The following information has been designed to accompany *The shade handbook* which contains general information essential to developing effective shade in any setting.

Click the links below to view the individual resources.

**Contents:**

Information sheets that cover specific settings where shade is a priority:

- early childhood centres
- schools
- public swimming pools
- beaches and other waterside recreation areas
- parks and reserves
- playgrounds
- sports grounds and facilities
- outdoor restaurants and cafes
- streetscapes
- homes

[Shade priority checklist template](#)

[Qualities of shade materials information sheets](#)
This information sheet has been written to assist directors, co-ordinators or management committees of early childhood centres to improve the quality of shade provided for babies, toddlers and children during outdoor play. It has been designed to accompany The shade handbook which contains general information essential to developing effective shade in any setting. The shade handbook is available from the Cancer Council WA website.

Please note that although the focus here is on centre-based early childhood programs, many of the issues are relevant to other children's services such as family day care, playgroups and pre-primary facilities at schools.

The importance of shade at early childhood centres

Australia has the highest rate of skin cancer in the world, with most skin cancers caused by overexposure to ultraviolet (UV) radiation from the sun. By reducing people’s exposure to the sun’s rays, the number of people affected by skin cancer can be decreased.

Sun protection is an important health and safety issue that early childhood centres need to address. All services, regardless of their size, can help prevent skin cancer because:

- One of the crucial periods for sustaining damage from overexposure to UV radiation occurs during childhood.
- Children and staff may attend services up to five days a week, often during the peak UV radiation period of each day.
- Children frequently play outdoors while attending these services.
- Sun protection in childhood and adolescence reduces the future risk of skin cancer.

Providing adequate shade is an important element in any early childhood centre’s sun protection strategy. However, as shade alone cannot provide total protection other protection measures should be encouraged. These include:

- Encouraging the use of personal protective measures such as wearing sun protective clothing, a broad brimmed hat, sunglasses and sunscreen.
- Scheduling outdoor activities to avoid the middle of the day when UV radiation levels are most intense.
- Ensuring staff act as role models by demonstrating appropriate sun protection behaviours.
- Providing education to children and their parents about the importance of sun protection.
It is essential that an assessment of existing shade be made before the planning and design of additional shade commences. Part 2 of *The shade handbook* contains a step by step approach to conducting a shade audit and how to plan and implement a shade project.

**Planning and design issues**
The following planning and design issues should be considered when planning shade development at early childhood centres. These issues are examined in greater detail in *The shade handbook*.

It is important to note the different areas within the outdoor space of an early childhood centre. These areas include:

- An open area for gross motor skills, such as running.
- A quiet area for focussed play, such as a sandpit.
- A formal quiet area for contained play, such as finger painting.
- An active area for busy physical play, such as climbing.
- A transition zone between indoor and outdoor areas, such as a verandah.
- While each area has its own shade requirements, they should be considered within the context of the whole site.

**Service types**
Shade planning and design for each service type will be influenced by the number of children in care and the size of the outdoor play space.

**Project team**
Representatives from management, staff, parents and relevant professionals such as architects or landscape architects should be involved in the design process. This will ensure that the need for shade is considered within the context of other issues and requirements.

**Existing shade**
Plans should be made to optimise the use of existing shade. For example, play equipment could be moved to a shaded area, or low branches could be removed from trees to allow children to play underneath.

**Site usage patterns**
Consider the usage patterns at the site, particularly the time of day and time of year it is most in use, and maximise shade at peak use times. If babies and toddlers are being catered for, there should be a separate play area for them within the outdoor space.
Climatic conditions
Consider the characteristics of the climate zone as well as any local weather conditions, such as strong winds or salt (which leads to corrosion). These factors will affect the design of a shade structure as well as the selection of tree species.

Seasonal considerations
Ensure new shade does not make an area uncomfortable and cold in winter. A shade structure may also provide rain protection for children.

Indirect UV radiation
Design shade structures to minimise indirect UV radiation. Shade structures should be of a sufficient size to ensure people can move away from the edges. The shade canopy should extend at least one metre past the actual areas of use with vertical barriers built into the sides.

Modify or select surfaces to reduce reflected UV radiation. For example, replace smooth concrete with brick or grass. Vertical surfaces such as walls should also be made of materials that reduce reflected UV radiation.

Aesthetics
Make structures both practical and attractive to encourage use. An approach which combines both natural and built shade is preferable. Using a range of different shade structures will help to create a more interesting play space. Visually attractive components include:

- Coloured sails.
- Structures with textured sides or spaces to view through.
- Structures that support flowering vines.
- Trees, shrubs and vines with different seeding, flowering and fruiting habits (ensure that these are not potentially hazardous to children).

Using a variety of tree and shrub species will also help to create a more interesting and stimulating environment for children.

Supervision
Children must be supervised by staff at all times. Staff and children need to have a clear view of each other during teaching activities. Designs that may hinder supervision and views include shade structures with solid or opaque sides, or low placement of overhead sails. Trees and shrubs also have the potential to obstruct supervision if they are inappropriately located.

Approval
Check local government requirements for built shade structures as you may need development approval.
Natural shade
Natural shade should be a major element of shade provision within an outdoor play space. Trees with dense foliage and wide spreading canopies provide the best protection, although leaves can create ongoing maintenance problems for sandpits.

Species should be selected to suit local soil and climatic conditions as well as the character of the surrounding environment. Root barriers and subsoil drainage will ensure adjacent paved areas are not damaged by tree roots.

Dense shrubs also have the potential to provide shade. They should be planted around the perimeter of a site so they do not obstruct supervision. Pruning shrubs on the underside may allow for shaded play nooks to be created underneath.

Shrubs and trees selected for the play space should be non-toxic and should not be dangerous in other ways. For example, avoid species that:

- Have seed pods or stone-fruit (a potential choking hazard for children under five years of age).
- Attract bees.
- Have thorns or spikes.
- Are known to cause adverse health effects such as asthma and skin irritation.
- Drop branches.

Temporary built structures can be used until trees planted for shade purposes mature.

Safety
It is important to ensure that shade structures do not create safety hazards. Support systems such as upright posts should be clearly visible and ideally have rounded edges or padding. Wherever possible guy ropes should be avoided as they can be a tripping hazard. Vertical barriers at the sides of shade structures should be designed to prevent children using them for climbing.

Scale
Shade structures should allow adult access to children's play areas. A head clearance of approximately 2 metres is recommended for shade structures. If vertical barriers are to be placed at the side of structures they should allow for views through at child height, rather than adult height. The useability of the floor space underneath the structure must also be considered. It should be of a sufficient size and shape to allow children to gather or play actively underneath.

Demountable structures
Demountable shade structures should only be used to supplement more permanent forms of shade. Some demountable structures such as umbrellas offer only limited protection and may be unstable during windy conditions.

Rain protection
It may be desirable to design shade structures that offer both UV radiation and rain protection.

Existing services
Consider the location of existing services such as drainage, power lines, gas and water.
# Recommendations

| Open areas | Partial shade is recommended, especially over grass which needs some sun for growth.  
Natural shade is the most appropriate option.  
Consider arranging planting in clusters so that groups of children can access shade.  
Deciduous trees will allow for penetration of warmth and light to the play space during cooler months. |
|---|---|
| Quiet areas | Shade throughout the year is recommended, particularly over sand pits.  
A permanent shade system is the most appropriate option.  
The need for winter warmth and light should be considered where appropriate. |
| Active areas | Shade throughout the year is recommended over fixed play equipment and areas where children play for extended periods of time, such as a sandpit.  
Moveable equipment used for active play, such as a climbing frame, should be placed in the shade.  
Consider using a combination of built and natural shade.  
The need for winter warmth and light should be considered where appropriate. |
| Fixed play equipment | Safety is a major consideration for shade provision over fixed play equipment.  
Shade structures over fixed play equipment should not have footholds or grip surfaces which would allow for climbing.  
The roofline of the shade structure should extend at least 500 mm beyond the edge of the deck of the play equipment, to prevent child access on the roof.  
The roof of the shade structure should allow for a minimum head clearance height of two metres above the deck of the play equipment. |
### Fixed play equipment (cont.)

Tree trunks and upright posts of shade structures should be located a minimum distance of two metres away from the most fully extended part of the play equipment, such as the side of a climbing platform or the end of an extended swing arc. This will ensure sufficient free-fall zones.

### Transition zones

Verandahs will provide permanent shade as well as rain protection.

The angle of the roof and the extent of overhang should be designed to maximise shade for the majority of the day, especially during summer.

The width of the verandah should be a minimum of four metres to allow for shaded play space underneath.

Roof materials should be selected to minimise heat build-up during summer. The roof should be insulated (with at least a ceiling cavity and preferably with insulation material) and airflow points should be provided.

Terraces, with a deciduous, vine-covered pergola or an adjustable shade system, will provide seasonal shade. Some canopies will also provide rain protection.

Retractable or louvered shade canopies should be easily adjustable, ideally by one person at ground level.

A combination of fixed roof verandah and terrace spaces may be desirable for some services.

Vertical pull-down blinds at the side of a verandah or terrace can provide additional protection from UV radiation when the sun is low in the sky.

### Baby/toddler area

Shade throughout the year is recommended.

Consider using a combination of natural and built shade. The need for winter warmth and light should be considered where appropriate.
Further information
The Cancer Council’s SunSmart Centres Program recognises early childhood centres that are taking a proactive role in protecting the children and staff in their care from harmful UV radiation from the sun. For more information contact the SunSmart Education Coordinator on (08) 9388 4333 or email sunsmart@cancerwa.asn.au.

The resource ‘SunSmart Childcare: A guide for service providers’ provides more detailed information about how early childhood service providers can implement sun protection strategies.

To access this resource please contact the Resource Officer at Cancer Council Western Australia on (08) 9388 4363/4362 or resourceofficer@cancerwa.asn.au.

Also refer to the following information sheets included in this series:
- Shade for playgrounds.
- Shade for homes.

The information contained in this resource has been sourced from:
Shade for everyone: A practical guide for shade development, 2004 (Cancer Council Victoria)
Under cover: Guidelines for shade planning and design, 2005 (NSW Health Department, Cancer Council NSW, Cancer Institute NSW)
This information sheet has been written to assist school communities to improve the quality of shade provided for students, staff and visitors. It has been designed to accompany *The shade handbook* which contains general information essential to developing effective shade in any setting. *The shade handbook* is available from the [Cancer Council WA website](http://www.cancerwa.asn.au/sunsmart).

**The importance of shade at schools**

Australia has the highest rate of skin cancer in the world, with most skin cancers caused by overexposure to ultraviolet (UV) radiation from the sun. By reducing people’s exposure to the sun’s rays, the number of people affected by skin cancer can be decreased.

Sun protection is an important health and safety issue that schools need to address. Schools can make a significant contribution to the prevention of skin cancer because:

- The sun exposure children and adolescents receive while they are young increases their risk of developing skin cancer as adults. Protecting children and adolescents from UV radiation will reduce the risk of skin cancer in the future.
- Students and staff attend school throughout much of the year and during the time when UV radiation is most intense, around the middle of the day.
- Students often spend time outdoors while at school.
- Schools are important settings through which to promote education about UV radiation and sun protection.

Providing adequate shade is important in any school’s sun protection policy and practice. However, as shade alone cannot provide total protection other protection measures should be encouraged. These include:

- Scheduling events and activities to avoid the middle of the day when UV radiation levels are most intense.
- Encouraging students, staff and visitors to adopt personal protective measures such as wearing sun protective clothing, a broad brimmed hat, sunglasses and sunscreen.
- Educating students and parents about the importance of sun protection. Ensuring staff act as role models by demonstrating appropriate sun protection behaviours.

