk evaluation of roadside hazards. The department will advise the NRRIT for state-controlled roads and local government will advise for local government-controlled roads.

Site specific engineering judgement will be required when considering shade trees, safety treatments, posted speeds and potential risk levels along roads with walking generating activity.

#### **4.2.1 Clear zone update**

The Austroads' *Guide to Road Design* Part 6, identifies the clear zone (also referred to as clear area), speed / distance metrics are no longer an appropriate method for determining the roadside safety area. Austroads advises that all hazards in the road reserve and their potential safety risks, should now be considered within the context of the road environment and characteristics (such as speed, land uses, level of pedestrian activity and urban or rural context). Establishing a clear zone adjacent to the road is one safety treatment that can be considered, based on the outcomes of the detailed risk evaluation.

Note: The clear zone is measured from the nearest through travel-lane and does not include on-road bicycle lanes, or kerbside parking (if permitted).

### **4.3 Treatments for existing trees**

The department's *Road Planning and Design Manual* (Volume 3 Part 6), provides guidance on the process for assessing safety treatment options within the road reserve. The assessment of existing trees should consider design options that could reduce the risk level, while maintaining the tree for shade. This should be considered before removing the tree, as tree retention is preferable, where possible.

Vegetation removal is one safety treatment option available. Prior to the removal of vegetation, a detailed risk evaluation supported by site-specific engineering judgement, should be completed which includes other safety treatments listed in the department's *Road Planning and Design Manual*.

Where a tree is to be retained and a barrier installed to mitigate risks, practitioners shall consider Australian Standard AS 4970 *Protection of Trees on Development Sites* when assessing and treating existing trees.

## 5 Related documents

Information related to shade provisions is listed in Table 5.

**Table 5 – Related documents**

Author	Document Title
Department of Transport and Main Roads	<a href="#"><i>Road Landscape Manual</i></a>
	<a href="#"><i>Road Planning and Design Manual</i></a> Parts 6, 6A, 6B
	<a href="#"><i>Public Transport Infrastructure Manuals</i></a>
Australian Standards	AS 4970 <i>Protection of Trees on Development Sites</i>
Austroroads	<a href="#"><i>Guide to Road Design</i></a> Parts 6, 6A, 6B
Department of Health	<a href="#"><i>Sun and shade basics</i></a>
	<a href="#"><i>Enhancing community wellbeing and liveability</i></a>
	<a href="#"><i>Design considerations</i></a>
	<a href="#"><i>Shade planning tools, technical guidelines and resources</i></a>
<a href="#"><i>Department of State Development, Infrastructure, Local Government and Planning</i></a>	<i>Model Code for Neighbourhood Design</i>
	<i>Walkable Neighbourhoods</i>
	<i>Walkable Neighbourhoods: Application overview</i>
	<i>Walkability Improvement Tool</i>
Department of Energy and Public Works	<a href="#"><i>QDesign Manual</i></a>
<a href="#"><i>Institute of Public Works Engineering Australasia, Queensland</i></a>	<i>Street Design Manual: Walkable Neighbourhoods</i>
	<i>Street Design Manual: Walkable Neighbourhoods Part 3 Practice Notes</i>