It is essential than an assessment of existing shade be made before the planning and design of additional shade commences. Part 2 of *The shade handbook* contains a step by step approach to conducting a shade audit and how to plan and implement a shade project.

**Planning and design issues**

The following planning and design issues should be considered when planning shade development at a school. These issues are examined in greater detail in *The shade handbook*. It is important to note the different areas of a school, including:

- Active playground areas for ball games and free play.
- Passive playground areas for eating lunch and socialising.
- Covered assembly areas.
- Canteen areas.
- Bus stop areas.
- Pedestrian links and transition zones.
Some schools also have specialist facilities such as swimming pools, tennis courts, sports fields or agricultural areas. While each area has its own shade requirements, they should be considered within the context of the whole site.

Project team
Ideally representatives from school management, teaching staff and parents as well as relevant professionals such as architects and landscape architects should be involved. This will help to ensure that the need for shade is considered within the context of other issues, including long term development plans for the site.

If the school grounds are used by community groups on weekends or during school holidays, it may be appropriate to liaise with them during the project, particularly if it will cause disruption to the areas they use.

Student participation
Students should be consulted and involved throughout the shade project. For example, they could undertake certain tasks in the shade audit.

Existing shade
Plans should be made to optimise the use of existing shade before additional shade is considered. For example, fixed seating could be relocated to a shaded area, low branches could be removed from trees to allow access to shady areas and playground use could be reviewed to permit access to shaded out-of-bounds areas.

Site usage patterns
It is important to take into account the usage patterns at the site, particularly the times of day different activities occur. Students’ play and social patterns also need to be considered. For example, primary school children are generally required to eat lunch in class groups while secondary students may tend to gather in small discreet clusters.

Active and passive use
Sufficient shade should be provided for students to undertake active outdoor activities such as free play, physical education classes and sport, particularly during summer. Sufficient shade should also be provided for eating and socialising, 'lining up' (especially after recess and lunch) and assemblies, particularly during summer. These activities could be undertaken in covered assembly areas, active playground areas or specific passive-use areas.

Climatic conditions
Consider the characteristics of the climate zone as well as any local weather conditions, such as strong winds or salt (which leads to corrosion). These factors will affect the design of a shade structure as well as the selection of tree species.
Seasonal considerations
Although summer protection is a priority, provision for winter shade should also be made in most locations across WA. Care needs to be taken to ensure that new shade initiatives do not intensify winter conditions at the site.

Summer shade provision should minimise UV radiation levels as well as reduce heat and light. Winter shade provision should minimise UV radiation levels, while allowing for transmission of sufficient levels of heat and light. The use of adjustable shade systems and deciduous vegetation may provide greater flexibility.

Indirect UV radiation
Design shade structures to minimise indirect UV radiation. Shade structures should be of a sufficient size to ensure people can move away from the edges. The shade canopy should extend at least one metre past the actual areas of use with vertical barriers built into the sides. Modify or select surfaces to reduce reflected UV radiation. For example, replace smooth concrete with brick or grass. Vertical surfaces such as walls should also be made of materials that reduce reflected UV radiation.

Aesthetics
Shade design should aim to be aesthetically pleasing as well as practical. Generally, an approach which combines both natural and built shade is preferable. Using a variety of tree and shrub species will also help to create a more interesting environment.

Approval
Check with the Department of Education and Training or the local council to determine whether you will need approval to build a shade structure.

Natural shade
Natural shade should be a major element of shade provision within a school. Trees with dense foliage and wide spreading canopies provide the best protection. Species should be selected to suit local soil and climatic conditions as well as the character of the surrounding environment. Root barriers and subsoil drainage will help to ensure that pavements are not damaged by tree roots. Dense shrubs also have the potential to provide shade.

Avoid shrubs and trees that:
- Are toxic.
- Have seed pods or stone-fruit.
- Attract bees.
- Have spikes or thorns.
- Are known to cause adverse health effects such as asthma or skin irritation.
- Drop their branches.

Temporary built structures can be used until trees planted for shade purposes mature.
Safety
It is important to ensure that shade structures do not create safety hazards. Support systems such as upright posts should be clearly visible and ideally have rounded edges or padding. They should be placed so as to minimise intrusion into play and circulation areas. Where possible guy ropes should be avoided as they may become a tripping hazard. In addition, vertical barriers at the sides of shade structures should be designed to prevent children using them for climbing.

Demountable structures
Demountable shade structures should only be used to supplement more permanent forms of shade. Some demountable structures such as umbrellas offer only limited protection and may be unstable during windy conditions.

Rain protection
Schools often lack sufficient wet weather shelter. Built structures that offer both UV radiation and rain protection can help overcome this issue.

Vandalism
As school grounds are often accessible after hours, the risk of vandalism needs to be considered.

Emergency access
Shade structures and planting should not restrict emergency vehicle access to school buildings and grounds.

Existing services
The location of shade structures and planting should take account of existing services such as drainage, power lines, gas, and water.

Carnivals
Shade is an important consideration for sports and swimming carnivals and other school events such as fetes. Demountable structures may be useful on these occasions.

Recommendations

<table>
<thead>
<tr>
<th>Active playgrounds</th>
<th>Partial shade is recommended for open playground areas, especially over grass which needs some sun for growth. Natural shade is the most appropriate option.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Consider arranging planting in clusters so that groups of children can access shade. Deciduous trees will allow for penetration of warmth and light to the playground during winter.</td>
</tr>
<tr>
<td></td>
<td>Shade throughout the year is recommended over play equipment and sandpits. Consider using a combination of built and natural shade. The need for winter warmth and light may be an issue.</td>
</tr>
</tbody>
</table>
### Passive playgrounds

Shade throughout the year is recommended for areas of passive playground use such as fixed seating and assembly areas.

- Relocate seating to areas of shade.
- Consider using a combination of natural and built shade.
- If appropriate, the need for winter warmth and light should be considered.

### Fixed play equipment areas

Safety is a major consideration for shade over fixed play equipment. Shade structures, in particular poles, should not have footholds or grip surfaces which allow for climbing.

- Extend rooflines at least 500 mm beyond the edge of the deck of the play equipment to prevent access to the roof.
- Provide clearance from the highest accessible point that a child might reasonably be expected to reach by climbing. The roof of the shade structure should allow for a minimum head clearance height of 2.5 metres above the deck of the play equipment.
- Ensure a free fall zone exists within the play area. Tree trunks and upright posts should be located a minimum distance of 2.5 m away from the most fully extended part of the play equipment, such as the end of an extended swing arc or the side of a climbing platform.
- Any shade structure in the play area should be designed with reference to AS/NZS 4486.1:1997 Playgrounds and playground equipment – development, installation, inspection, maintenance and operation.

### Sports grounds and facilities

Use built shade over all seated spectator areas. This will also provide protection from the rain.

- Natural shade or a combination of natural and built shade is recommended for other spectator areas.
- Provide shade for competitors in the marshalling area and for officials. Demountable shade may be the most appropriate option for these locations.

### Canteen areas

Shade throughout the year is recommended for queuing areas. Built shade such as a broad awning is the most appropriate option. Rain protection is recommended.
Shade is recommended for thoroughfares linking buildings and facilities within a school. Consider using a combination of natural and built shade.

Rain protection is recommended, particularly where students are moving from one building to another throughout the day.

Shade is recommended for waiting areas at school bus stops, particularly during summer. Consider using natural shade although where possible built structures that offer both UV radiation and rain protection should be provided.

Although school bus stops will usually be part of the general streetscape and therefore outside the school boundaries, it may be possible to shade the area by planting trees immediately within the boundary.

Further information
The SunSmart Schools Program is a nationally recognised program for schools that have a strong commitment to sun protection. Cancer Council WA has also developed the Generation SunSmart website especially for teachers and school nurses to increase their knowledge of sun safety issues. To learn more visit www.generationsunsmart.com.au or www.cancerwa.asn.au/sunsmart.

For further resources please contact the Resource Officer at Cancer Council Western Australia on (08) 9388 4363/4362 or resourceofficer@cancerwa.asn.au.

Also refer to the following information sheets in this series:
• Shade for public swimming pools.
• Shade for sports grounds and facilities.
• Shade for playgrounds.

The information contained in this resource has been sourced from:
Shade for everyone: A practical guide for shade development, 2004 (Cancer Council Victoria)
Under cover: Guidelines for shade planning and design, 2005 (NSW Health Department, Cancer Council NSW, Cancer Institute NSW)
This information sheet has been written to assist managers of swimming pool venues to improve the quality of shade provided for patrons. It has been designed to accompany *The shade handbook* which contains general information essential to developing effective shade in any setting. *The shade handbook* is available from the Cancer Council WA website.

**The importance of shade at public swimming pools**

Australia has the highest rate of skin cancer in the world, with most skin cancers caused by overexposure to ultraviolet (UV) radiation from the sun. By reducing people’s exposure to the sun’s rays, the number of people affected by skin cancer can be decreased.

Swimming is a popular activity in Australia, particularly during summer. For many people a public swimming pool offers a safe and convenient place for swimming and socialising. However, when pools are located outdoors, patrons’ risk of overexposure to harmful UV radiation can be high. This is because:

- Public pools are commonly used in summer when annual UV radiation levels are most intense.
- Pool users typically wear minimal clothing.
- There is often little shade.
- There are often high levels of indirect UV radiation.

Providing shade at swimming pools contributes to a safer environment for the general public. However, as shade alone cannot provide total protection other protection measures should be encouraged. These include:

- Scheduling events and activities to avoid the middle of the day when UV radiation levels are most intense.
- Encouraging patrons to adopt personal protective measures such as wearing sun protective clothing, a broad brimmed hat, sunglasses and sunscreen.
- Broadcasting sun protection messages over the public address system and erecting signage to remind patrons to take care.
- Ensuring staff (lifeguards, swimming instructors, pool attendants etc) act as role models by demonstrating appropriate sun protection behaviours.

It is essential that an assessment of existing shade be made before the planning and design of additional shade commences. *Part 2 of The shade handbook* contains a step by step approach to conducting a shade audit and how to plan and implement a shade project.
Planning and design issues
The following planning and design issues should be considered when planning shade development at a swimming pool. These issues are examined in greater detail in *The shade handbook*.

It is important to note the different areas of a swimming pool complex, including:
- Spectator areas.
- Aquatic areas.
- Playgrounds.
- Refreshment areas.
- Pedestrian links and concourse.

While each area has its own shade requirements, they should be considered within the context of the whole site.

Existing shade
Plans should be made to optimise the use of existing shade. For example, fixed seating could be moved to a shaded location, or trees could be pruned to improve access to shady areas.

Site usage patterns
Consider the usage patterns at the site, particularly the time of day and time of year it is most in use, and maximise shade at peak use times.

Carnivals
Provide sufficient shade for participants, competitors, officials and spectators at large events such as carnivals and competitions. Pool management could offer the use of portable structures as part of pool hiring packages.

Climatic conditions
Consider the characteristics of the climate zone as well as any local weather conditions, such as strong winds or salt (which leads to corrosion). These factors will affect the design of a shade structure as well as the selection of tree species.

Indirect UV radiation
Swimming pools experience high levels of indirect UV radiation from the water and concourse surfaces. While it is difficult to eliminate indirect UV radiation in this situation, exposure can be minimised. For example, shade structures should be of a sufficient size to ensure people can move away from the edges. The shade canopy should extend at least one metre past the actual areas of use with vertical barriers built into the sides. Select or modify ground surfaces to reduce reflected UV radiation, such as replacing smooth concrete with brick or grass.

Aesthetics
Make structures both practical and attractive to encourage use. An approach which combines both natural and built shade is preferable.
Approval
Check local government requirements for built shade structures as you may need development approval.

Natural shade
Natural shade should be a significant element of shade provision for the perimeters of areas adjacent to pools. Trees with dense foliage and wide spreading canopies provide the best protection.

Species should be selected to suit local soil and climatic conditions as well as the character of the surrounding environment. Root barriers and subsoil drainage will help ensure that pavements are not damaged by tree roots. Temporary built structures can be used until trees planted for shade purposes mature.

Safety
It is important to ensure that shade structures do not create safety hazards. Support systems such as upright posts should be clearly visible and ideally have rounded edges or padding. Wherever possible guy ropes should be avoided as they can be a tripping hazard.

Sightlines
Shade structures should not obstruct sightlines and views of the pool area for lifeguards, spectators or officials.

Corrosion
The supporting systems of shade structures should not be placed in or near the pool as structural corrosion may occur.

Personal shade hire
Personal shade structures such as umbrellas could be available for hire. The income from such a scheme could be used to provide additional shade at the site.

Existing services
Consider the location of existing services such as drainage, power lines, gas and water.

Recommendations

<table>
<thead>
<tr>
<th>Spectator areas</th>
<th>Provide shade over all seated spectator areas. A permanent shade system is the most appropriate option.</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Provide shade within general spectator areas, particularly where people relax after a swim. A combination of built and natural shade is most appropriate.</td>
</tr>
<tr>
<td></td>
<td>There should be enough shade to allow use by most spectators. Use demountable structures during busy times to supplement permanent shade.</td>
</tr>
</tbody>
</table>
**Aquatic areas**

Provide shade throughout the year over the toddler pool and surrounding supervising area. A permanent system is most appropriate. Where possible, provide shade where children's swimming lessons are held - often in the shallow end of the pool. Consider a demountable or adjustable system so that shade can be removed during winter if appropriate.

Provide demountable shade for marshalling and official areas during carnivals and competitions.

**Concourse**

Extend shade over pools and adjacent spectator areas so that the concourse is also shaded.

Use ground surfaces that reflect minimal UV radiation.

**Refreshment areas**

Provide shade at kiosk queuing areas. Built shade, sized to cater for capacity crowds, is the most appropriate.

Provide shade over fixed picnic tables, BBQ areas and other areas where refreshments are consumed.

Use ground surfaces that reflect minimal UV radiation.

**Entrance zones and pedestrian links**

Consider planting avenues of trees to provide shade over common pedestrian routes such as between the main entrance and change-room areas.

Provide shaded seating at common meeting points around swimming pools.

Use ground surfaces that reflect minimal UV radiation.

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**Further information**

For further resources please contact the Resource Officer at Cancer Council Western Australia on (08) 9388 4363/4362 or resourceofficer@cancerwa.asn.au. For more information on sun protection visit [www.cancerwa.asn.au/sunsmart](http://www.cancerwa.asn.au/sunsmart).

Also refer to the following information sheets in this series:

- Shade for playgrounds.
- Shade for outdoor restaurants, cafes and beer gardens.

The information contained in this resource has been sourced from:

- Shade for everyone: A practical guide for shade development, 2004 (Cancer Council Victoria)
- Under cover: Guidelines for shade planning and design, 2005 (NSW Health Department, Cancer Council NSW, Cancer Institute NSW)
This information sheet has been written to assist agencies managing beaches and other waterside recreation areas such as lakes and inland rivers to improve the quality of shade provided for the public. It has been designed to accompany *The shade handbook* which contains general information essential to developing effective shade in any setting. *The shade handbook* is available from the [Cancer Council WA website](http://www.cancerwa.asn.au/sunsmart).

**The importance of shade at beaches and other waterside recreation areas**

Australia has the highest rate of skin cancer in the world, with most skin cancers caused by overexposure to ultraviolet (UV) radiation from the sun. By reducing people’s exposure to the sun’s rays, the number of people affected by skin cancer can be decreased.

Beaches and other waterside recreation areas are traditionally popular places of leisure, recreation and socialising for many people living in Western Australia. However users risk overexposure to harmful UV radiation because:

- Users typically wear minimal clothing.
- People often spend extended periods of time in these areas.
- There are high levels of indirect UV radiation.
- There is little shade on the beach itself and often shade on adjacent reserves is also inadequate.

Providing shade at beaches and other waterside recreation areas contributes to a safer environment for the general public. However, as shade alone cannot provide total protection other protection measures should be encouraged. These include:

- Scheduling events and activities to avoid the middle of the day when UV radiation levels are most intense.
- Encouraging the public to adopt personal protective measures such as wearing sun protective clothing, a broad brimmed hat, sunglasses and sunscreen.
- Erecting signage to remind people to take care.

It is essential that an assessment of existing shade be made before the planning and design of additional shade commences. Section 2 of *The shade handbook* contains a step by step approach to conducting a shade audit and how to plan and implement a shade project.
Planning and design issues
The following planning and design issues should be considered when planning shade development at a beach or other waterside recreation area. These issues are examined in greater detail in *The shade handbook*.

Sand areas
Providing shade to the sand areas of beaches should be a major consideration. This can be achieved by a cantilevered structure over the sand from walkways or areas immediately adjacent to the beach. Trees planted as near as possible to the sand may also provide shade. Lightweight structures such as tension membrane structures or overhead sails can be erected directly over the sand areas. These could be designed to allow for removal during winter months and could provide financial benefits by carrying sponsors' messages.

Modifying site usage
While it may not be feasible to provide permanent shade on the beach itself, permanent shade should be provided at adjacent public reserves. Beaches and adjacent reserves should be as integrated as possible so that people will be more inclined to retreat from unshaded sand areas. If reserves are slightly elevated, close to the sand, easily accessible and offer shade, it is likely they will be extensively used. The shade requirements for different areas within a reserve will vary according to the type of activities that occur there. For example, in areas where people are sitting in one spot, such as picnic tables, the need for permanent shade over a significant part of the area is high. In areas where people are active and mobile, such as large grassed areas, it is more difficult to position shade so that it will be effective. Occasional scattered shade however should still be considered for these areas.

Carnivals
Shade is an important consideration for large scale events such as surf life saving carnivals. Demountable shade structures can be used to provide shade over areas for spectators, competitors and officials.

Indirect UV radiation
Indirect UV radiation is an important factor to consider due to the high levels of reflected UV radiation at beaches. While it is difficult to eliminate indirect UV radiation in this situation, its effect on adjacent reserve areas can be reduced by planting panels of vegetation between the beach and reserve. Shade structures at reserves, as well as on the sand, should also be designed to control indirect UV radiation. For example, they should be of a sufficient size to ensure people can move away from the edges. The shade canopy should extend at least one metre past the actual area of use, with vertical barriers built into the sides.

The potential for exposure to indirect UV radiation should also be considered when selecting ground surfaces within reserve areas. Existing surfaces can be modified if they reflect high levels of UV radiation. For example, replace smooth concrete or light coloured sand with brick or grass.
Aesthetics
Shade design should aim to be aesthetically pleasing as well as practical. Generally, an approach which combines built and natural shade is preferable.

Natural shade
Natural shade should be a major element of shade provision at public reserve areas adjacent to beaches. Trees with dense foliage and wide spreading canopies provide the best protection. Trees should be selected to suit local soil and climatic conditions as well as the character of the surrounding environment. They should also be salt-resistant. Root barriers and subsoil drainage will help to ensure that adjacent pavements are not damaged by tree roots. Temporary built structures can be used until trees planted for shade purposes mature.

Safety
It is important to ensure that shade structures do not create safety hazards. Support systems such as upright posts should be clearly visible and ideally have rounded edges. They should be placed so as to minimise intrusion into circulation areas. Where possible guy ropes should be avoided as they may become a tripping hazard.

Sightlines
Shade structures should not obstruct peoples' views of the beach area, particularly lifeguards' views.

Corrosion and wind
Shade structures in coastal areas will be subject to corrosion from salt as well as frequent high wind conditions. These issues should be considered in the design of supporting structures and the selection of shade materials.

Personal shade hire
Personal shade structures such as umbrellas or sun domes could be available for hire. Surf clubs, neighbouring shops and local councils could provide this service. However, it should be noted that because of indirect UV radiation umbrellas provide only limited protection.

Vandalism
As beaches and adjacent reserves are accessible at all hours of the day and night, the risk of vandalism is an issue that needs to be considered.

Recommendations

<table>
<thead>
<tr>
<th>Sand areas</th>
<th>Consider providing shade to popular sand areas. Long-span, lightweight, demountable systems are the most appropriate option.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Trees and overhanging built structures located as close as possible to the edge of the beach will provide shade to sand areas.</td>
</tr>
<tr>
<td></td>
<td>Facilities for beach inspectors and lifeguards must be fully shaded.</td>
</tr>
</tbody>
</table>
# The Shade Handbook

**Shade for Beaches and Other Waterside Recreation Areas**

## Areas Adjacent to Beach

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shade</strong></td>
<td>Shade should be provided at adjacent reserves, particularly towards the beach side. Shade is recommended for queuing areas at kiosks. Built shade such as a broad awning is the most appropriate option. Awnings should be of a sufficient size to cater for capacity crowds. Consider rain protection qualities when selecting a shade material. Shade is recommended over picnic tables and other areas where refreshments are consumed, particularly during the middle period of the day. Where possible, ground surfaces surrounding these areas should reflect minimal levels of UV radiation, heat and light.</td>
</tr>
</tbody>
</table>

## Playgrounds

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Partial shade</strong></td>
<td>Provide partial shade for open areas of playgrounds, especially over grass that needs sun for growth. Natural shade is recommended.</td>
</tr>
<tr>
<td></td>
<td>Provide shade throughout the year over children's play equipment and sandpits. Generally a permanent structure is most appropriate.</td>
</tr>
<tr>
<td></td>
<td>Provide shade over seating. Ensure placement of shade does not obstruct parents' view of play areas.</td>
</tr>
</tbody>
</table>

## Fixed Play Equipment

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Safety</strong></td>
<td>Safety is a major consideration for shade over fixed play equipment.</td>
</tr>
<tr>
<td></td>
<td>Shade structures, in particular poles, should not have footholds or grip surfaces which allow for climbing.</td>
</tr>
<tr>
<td></td>
<td>Extend rooflines at least 500 mm beyond the edge of the deck of the play equipment, to prevent access to the roof.</td>
</tr>
<tr>
<td></td>
<td>Provide clearance from the highest accessible point that a child might reasonably be able to reach by climbing.</td>
</tr>
<tr>
<td></td>
<td>The roof of the shade structure should allow for a minimum head clearance height of 2.5 metres above the deck of the play equipment.</td>
</tr>
<tr>
<td></td>
<td>Ensure a freefall zone exists within the play area. Tree trunks and upright posts should be located a minimum distance of 2.5 m away from the most fully extended part of the play equipment, such as the end of an extended swing arc or the side of a climbing platform.</td>
</tr>
<tr>
<td></td>
<td>Any shade structure in the play area should be designed with reference to AS/NZS 4486.1:1997 Playgrounds and playground equipment – development, installation, inspection, maintenance and operation.</td>
</tr>
</tbody>
</table>
The shade handbook
Shade for beaches and other waterside recreation areas

### Picnic and BBQ areas
- Shade is recommended over picnic tables and BBQ areas.
- Surfaces should reflect minimal UV radiation, heat and light.
- Fire safety is an important consideration for BBQ areas, particularly when selecting material for shade canopies and when planting trees.

### Pedestrian links
- Plant avenues of trees over common pedestrian routes.
- Provide shaded seating at common meeting points.
- Ground surfaces should reflect minimal UV radiation, heat and light.

### Further information
For further resources please contact the Resource Officer at Cancer Council Western Australia on (08) 9388 4363/4362 or email resourceofficer@cancerwa.asn.au. For more information on sun protection visit [www.cancerwa.asn.au/sunsmart](http://www.cancerwa.asn.au/sunsmart).

Also refer to the following information sheets in this series:
- Shade for parks and reserves.
- Shade for playgrounds.
- Shade for outdoor restaurants, cafes and beer gardens.

The information contained in this resource has been sourced from:
Shade for everyone: A practical guide for shade development, 2004 (Cancer Council Victoria)
Under cover: Guidelines for shade planning and design, 2005 (NSW Health Department, The Cancer Council NSW, Cancer Institute NSW)
This information sheet has been written to assist agencies managing parks and reserves to improve the quality of shade provided for the public. It has been designed to accompany *The shade handbook* which contains general information essential to developing effective shade in any setting. *The shade handbook* is available from the Cancer Council WA website.

**The importance of shade at parks and reserves**

Australia has the highest rate of skin cancer in the world, with most skin cancers caused by overexposure to ultraviolet (UV) radiation from the sun. By reducing people's exposure to the sun's rays, the number of people affected by skin cancer can be decreased.

Parks and reserves are used by people of all ages throughout the year. Heaviest usage often coincides with the summer months and during the middle of the day when levels of UV radiation are most intense. Therefore the need for shade is generally high.

Providing shade at parks and reserves contributes to a safer environment for the general public. Increased comfort levels afforded by well-designed shady environments, which provide cooling in summer, are also likely to increase users' satisfaction. However, as shade alone cannot provide total protection other protection measures should be encouraged. These include:

- Scheduling events and activities to avoid the middle of the day when UV radiation levels are most intense.
- Encouraging patrons to adopt personal protective measures such as wearing sun protective clothing, a broad brimmed hat, sunglasses and sunscreen.
- Erecting signage to remind users to take care.

It is essential that an assessment of existing shade be made before the planning and design of additional shade commences. Part 2 of *The shade handbook* contains a step by step approach to conducting a shade audit and how to plan and implement a shade project.

**Planning and design issues**

The following planning and design issues should be considered when planning shade development at parks and reserves. These issues are examined in greater detail in *The shade handbook*.

It is important to note the different areas used within parks and reserves, such as:

- Open areas.
- Playgrounds.
- Picnic and BBQ areas.
- Playing fields.

While each area has its own shade requirements, they should be considered within the context of the whole site.

**Existing shade**

Plans should be made to optimise the use of existing shade before additional shade is considered. For example, fixed seating could be relocated to a shaded area or low branches could be removed from trees to allow access to shaded areas.
Climatic conditions
Consider the characteristics of the climate zone as well as any local weather conditions, such as strong winds or salt (which leads to corrosion). These factors will affect the design of a shade structure as well as the selection of tree species.

Site usage patterns
It is important to take into account the usage patterns at the site, including the type of activities that occur, where they occur and when they occur. Sufficient shade should be available at the times of heaviest usage, particularly when UV radiation levels are most intense.

Active and passive use
The shade requirements for different areas within a park or reserve will vary according to the type of activities that occur there. For example, in areas where people are sitting in one spot, or where play is confined to a relatively small area, such as a playground, the need for permanent shade over a significant part of the area is high.

In areas where people are active and mobile such as large grassed areas, it is more difficult to position shade so that it will be effective. Occasional scattered shade should be considered for these areas, so that park users have the opportunity to access shade.

Indirect UV radiation
Indirect UV radiation is an important factor to consider when designing built shade structures and selecting ground surfaces for areas within a park or reserve. Select or modify ground surfaces to reduce reflected UV radiation, such as replacing smooth concrete with brick or grass.

Aesthetics
Shade design should aim to be aesthetically pleasing as well as practical. Generally, an approach which combines built and natural shade is preferable. People will be less inclined to sit in the shade or even visit the park if structures are unattractive, poorly designed or unsympathetic to the surrounding environment.

Safety
It is important to ensure that shade structures do not create safety hazards. Support systems such as upright posts should be clearly visible and ideally have rounded edges or padding. They should be placed so as to minimise intrusion into circulation and children’s play areas. Where possible guy ropes should be avoided as they may become a tripping hazard.

Approval
Local councils may require development approval for built shade structures.

Natural shade
Natural shade is a major element of shade provision at parks and reserves. Trees with dense foliage and wide spreading canopies provide the best protection. Species should be selected to suit local soil and climatic conditions as well as the surrounding environment. Root barriers and subsoil drainage will help to ensure that pavements are not damaged by tree roots. Temporary built structures can be used until trees planted for shade purposes mature.
**Rain protection**
It may be desirable to incorporate built structures that offer both UV radiation and rain protection into the design.

**Vandalism**
As parks and reserves are often accessible at all hours of the day and night, the risk of vandalism is an issue that needs to be considered.

**Existing services**
The location of shade structures and planting should take account of existing services such as drainage, power lines, gas and water.

**Recommendations**

<table>
<thead>
<tr>
<th>Open areas</th>
<th>Partial shade is recommended for open areas, especially over grass which needs some sun for growth.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Natural shade is the most appropriate option.</td>
</tr>
<tr>
<td></td>
<td>Consider arranging planting in clusters so that groups of people can access shade.</td>
</tr>
<tr>
<td></td>
<td>Fixed seating should be placed in the shade.</td>
</tr>
<tr>
<td>Playground</td>
<td>Partial shade is recommended for grassed areas of playgrounds.</td>
</tr>
<tr>
<td></td>
<td>Natural shade is the most appropriate option.</td>
</tr>
<tr>
<td></td>
<td>Shade throughout the year is recommended over children’s play equipment. Generally, a permanent shade system is the most appropriate option.</td>
</tr>
<tr>
<td></td>
<td>The need for winter warmth and light should be considered.</td>
</tr>
<tr>
<td></td>
<td>Seating should be placed in the shade and positioned to allow supervising adults a clear view of children at play.</td>
</tr>
<tr>
<td>Fixed play equipment</td>
<td>Safety is a major consideration for shade provision over fixed play equipment.</td>
</tr>
<tr>
<td></td>
<td>Shade structures over fixed play equipment should not have footholds, grips or surfaces which would allow for climbing.</td>
</tr>
<tr>
<td></td>
<td>The roofline of the shade structure should extend at least 500 mm beyond the edge of the deck of the play equipment, to prevent child access onto the roof.</td>
</tr>
</tbody>
</table>
### Fixed play equipment (cont.)

The roof of the shade structure should allow for a minimum head clearance height of 2.5 m above the deck of the play equipment.

Tree trunks and the upright posts of shade structures should be located a minimum distance of 2.5 m away from the most fully extended part of the play equipment, such as the side of a climbing platform or the end of an extended swing arc. This will ensure sufficient free-fall zones. Any shade structure in the play area should be designed with reference to AS/NZS 4486.1:1997 Playgrounds and playground equipment – development, installation, inspection, maintenance and operation.

### Picnic and BBQ areas

Shade is recommended over picnic tables and BBQ areas, particularly during the middle period of the day when UV radiation levels are generally at their peak.

Where possible, ground surfaces should reflect minimal levels of UV radiation, heat and light.

Fire safety is an issue that needs to be considered in relation to BBQ areas, particularly when selecting materials for shade canopies and when planting trees.

### Playing fields

Provide shade and rain protection in off-field areas, including warm-up areas and where officials are located.

Provide shade where possible on the field. For example, a bocce field could be covered with a large clear span structure.

For safety, ensure there is ample clearance between the edge of the playing field and the support system of the shade structure.

### Pedestrian links

Plant avenues of trees over common pedestrian routes.

Provide shaded seating at common meeting points.

Use ground surfaces that reflect minimal UV radiation, heat and light.
Further information
For further resources please contact the Resource Officer at Cancer Council Western Australia on (08) 9388 4363/4362 or email resourceofficer@cancerwa.asn.au. For more information on sun protection visit www.cancerwa.asn.au/sunsmart.

Also refer to the following information sheets included in this series:
- Shade for playgrounds.
- Shade for sports grounds and facilities.

The information contained in this resource has been sourced from:
Shade for everyone: A practical guide for shade development, 2004 (Cancer Council Victoria)
Under cover: Guidelines for shade planning and design, 2005 (NSW Health Department, Cancer Council NSW, Cancer Institute NSW)
This information sheet has been written to assist agencies managing playground areas to improve the quality of shade provided to users. It has been designed to accompany *The shade handbook* which contains general information essential to developing effective shade in any setting. *The shade handbook* is available from the [Cancer Council WA website](http://www.cancerwa.asn.au/sunsmart).

**The importance of shade at playgrounds**

Australia has the highest rate of skin cancer in the world, with most skin cancers caused by overexposure to ultraviolet (UV) radiation from the sun. By reducing people’s exposure to the sun’s rays, the number of people affected by skin cancer can be decreased.

Providing sun protection at playgrounds can make a significant contribution to the prevention of skin cancer because:

- Children and parents use playgrounds throughout the year.
- Heaviest usage generally occurs during the summer months, particularly during holidays and during the middle of the day when UV radiation levels are most intense.
- The sun exposure children receive while they are young increases their risk of developing skin cancer as adults.
- Protecting children from UV radiation will reduce the risk of skin cancer in the future.

However, as shade alone cannot provide total protection other protection measures should be encouraged. These include:

- Encouraging users to adopt personal protective measures such as wearing sun protective clothing, a broad brimmed hat, sunglasses and sunscreen.
- Erecting signage to remind patrons to take care. It is essential that an assessment of existing shade be made before the planning and design of additional shade commences. Part 2 of *The shade handbook* contains a step by step approach to conducting a shade audit and how to plan and implement a shade project.

**Planning and design issues**

The following planning and design issues should be considered when planning shade development at playgrounds. These issues are examined in greater detail in *The shade handbook*.

**Existing shade**

Plans should be made to optimise the use of existing shade before additional shade is considered. For example, fixed seating could be re-located to a shaded area or low branches could be removed from trees to allow access to shady areas.

**Active and passive use**

Consider the type of activity occurring in the area when planning shade. Provide scattered shade in playground areas where children are more active and mobile. Areas where children or users are sitting in one spot or where play is confined to a relatively small area need more shade.
**Climatic conditions**
Consider the characteristics of the climate zone as well as any local weather conditions, such as strong winds or salt (which leads to corrosion). These factors will affect the design of a shade structure as well as the selection of tree species.

**Seasonal considerations**
Although summer protection is a priority, provision for winter shade should also be made in most locations across WA. Care needs to be taken to ensure that new shade initiatives do not intensify winter conditions at the site. Summer shade provision should minimise UV radiation levels as well as reduce heat and light. Winter shade provision should minimise UV radiation levels, while allowing for transmission of sufficient levels of heat and light. The use of adjustable shade systems and deciduous vegetation may provide greater flexibility.

**Indirect UV radiation**
Design shade structures to minimise indirect UV radiation. Shade structures should be of a sufficient size to ensure people can move away from the edges. The shade canopy should extend at least one metre past the actual areas of use with vertical barriers built into the sides. Modify or select surfaces to reduce reflected UV radiation. For example, replace smooth concrete with brick or grass. Vertical surfaces such as walls should also be made of materials that reduce reflected UV radiation.

**Aesthetics**
Shade design should aim to be aesthetically pleasing as well as practical. Generally, an approach which combines both natural and built shade is preferable. Using a variety of tree and shrub species will also help to create a more interesting environment.

**Natural shade**
Natural shade should be a major element of shade provision within a playground. Trees with dense foliage and wide spreading canopies provide the best protection. Species should be selected to suit local soil and climatic conditions as well as the character of the surrounding environment. Root barriers and subsoil drainage will help to ensure that pavements are not damaged by tree roots. Dense shrubs also have the potential to provide shade. Avoid shrubs and trees that:
- Are toxic.
- Have seed pods or stone-fruit.
- Attract bees.
- Have spikes or thorns.
- Are known to cause adverse health effects such as asthma or skin irritation.
- Drop their branches.

Temporary built structures can be used until trees planted for shade purposes mature.

[Visit Cancer Council WA website for more information: www.cancerwa.asn.au/sunsmart]
Safety
It is important to ensure that shade structures do not create safety hazards. Support systems such as upright posts should be clearly visible and ideally have rounded edges and padding. They should be placed so as to minimise intrusion into play and circulation areas. Where possible guy ropes should be avoided as they may become a tripping hazard. In addition, vertical barriers at the sides of shade structures should be designed to prevent children using them for climbing.

Vandalism
As playgrounds are often accessible after hours the risk of vandalism is an issue that needs to be considered.

Supervision
Children need to be viewed by carers at all times. Avoid designs that hinder supervision such as solid or opaque sides, inappropriate tree and shrub placements or sails that are too low.

Existing services
The location of shade structures and planting should take account of existing services such as drainage, power lines, gas, and water.

Recommendations

<table>
<thead>
<tr>
<th>Playgrounds</th>
<th>Provide partial shade for open areas of playgrounds, especially over grass that needs sun for growth. Natural shade is recommended.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Provide shade throughout the year over children’s play equipment. Generally a permanent structure is most appropriate, but consider the need for winter warmth.</td>
</tr>
<tr>
<td></td>
<td>Provide shade throughout the year over sandpits. Built shade is the most appropriate option.</td>
</tr>
<tr>
<td></td>
<td>Provide shade over seating. Ensure placement of shade does not obstruct carers’ view of play areas.</td>
</tr>
<tr>
<td>Fixed play equipment</td>
<td>Shade structures, in particular poles, should not have footholds or grip surfaces which allow for climbing.</td>
</tr>
<tr>
<td></td>
<td>Extend rooflines at least 500 mm beyond the edge of the deck of the play equipment to prevent access to the roof. Shade for playgrounds</td>
</tr>
<tr>
<td></td>
<td>Provide clearance from the highest accessible point that a child might reasonably be expected to reach by climbing.</td>
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<tr>
<td></td>
<td>The roof of the shade structure should allow for a minimum head clearance height of 2.5 m above the deck of play equipment.</td>
</tr>
</tbody>
</table>
Fixed play equipment (cont.)

Ensure a freefall zone exists within the play area. Tree trunks and upright posts should be located a minimum distance of 2.5 m away from the most fully extended part of the play equipment, such as the end of an extended swing arc or the side of a climbing platform.

Any shade structure in the play area should be designed with reference to AS/NZS 4486.1:1997 Playgrounds and playground equipment – development, installation, inspection, maintenance and operation.

Safety is a major consideration for shade over fixed play equipment.

Picnic and BBQ areas

Shade is recommended over picnic tables and BBQ areas.

Surfaces should reflect minimal UV radiation, heat and light.

Fire safety is an important consideration for BBQ areas, particularly when selecting material for shade canopies and when planting trees.

Further information

For further resources please contact the Resource Officer at Cancer Council Western Australia on (08) 9388 4363/4362 or email resourceofficer@cancerwa.asn.au. For more information on sun protection visit www.cancerwa.asn.au/sunsmart.

Also refer to the following information sheets included in this series:

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Under cover: Guidelines for shade planning and design, 2005 (NSW Health Department, Cancer Council NSW, Cancer Institute NSW) Shade for playgrounds
This information sheet has been written to assist organisers and administrators of outdoor sport and recreation venues to improve the quality of shade for participants. It has been designed to accompany The shade handbook which contains general information essential to developing effective shade in any setting. The shade handbook is available from the Cancer Council WA website.

The importance of shade at sports grounds and facilities
Australia has the highest rate of skin cancer in the world, with most skin cancers caused by overexposure to ultraviolet (UV) radiation from the sun. By reducing people’s exposure to the sun’s rays, the number of people affected by skin cancer can be decreased.

Reducing exposure among everyone involved in sport and recreation can make a significant contribution to the prevention of skin cancer because:

- Most people are involved in some form of outdoor sport and recreation, either as participants, volunteers, officials, parents or spectators.
- Participation is highest during childhood and adolescence and minimising exposure during this time reduces the lifetime risk of skin cancer.
- Outdoor sport and recreation activities often occur during the middle of the day when UV radiation levels are most intense.
- Many sporting activities take place in environments where there is little or no shade.
- Many sporting activities take place in environments where there is a high level of indirect UV radiation reflected from surfaces such as cement, sand and water.
- Participants often wear clothing or hats that do not provide adequate protection from the sun.
- Providing adequate shade is an important element in any sport and recreation organisation's sun protection policy and practice. However, as shade alone cannot provide total protection other protection measures should be encouraged. These include:
  - Scheduling events and activities to avoid the middle of the day when UV radiation levels are most intense.
  - Encouraging spectators and participants to adopt personal protective measures such as wearing sun protective clothing, a broad brimmed hat, sunglasses and sunscreen.
  - Broadcasting sun protection messages over the public address system and erecting signage to remind patrons to take care.
  - It is essential that an assessment of existing shade be made before the planning and design of additional shade commences. Part 2 of The shade handbook contains a step by step approach to conducting a shade audit and how to plan and implement a shade project.
Planning and design issues
The following planning and design issues should be considered when planning shade development at sports grounds. These issues are examined in greater detail in The shade handbook. It is important to note the different areas of a sports ground, including:

- Spectator areas.
- Playing/competition areas.
- Refreshment areas.
- Entrance zones and pedestrian links.

While each area has its own shade requirements, they should be considered within the context of the whole site.

Existing shade
Plans should be made to optimise the use of existing shade before additional shade is considered. For example fixed seating could be relocated to a shaded area.

Site usage patterns
It is important to take into account the usage patterns at the grounds and facilities, particularly the times of day and year it is most in use. Sufficient shade should be available at the times of the heaviest usage, particularly when UV radiation levels are most intense. For example, if games are usually played in the afternoon during summer, shade should be available at this time of day. To achieve this it may be necessary to supplement permanent shade with demountable structures.

Major events
Providing shade is very important for major events such as grand finals where people are often at the sports ground all day. Demountable structures can be used to provide additional shade over spectator areas, as well as the sideline areas for participants and officials. Site management could offer the use of such structures as part of hiring packages.

Climatic conditions
Consider the characteristics of the climate zone as well as any local weather conditions, such as strong winds or salt (which leads to corrosion). These factors will affect the design of a shade structure as well as the selection of tree species.

Seasonal considerations
Although summer protection is a priority, provision for winter shade should also be made in most locations across WA. Care needs to be taken to ensure that new shade initiatives do not intensify winter conditions at the site.

Summer shade provision should minimise UV radiation levels as well as reduce heat and light. Winter shade provision should minimise UV radiation levels, while allowing for transmission of sufficient levels of heat and light.

Indirect UV radiation
Indirect UV radiation is an important factor to consider when designing built shade structures and selecting surfaces for the sports grounds. Select or modify ground surfaces to reduce reflected UV radiation, such as replacing smooth concrete with brick or grass.
Aesthetics
Shade design should aim to be aesthetically pleasing as well as practical. Generally, an approach which combines both built and natural shade is preferable.

Approval
Local councils may require development approval for built shade structures.

Natural shade
Natural shade should be a major element of shade provision for areas within sports grounds and facilities. Trees with dense foliage and wide spreading canopies provide the best protection. Species should be selected to suit local soil and climatic conditions as well as the character of the surrounding environment. Root barriers and subsoil drainage will help to ensure that pavements are not damaged by tree roots. Temporary built structures can be used until trees planted for shade purposes mature.

Safety
It is important to ensure that shade structures do not create safety hazards. Support systems such as upright posts should be clearly visible and ideally have rounded edges and padding. They should be placed so as to minimise intrusion into play and circulation areas. Where possible guy ropes should be avoided as they may become a tripping hazard.

Sightlines
Shade structures should not obstruct spectators' or officials' views of the sports field or competition area.

Demountable structures
Demountable shade structures should only be used to supplement more permanent forms of shade or when it is likely to be several seasons before a shade project can be completed. Some demountable structures such as umbrellas offer only limited protection and may be unstable during windy conditions.

Rain protection
It may be desirable to provide both UV radiation and rain protection over areas for spectators, players and officials.

Vandalism
As sporting grounds and facilities are often accessible at all hours of the day and night, the risk of vandalism is an issue that needs to be considered.

Existing services
The location of shade structures and planting should take account of existing services such as drainage, power lines, gas and water.
## Recommendations

| **Spectator areas** | Shade is recommended over all seated spectator areas. Built shade is the most appropriate option. Rain protection is recommended.  
Shade is recommended for general spectator areas, particularly the preferred viewing area/s, as this is where people will tend to congregate. A combination of natural and built shade is the most appropriate option.  
Demountable structures can be used to supplement permanent shade.  
Shade should be provided at different parts of the ground or facility as supporters of opposing teams usually prefer to congregate in distinct areas.  
Shade should be provided close enough to the action, however structures should not be located so as to create a hazard for players or to obscure views of the playing field or competition area. |
| **Playing fields and competition areas** | Players’ off-field areas, such as baseball dugouts should be shaded and if possible, protected from the rain. Warm-up areas should also be shaded.  
The areas where officials are located, for example scoring boxes and umpires’ chairs, should be shaded and if possible protected from the rain. In some circumstances personal devices such as an adjustable umbrella may be the only viable option.  
Where possible, the on-field areas should be shaded. For example, each end of a bowling green could be covered with a retractable shade canopy.  
The safety of players and officials is an important consideration. Ensure that there is suitable clearance between the edge of the playing field and the support system of the shade structure. |
| **Refreshment areas** | Shade is recommended for queuing areas at kiosks. Built shade such as a broad awning is the most appropriate option.  
Awnings should be of a sufficient size to cater for capacity crowds. Rain protection may also be a consideration when selecting awning materials.  
Shade is recommended over picnic tables and BBQ areas. Where possible, ground surfaces should reflect minimal levels of UV radiation, heat and light. |
| **Entrance zones and pedestrian links** | Consider planting avenues of trees to provide shade over pedestrian links between the entrance, main spectator areas and other activity zones. Shaded seating could be provided at rendezvous points both inside and outside the grounds. Where possible, ground surfaces should reflect minimal levels of UV radiation, heat and light. |
Further information
For further information or resources please contact the Resource Officer at Cancer Council Western Australia on (08) 9388 4363/4362 or email resourceofficer@cancerwa.asn.au. For more information on sun protection visit www.cancerwa.asn.au/sunsmart.

Also refer to the following information sheets included in this series:
- Shade for parks and reserves.
- Shade for playgrounds.
- Shade for public swimming pools.

The information contained in this resource has been sourced from:
Shade for everyone: A practical guide for shade development, 2004 (Cancer Council Victoria)
Under cover: Guidelines for shade planning and design, 2005 (NSW Health Department, Cancer Council NSW, Cancer Institute NSW)
This information sheet has been written for the owners and managers of outdoor restaurants, cafes and beer gardens to improve the quality of shade provided for patrons. It has been designed to accompany *The shade handbook* which contains general information essential to developing effective shade in any setting. *The shade handbook* is available from the Cancer Council WA website.

**The importance of shade at outdoor restaurants, cafes and beer gardens**

Australia has the highest rate of skin cancer in the world, with most skin cancers caused by overexposure to ultraviolet (UV) radiation from the sun. By reducing people’s exposure to the sun’s rays, the number of people affected by skin cancer can be decreased.

The ideal climatic conditions experienced in most areas of Western Australia have lead to the increased popularity of outdoor restaurants, cafes and beer gardens. These venues are often at their busiest during lunchtime when UV radiation levels are most intense. Also, food and drinks can often be consumed over a long period of time, which means that patrons have an increased risk of excessive UV radiation exposure.

As well as contributing to the health and safety of their customers, the increased comfort levels afforded by a well-designed shady environment are likely to increase customer satisfaction and patronage. However, as shade alone cannot provide total protection other protection measures should be encouraged. These include:

- Encouraging patrons to adopt personal protective measures such as wearing sun protective clothing, a broad brimmed hat, sunglasses and sunscreen.
- Erecting signage to remind patrons to take care.
- Ensuring staff act as role models by demonstrating appropriate sun protection behaviours.

It is essential that an assessment of existing shade be made before the planning and design of additional shade commences. Part 2 of *The shade handbook* contains a step by step approach to conducting a shade audit and how to plan and implement a shade project.

**Planning and design issues**

The following planning and design issues should be considered when planning shade development at outdoor restaurants, cafes and beer gardens. These issues are examined in greater detail in *The shade handbook*.

**Climatic conditions**

Consider the characteristics of the climate zone as well as any local weather conditions, such as strong winds or salt (which leads to corrosion). These factors will affect the design of a shade structure as well as the selection of tree species.
Seasonal considerations
Although summer protection is a priority, provision for winter shade should also be made in most locations across WA. Care needs to be taken to ensure that new shade initiatives do not intensify winter conditions at the site. Summer shade provision should minimise UV radiation levels as well as reduce heat and light. Winter shade provision should minimise UV radiation levels, while allowing for transmission of sufficient levels of heat and light. The use of adjustable shade systems and deciduous vegetation may provide greater flexibility.

Indirect UV radiation
Indirect UV radiation is an important factor to consider when designing built shade structures and selecting ground surfaces for outdoor restaurants, cafes and beer gardens. Select or modify ground surfaces to reduce reflected UV radiation, such as replacing smooth concrete with brick or grass.

Aesthetics
Shade design should aim to be aesthetically pleasing as well as practical. An approach which combines natural shade with well-designed, high quality structures will help to create an aesthetically appealing venue that will encourage patronage. One with unattractive, poorly designed structures may have the reverse effect.

Natural shade
Trees with dense foliage and wide spreading canopies provide the best protection. Species should be selected to suit local soil and climatic conditions as well as the character of the surrounding environment. Root barriers and subsoil drainage will help to ensure that pavements are not damaged by tree roots. Temporary built structures can be used until trees planted for shade purposes mature.

Safety
It is important to ensure that shade structures do not create safety hazards. Support systems such as upright posts should be clearly visible and ideally have rounded edges and padding. They should be placed so as to minimise intrusion into circulation areas. Where possible guy ropes should be avoided as they may become a tripping hazard.

Demountable structures
Demountable shade structures should only be used to supplement more permanent forms of shade. Some demountable shade structures such as an umbrella offer only limited protection and may be unstable in windy conditions. The placement of umbrellas in groups may be a more effective way of using these items for shade purposes.

Rain protection
Built systems that offer rain protection as well as UV radiation protection will ensure that the outdoor areas of restaurants, cafes and hotels can be used during wet weather.

Existing services
The location of shade structures and planting should take account of existing services such as drainage, power lines, gas and water.

www.cancerwa.asn.au/sunsmart
Recommendations

<table>
<thead>
<tr>
<th>Outdoor eateries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shade throughout the year is necessary over outdoor areas at restaurants and cafes.</td>
</tr>
<tr>
<td>During summer, it is recommended that at the absolute minimum, 50% of customers should be able to choose to sit in the shade.</td>
</tr>
<tr>
<td>Similarly in winter, customers should be able to sit in the shade if they wish. Consider using a combination of natural and built shade, for example, a trellis covered with a climbing vine, as it will enhance the visual appeal of the space.</td>
</tr>
<tr>
<td>An adjustable built system and deciduous vegetation may be preferential as it will allow for heat and light penetration during the cooler months. Built systems that offer rain protection should also be considered.</td>
</tr>
<tr>
<td>It may be necessary to supplement permanent shade with demountable structures, particularly during summer.</td>
</tr>
<tr>
<td>Where possible, ground surfaces should reflect minimal levels of UV radiation, heat and light.</td>
</tr>
</tbody>
</table>

Further information

For further resources please contact the Resource Officer at Cancer Council Western Australia on (08) 9388 4363/4362 or email resourceofficer@cancerwa.asn.au. For more information on sun protection visit www.cancerwa.asn.au/sunsmart.

The information contained in this resource has been sourced from:
Shade for everyone: A practical guide for shade development, 2004 (Cancer Council Victoria)
Under cover: Guidelines for shade planning and design, 2005 (NSW Health Department, Cancer Council NSW, Cancer Institute NSW)
This information sheet has been written to assist people involved in the design and maintenance of streetscapes to improve the quality of shade provided for the public. It has been designed to accompany *The shade handbook* which contains general information essential to developing effective shade in any setting. *The shade handbook* is available from the Cancer Council WA website.

The importance of shade within streetscapes

Australia has the highest rate of skin cancer in the world, with most skin cancers caused by overexposure to ultraviolet (UV) radiation from the sun. By reducing people’s exposure to the sun’s rays, the number of people affected by skin cancer can be decreased. The term 'streetscape' includes footpaths and pedestrian thoroughfares, public transport points such as bus stops and taxi ranks, and local shopping centres. These facilities are in daily use throughout the year. The provision of sufficient UV radiation protection at these facilities is vital in the development of a safe public environment.

The increased comfort levels afforded by a well-designed shady environment will also encourage patronage of local shopping facilities and increase community satisfaction with these facilities. However, as shade alone cannot provide total protection other protection measures should be encouraged. These include:

- Scheduling events, festivals and activities to avoid the middle of the day when UV radiation levels are most intense.
- Encouraging patrons to adopt personal protective measures such as wearing sun protective clothing, a broad brimmed hat, sunglasses and sunscreen.
- Erecting signage to remind patrons to take care.

It is essential that an assessment of existing shade be made before the planning and design of additional shade commences. Part 2 of *The shade handbook* contains a step by step approach to conducting a shade audit and how to plan and implement a shade project.

Planning and design issues

The following planning and design issues should be considered when planning shade development within streetscapes. These issues are examined in greater detail in *The shade handbook*.

It is important to note the different areas of the general streetscape. They include:

- Footpaths and pedestrian thoroughfares.
- Public transport points.
- Local shopping centres.

While each area has its own shade requirements, they should be considered within the context of the whole site.

Existing shade

Plans should be made to optimise the use of existing shade before additional shade is considered. For example fixed seating could be relocated to a shaded area or low branches could be removed from trees to allow access to shady areas.
Site usage patterns
It is important to take into account the usage patterns of streetscape areas, including the type of activities that occur, where they occur and when they occur. Sufficient shade should be available at the times of heaviest usage, particularly when UV radiation levels are at their peak.

Active and passive use
Some locations within the classification 'streetscape' have usage patterns that involve prolonged exposure to UV radiation. For example, areas where people congregate and linger in one spot, such as a courtyard in an outdoor shopping mall or waiting areas at bus stops and taxi ranks. The need for shade over a significant part of these areas is high and should be considered a priority.

In areas where people are active and moving, such as footpaths and pedestrian thoroughfares, it is more difficult to position shade so that it will be effective. Occasional scattered shade should be considered for these areas so that people have the opportunity to access shade.

Climatic conditions
Consider the characteristics of the climate zone as well as any local weather conditions, such as strong winds or salt (which leads to corrosion). These factors will affect the design of a shade structure as well as the selection of tree species.

Seasonal considerations
Although summer protection is a priority, provision for winter shade should also be made within streetscape areas in most locations across WA as they are in constant use throughout the year. Care needs to be taken to ensure that new shade initiatives do not intensify winter conditions at the site. Summer shade provision should minimise UV radiation levels as well as reduce heat and light. Winter shade provision should minimise UV radiation levels, while allowing for transmission of sufficient levels of heat and light. The use of adjustable shade systems and deciduous vegetation may provide greater flexibility.

Indirect UV radiation
Indirect UV radiation is an important factor to consider when designing built shade structures and selecting ground surfaces for streetscape areas. Select or modify ground surfaces to reduce reflected UV radiation, such as replacing smooth concrete with brick or grass.

Aesthetics
Shade design should aim to be aesthetically pleasing as well as practical. An approach which combines natural shade with well-designed, high quality shade structures will help to create aesthetically appealing streetscape areas (particularly at local shopping centres) that will encourage patronage.

Approval
Local councils may require development approval for built shade structures.
Natural shade
Natural shade should be a major element of shade provision for streetscape areas. Trees with dense foliage and wide spreading canopies provide the best protection. A 2.5 m head clearance from the ground to the mature tree canopy is recommended. Species should be selected to suit local soil and climatic conditions as well as the character of the surrounding environment. Root barriers and subsoil drainage will help to ensure that footpaths are not damaged by tree roots. Councils should develop a street tree policy to ensure proper selection, planting and maintenance of street trees used for shade. The implementation of such policies will also help to improve the appearance of local streets. Temporary built structures can be used until trees planted for shade purposes mature.

Existing services
The location of shade structures and planting should take account of existing services such as drainage, power lines, gas and water.

Safety
It is important to ensure that shade structures do not create safety hazards. Support systems such as upright posts should be clearly visible and ideally have rounded edges or padding. They should be placed so as to minimise intrusion into play and circulation areas. Where possible guy ropes should be avoided as they may become a tripping hazard.

Rain protection
It may be desirable to provide rain protection as well as UV radiation protection over some streetscape areas such as bus stops or taxi ranks.

Vandalism
As streetscape areas are accessible at all hours of the day and night, the risk of vandalism is an issue that needs to be considered.

Recommendations

<table>
<thead>
<tr>
<th>Footpaths</th>
<th>Shade is recommended for footpaths with significant levels of regular pedestrian traffic (at least one side of the street). Shade trees planted at regular intervals are the most appropriate option for residential areas. Shade is recommended for pedestrian thoroughfares linking areas such as car parks to shopping centres and schools to transport points. Consider using shade trees, planted at regular intervals. Built shade may be appropriate in some locations.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public transport points</td>
<td>Shade throughout the year is recommended for waiting areas at major public transport points such as local shopping centres. As rain protection is also desirable built shade is the most appropriate option. Trees could be planted to supplement the shade for capacity crowd situations.</td>
</tr>
</tbody>
</table>
Shade should also be provided at minor public transport points in residential streets. Consider using natural shade, although where possible built structures that offer both UV radiation and rain protection should be provided.

### Local shopping centres

General outdoor areas at local shopping centres require a mix of shade in summer and winter, as well as access to warmth and light in winter. Consider using natural shade as well as built shade for these areas.

- Shade throughout the year is recommended over specified outdoor eating areas.
- Shade is recommended over areas where people congregate and linger such as seating areas in shopping mall courtyards.
- Business operators should be encouraged to build awnings on their premises. As well as contributing to a shaded walkway for shoppers, this may help to increase patronage, as people will be more inclined to linger in cool, shaded areas outside shop windows.
- Where possible, ground surfaces should reflect minimal levels of UV radiation, heat and light.

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**Further information**

For further resources please contact the Resource Officer at Cancer Council Western Australia on (08) 9388 4363/4362 or email resourceofficer@cancerwa.asn.au. For more information on sun protection visit [www.cancerwa.asn.au/sunsmart](http://www.cancerwa.asn.au/sunsmart).

Also refer to the following information sheets included in this series:

- Shade for outdoor restaurants, cafes and beer gardens.
- Shade for playgrounds.

The information contained in this resource has been sourced from:

- Shade for everyone: A practical guide for shade development, 2004 (Cancer Council Victoria)
- Under cover: Guidelines for shade planning and design, 2005 (NSW Health Department, Cancer Council NSW, Cancer Institute NSW)
The shade handbook
Shade for the home

This information sheet has been written to assist home owners to improve the quality of shade provided to their family and friends. It has been designed to accompany The shade handbook which contains general information essential to developing effective shade in any setting. The shade handbook is available from the Cancer Council WA website.

The importance of shade at the home
Australia has the highest rate of skin cancer in the world, with most skin cancers caused by overexposure to ultraviolet (UV) radiation from the sun. By reducing people’s exposure to the sun’s rays, the number of people affected by skin cancer can be decreased.

Many homes have outdoor areas such as backyards, courtyards, decks, swimming pools, play areas and sandpits. The ideal climatic conditions experienced by much of WA mean that these areas are regularly used, often on a year-round basis.

The provision of shade for outdoor areas within the home will contribute to the health and safety of family members, particularly children, and visitors. Well-designed shade will also enhance the aesthetic qualities of the home environment, resulting in outdoor spaces that are both visually appealing and comfortable to use. However, as shade alone cannot provide total protection other protection measures should be encouraged. These include:

- Taking care to avoid the sun around the middle of the day when UV radiation is most intense.
- Encouraging people to adopt personal protective measures such as wearing sun protective clothing, a broad brimmed hat, sunglasses and sunscreen.

It is essential than an assessment of existing shade be made before the planning and design of additional shade commences. Part 2 of The shade handbook contains a step by step approach to conducting a shade audit and how to plan and implement a shade project.

Planning and design issues
The following planning and design issues should be considered when planning shade development at the home. These issues are examined in greater detail in The shade handbook.

It is important to note the different outdoor areas of the home. They include:

- General outdoor areas.
- Outdoor eating areas, decks and patios.
- Sandpits and play equipment.
- Pool areas.
- Verandahs.

While each area has its own shade requirements, they should be considered within the context of the whole site.
Existing shade
Plans should be made to optimise the use of existing shade before additional shade is considered. For example, outdoor seating or play equipment could be relocated to a shaded area, or low branches could be removed from trees to allow access to shady areas.

Climatic conditions
Consider the characteristics of the climate zone as well as any local weather conditions, such as strong winds or salt (which leads to corrosion). These factors will affect the design of a shade structure as well as the selection of tree species.

Seasonal considerations
Although summer protection is a priority, provision for winter shade should also be made in most locations across WA. Care needs to be taken to ensure that new shade initiatives do not intensify winter conditions at the site.

Summer shade provision should minimise UV radiation levels as well as reduce heat and light. Winter shade provision should minimise UV radiation levels, while allowing for transmission of sufficient levels of heat and light. The use of adjustable shade systems and deciduous vegetation may provide greater flexibility.

Indirect UV radiation
Indirect UV radiation is an important factor to consider when designing built shade structures and selecting ground surfaces for outdoor areas within the home. Coarse or soft surfaces, such as brick pavers or grass, will reflect less UV radiation than hard or smooth surfaces, such as concrete. Existing surfaces can be modified if they reflect high levels of UV radiation.

Aesthetics
Shade design should aim to be aesthetically pleasing as well as practical. Generally, an approach which combines both natural and built shade is preferable. Using a variety of tree and shrub species will also help to create a more interesting environment.

Approval
Local councils may require development approval for built shade structures.

Natural shade
Natural shade should be a major element of shade provision for outdoor areas around the home. Trees with dense foliage and wide spreading canopies provide the best protection. Species should be selected to suit local soil and climatic conditions as well as the character of the surrounding environment. Root barriers and subsoil drainage will help to ensure that pavements are not damaged by tree roots. Temporary built structures can be used until trees planted for shade purposes mature.
Safety
It is important to ensure that shade structures do not create safety hazards. Support systems such as upright posts should be clearly visible and ideally have rounded edges or padding. They should be placed so as to minimise intrusion into play and circulation areas. Where possible guy ropes should be avoided as they may become a tripping hazard.

Demountable structures
Demountable shade structures should only be used to supplement more permanent forms of shade. Some demountable structures such as umbrellas offer only limited protection and may be unstable during windy conditions.

Rain protection
It may be desirable to provide rain protection as well as UV radiation protection over some outdoor areas around the home, such as decks.

Existing services
The location of shade structures and planting should take account of existing services such as drainage, power lines, gas, and water.

Thermal control
If properly designed, external components of a house such as verandahs, awnings, and extended eaves, can provide considerable shade outdoors as well as additional thermal control for the inside areas of the house.

Recommendations

<table>
<thead>
<tr>
<th>General outdoor areas</th>
<th>Partial shade is recommended for general outdoor areas, especially over grass which needs some sun for growth. Natural shade is the most appropriate option. If sufficient shade is available at all times of the day, it will allow greater flexibility for children’s play.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdoor eating areas, decks and patios</td>
<td>Shade is recommended over outdoor eating and similar areas such as decks and patios. Consider using a combination of natural and built shade, for example a trellis covered with a climbing vine, as it will enhance the visual appeal of the space. An adjustable built system and deciduous vegetation will allow for heat and light penetration during the cooler months.</td>
</tr>
<tr>
<td>Sandpits and play equipment</td>
<td>Shade throughout the year is recommended over sandpits. Built shade is the most appropriate option. Pull-down screens at the side of the structure will help protect against indirect UV radiation. Partial shade is recommended for the area which contains fixed play equipment. Natural shade is the most appropriate option.</td>
</tr>
</tbody>
</table>
The ability to supervise children is an important issue. Inappropriately located trees and shrubs, and shade structures with solid or opaque sides may obstruct views of children playing.

Shade throughout the year is recommended over the relaxation area adjacent to the pool. Consider using built shade, as tree leaves may create ongoing pool maintenance problems. Pool lounges and other seats should be placed in the shade, particularly during the middle part of the day.

Verandahs will provide permanent shade as well as rain protection. The angle of the roof and the extent of the overhang should be designed to maximise shade for the major part of the day, especially during summer. The width of the verandah should allow sufficient space for activities such as outdoor eating or children's play to occur. Vertical pull-down blinds at the side of a verandah can provide additional protection from UV radiation when the sun is low in the sky.

Further information
For further resources please contact the Resource Officer at Cancer Council Western Australia on (08) 9388 4363/4362 or email resourceofficer@cancerwa.asn.au. For more information on sun protection visit [www.cancerwa.asn.au/sunsmart](http://www.cancerwa.asn.au/sunsmart).

Also refer to the following information sheets included in this series:
- Shade for public swimming pools.
- Shade for playgrounds.

The information contained in this resource has been sourced from:
Shade for everyone: A practical guide for shade development, 2004 (Cancer Council Victoria)
Under cover: Guidelines for shade planning and design, 2005 (NSW Health Department, Cancer Council NSW, Cancer Institute NSW)
Once you have made an inventory of all the sites where shade is important you can use this checklist to prioritise each site.

Score each site against the five factors, then add up the grand total for each site and compare the final scores.

Sites with the highest point scores should be viewed as a high priority for shade. For sites with a lower score, shade is still an important issue, however shade provision may be delayed in favour of those sites of higher priority.

<table>
<thead>
<tr>
<th>Name of site:</th>
<th>Key factor relating to shade priority</th>
<th>No never</th>
<th>Sometimes</th>
<th>Yes always</th>
<th>Overall score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of users:</td>
<td>• 30% or more of regular users are aged 0 – 18 years</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Time of use:</td>
<td>• Activity at the site is likely to occur around the middle of the day</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• The site is used over summer</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• The site is used over spring and autumn</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Duration of use:</td>
<td>• Activity at the site occurs for 15 minutes or more at a time</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Level of use:</td>
<td>• The site is well used on weekends</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• The site is well used on weekdays</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Nature of the site and the activity:</td>
<td>• Users of the site are exposed to high levels of indirect UV radiation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Activity at the site is likely to occur in minimal clothing</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Grand total
This information sheet details the characteristics of a range of materials commonly used in shade projects. Click the appropriate link below to view the properties of that material.

- Metal roof sheeting
- Roof tiles
- Timber
- Concrete
- Masonry
- Expanded metal mesh
- Perforated metal sheet
- Glass
- Polycarbonate sheeting
- Fibreglass sheeting
- Canvas
- Teflon coated fibreglass fabric
- PVC coated polyester fabric
- Knitted polyethylene (shade cloth)
- Woven PVC coated yarn (shade cloth)
- Shingles
- Thatch

The information contained in this resource has been sourced from:
Under cover: Guidelines for shade planning and design, 2005 (NSW Health Department, Cancer Council NSW, Cancer Institute NSW).
The shade handbook
Qualities of shade materials

Metal roof sheeting
Steel, aluminium, zinc, copper

<table>
<thead>
<tr>
<th><strong>Suitability</strong></th>
<th>Roofing and walling; steep or low pitches, curved and straight forms. Typically used for permanent fixed shade structures, although may be used as adjustable louvres. Most suited to summer shading where cool shade is required.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UV radiation protection</strong></td>
<td>Excellent protection, UPF 50+.</td>
</tr>
<tr>
<td><strong>Waterproof</strong></td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Light transmission</strong></td>
<td>Opaque.</td>
</tr>
<tr>
<td><strong>Solar heat gain</strong></td>
<td>Thermal resistance if insulated. Lighter colours reflect heat.</td>
</tr>
<tr>
<td><strong>Structural implications</strong></td>
<td>Adequate ‘tie-down’ must be designed according to the wind code. Consult professional designer.</td>
</tr>
<tr>
<td><strong>Ease of replacement</strong></td>
<td>Material readily available; easily re-fitted.</td>
</tr>
<tr>
<td><strong>Maintenance requirements</strong></td>
<td>Subject to moisture or condensation conditions. Ensure all metallic particles are swept from roof on completion of installation to prevent staining and corrosion.</td>
</tr>
<tr>
<td><strong>Life span</strong></td>
<td>Long life if well maintained. Fixings and flashing material should have a lifetime similar to that of the roof covering material.</td>
</tr>
<tr>
<td><strong>Particular properties</strong></td>
<td>Strongest of roof and wall materials available. Long lengths and range of 'profiles' available. Can be cut to length. Some profiles can be curved. Available in sandwich panels for increased insulation. Is often finished/coated to extend life span, eg. galvanised, Colourbond, stainless steel, or coated with plastics, eg. PVC.</td>
</tr>
<tr>
<td><strong>Environmental considerations</strong></td>
<td>Long life spans mean less environmental impact in terms of material replacement. However, they need considerable support structure. Made from non-renewable resources. All high embodied energy although to differing degrees, aluminium is extremely energy intensive. All produce pollutants during manufacture (including coatings) but are generally contained. All are recyclable: steel and aluminium are commonly recycled and often contain recycled content. The potential of steel, copper and aluminium to be re-used is very good, especially if designed for disassembly. Steel and aluminium are good for collecting rainwater if properly sealed. The corrosion of copper and zinc may cause contamination of nearby water and soil.</td>
</tr>
<tr>
<td><strong>Relative cost</strong></td>
<td>Economic for both small and large structures. Timber or steel frame required for support.</td>
</tr>
</tbody>
</table>
Roof tiles
Concrete, clay, slate, fibre cement

| Suitability | Mainly roofing. Typically used for permanent fixed shade structures. Most suited to summer shading where cool shade is required. |
| UV radiation protection | Excellent protection, UPF 50+. |
| Waterproof | Yes. |
| Light transmission | Opaque. |
| Solar heat gain | Better thermal performance if lined. |
| Structural implications | Requires substantial support structure. Must be fixed to manufacturer’s specification. |
| Ease of replacement | Material readily available; easily fitted. |
| Maintenance requirements | Hard wearing requiring minimal maintenance. |
| Life span | Long. Fixings and flashing materials should have a lifetime similar to that of the roof covering material. |
| Environmental considerations | All tiles have impacts during manufacture, are made of non-renewable resources, and require a comparatively large volume of material. Using locally reclaimed tiles lessens these impacts. Slate has the lowest manufacturing impacts, however it is usually imported, which increases its embodied energy, reclaimed slate is preferable. Clay has high embodied energy; however this may be offset by long life use, as it is more durable than concrete. Concrete tiles with slag instead of cement are preferable. |
| Relative cost | Low, but support structure cost may be significant. |
## Timber

<table>
<thead>
<tr>
<th><strong>Suitability</strong></th>
<th>Pergolas, trellis, lattice, screens, vertical or horizontal louvres. Suitable for use in combination with natural shade elements. Generally used in fixed permanent structures.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UV radiation protection</strong></td>
<td>Solid sections provide excellent protection, UPF 50+. Other situations depend on density of construction, eg. lattice or covering vegetation.</td>
</tr>
<tr>
<td><strong>Waterproof</strong></td>
<td>Depends on detailing and use.</td>
</tr>
<tr>
<td><strong>Light transmission</strong></td>
<td>Depends on detailing.</td>
</tr>
<tr>
<td><strong>Solar heat gain</strong></td>
<td>Does conduct heat, but this is lessened in open air situations.</td>
</tr>
<tr>
<td><strong>Structural implications</strong></td>
<td>Design for appropriate wind code.</td>
</tr>
<tr>
<td><strong>Ease of replacement</strong></td>
<td>Usually readily available; ease of re-fitting depends on type of construction.</td>
</tr>
<tr>
<td><strong>Maintenance requirements</strong></td>
<td>Guard against termites. If using preserved or treated timber, care must be taken in handling. Painting or other protective treatment will extend life span.</td>
</tr>
<tr>
<td><strong>Life span</strong></td>
<td>Longevity will depend on: ongoing maintenance and servicing; types of treatments; grade of timber used; type of timber, eg. hardwoods/treated softwoods, as well as its detailing (how it is fixed).</td>
</tr>
<tr>
<td><strong>Particular properties</strong></td>
<td>Available in a wide range of sizes and strengths. Can also be in sheet form, eg. plywood.</td>
</tr>
<tr>
<td><strong>Environmental considerations</strong></td>
<td>Timber is a renewable resource but only if forests are managed correctly. It generally has low embodied energy (depending on transport energy) but some wastage to produce building materials. The main issue with timber and environmental impact is its sourcing - preference should be given to sustainably managed forests or plantation resources. Timbers with the longest life span are hardwoods that are often unsustainably harvested. Look to use recycled/reclaimed timbers. Treatments which extend life span for timber are often highly toxic, especially copper chrome arsenic (CCA). As ammoniacal copper quartenary (ACQ) has less heavy metals than CCA, it is preferable; both treatments mean that timber cannot be burnt. Use of hardwoods can avoid this environmental problem, however they are often from old growth forests. Life span can be extended beyond its initial use by keeping pieces in long lengths and designing for disassembly. For plywood sheeting, ensure facing is a sustainably grown local product and specify marine grade; other grades have higher volatile organic compounds in glues.</td>
</tr>
<tr>
<td><strong>Relative cost</strong></td>
<td>Depends on design lengths, proposed usage, etc. Readily available, economical material.</td>
</tr>
</tbody>
</table>
## Concrete

Precast or in situ, concrete blocks, autoclaved aerated concrete, fibre cement sheet

<table>
<thead>
<tr>
<th>Quality</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Suitability</strong></td>
<td>Walls, roofs, louvres, sunhoods. Suitable for permanent fixed structures.</td>
</tr>
<tr>
<td><strong>UV radiation Protection</strong></td>
<td>Excellent protection, UPF 50+.</td>
</tr>
<tr>
<td><strong>Waterproof</strong></td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Light transmission</strong></td>
<td>Opaque.</td>
</tr>
<tr>
<td><strong>Solar heat gain</strong></td>
<td>Absorbs heat slowly and re-transmits as air temperature falls.</td>
</tr>
<tr>
<td><strong>Structural implications</strong></td>
<td>Requires substantial support and footings.</td>
</tr>
<tr>
<td><strong>Ease of replacement</strong></td>
<td>Materials readily available; re-fitting depends on form of material - large precast units and cast in situ forms, eg. suspended reinforced concrete slabs, are very difficult to replace; smaller pre-manufactured units, eg. fibre cement sunhoods or block walls, easily replaced.</td>
</tr>
<tr>
<td><strong>Maintenance requirements</strong></td>
<td>Low.</td>
</tr>
<tr>
<td><strong>Life span</strong></td>
<td>Long.</td>
</tr>
<tr>
<td><strong>Particular properties</strong></td>
<td>Flexible material in many forms. Slow heat absorption.</td>
</tr>
<tr>
<td><strong>Environmental considerations</strong></td>
<td>Uses a high volume of material with high embodied energy. Concrete (precast, in situ or blocks) can be used as a thermal mass. All finite resources - scarcity is becoming an issue in some localities. Production of the critical ingredient (cement) is major contributor to CO2 emissions (also nitrous oxides and sulphurous oxides emissions). Concrete aggregates may be supplemented with slag to reduce overall impact. Large volumes of water required in manufacturing/construction. Possibility for down-cycling (the recycling of material into a material of lesser quality).</td>
</tr>
<tr>
<td><strong>Relative cost</strong></td>
<td>Low, but cost of support structures may be significant.</td>
</tr>
</tbody>
</table>
Masonry
Clay bricks, rammed earth, mud bricks, straw bale

<table>
<thead>
<tr>
<th>Suitability</th>
<th>Walls. Suitable for permanent, fixed structures.</th>
</tr>
</thead>
<tbody>
<tr>
<td>UV radiation protection</td>
<td>Excellent protection, UPF 50+.</td>
</tr>
<tr>
<td>Waterproof</td>
<td>Yes.</td>
</tr>
<tr>
<td>Light transmission</td>
<td>Opaque.</td>
</tr>
<tr>
<td>Solar heat gain</td>
<td>Absorbs heat slowly and re-transmits as air temperature falls.</td>
</tr>
<tr>
<td>Structural implications</td>
<td>Requires substantial support and footings.</td>
</tr>
<tr>
<td>Ease of replacement</td>
<td>Materials readily available; re-fitting usually straightforward.</td>
</tr>
<tr>
<td>Maintenance requirements</td>
<td>Low.</td>
</tr>
<tr>
<td>Life span</td>
<td>Generally long; rammed earth and straw bales durable if protected by eaves.</td>
</tr>
<tr>
<td>Particular properties</td>
<td>Slow heat absorption. Straw bales have a far less thermal mass than others.</td>
</tr>
<tr>
<td>Environmental considerations</td>
<td>Made from finite resources (although not scarce), these materials can also be used as an energy store. As walling, these materials use a high volume of material. Locally sourced natural stone, mudbricks, straw bale and rammed earth have extremely low environmental impact. More traditional clay bricks have impacts in manufacturing of high embodied energy, contribution to acid rain and the possible release of toxic gases. Re-used bricks or natural stone are therefore preferable and often available. Use soft mortar with clay bricks so that bricks can be re-used later.</td>
</tr>
<tr>
<td>Relative cost</td>
<td>Low, though substantial footings required.</td>
</tr>
</tbody>
</table>
## Expanded metal mesh

<table>
<thead>
<tr>
<th><strong>Suitability</strong></th>
<th>Adjustable or fixed screens and wind deflectors. Operable roofs and walls.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UV radiation protection</strong></td>
<td>Forms an effective shield depending on the positions of the slit opening.</td>
</tr>
<tr>
<td><strong>Waterproof</strong></td>
<td>No.</td>
</tr>
<tr>
<td><strong>Light transmission</strong></td>
<td>Moderate transmission of light.</td>
</tr>
<tr>
<td><strong>Solar heat gain</strong></td>
<td>Barrier to direct solar radiation while allowing ventilation.</td>
</tr>
<tr>
<td><strong>Structural implications</strong></td>
<td>Can span quite large openings. Must withstand lateral forces. No uplift forces.</td>
</tr>
<tr>
<td><strong>Ease of replacement</strong></td>
<td>Readily available.</td>
</tr>
<tr>
<td><strong>Maintenance requirements</strong></td>
<td>Should be galvanised to ensure low maintenance.</td>
</tr>
<tr>
<td><strong>Life span</strong></td>
<td>Very durable. Affected by such things as coatings and hole size, eg. rust. Particular properties Depending on angle of mesh, will let air through.</td>
</tr>
<tr>
<td><strong>Environmental considerations</strong></td>
<td>Non-renewable, however it could contain a percentage of recycled content. No waste material in production as it is made from one continuous piece of metal. Requires less structural support than solid sheet metal and uses a low volume of material. Usually made from steel, also can be made from aluminium (which requires more energy to produce) and copper (which has some problems with nearby soil and water contamination). Different finishes usually applied pre-purchase; often galvanised, plastic coated, eg. PVC, or painted. Can be recycled and re-used, especially if designed for disassembly.</td>
</tr>
<tr>
<td><strong>Relative cost</strong></td>
<td>Low.</td>
</tr>
</tbody>
</table>
Perforated metal sheet

<table>
<thead>
<tr>
<th>Suitability</th>
<th>Screens, awnings and sunhoods. Used for both permanent and adjustable systems.</th>
</tr>
</thead>
<tbody>
<tr>
<td>UV radiation protection</td>
<td>Varies as only solid sections provide barrier to UV radiation.</td>
</tr>
<tr>
<td>Waterproof</td>
<td>No.</td>
</tr>
<tr>
<td>Light transmission</td>
<td>Modulates light.</td>
</tr>
<tr>
<td>Solar heat gain</td>
<td>Cuts direct solar radiation and allows ventilation.</td>
</tr>
<tr>
<td>Structural implications</td>
<td>Must be strong enough to span required opening.</td>
</tr>
<tr>
<td>Ease of replacement</td>
<td>Readily available; easily replaced.</td>
</tr>
<tr>
<td>Maintenance requirements</td>
<td>Should be galvanised. Pre-painted sheets require low maintenance unless in a highly corrosive environment.</td>
</tr>
<tr>
<td>Life span</td>
<td>Very durable. Specify for appropriate life span, ie. coatings and hole size to minimise rust.</td>
</tr>
<tr>
<td>Particular properties</td>
<td>Holes will allow air though.</td>
</tr>
<tr>
<td>Environmental considerations</td>
<td>Non-renewable, however it could contain a percentage of recycled content. Small amount of waste material in production. Requires less structural support than solid sheet metal and uses a low volume of material. Usually made from steel, also can be made from aluminium (which requires more energy to produce) and copper (which has some problems with nearby soil and water contamination). Different finishes usually applied pre-purchase; often galvanised, plastic coated, eg. PVC or painted. Can be recycled and re-used, especially if designed for disassembly.</td>
</tr>
<tr>
<td>Relative cost</td>
<td>Low.</td>
</tr>
</tbody>
</table>
**Glass**

<table>
<thead>
<tr>
<th>Qualities of shade materials</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Suitability</strong></td>
<td>Roofs or walls. Use where light and/or visibility is required. Generally permanent fixed structures.</td>
</tr>
<tr>
<td><strong>UV radiation protection</strong></td>
<td>Depends on thickness and type. Ordinary window glass offers little protection from UV radiation. Laminated glass can absorb almost all UVB; by contrast, toughened glass transmits some UVB. Additives during manufacture and reflective surface laminates can affect UV radiation penetration.</td>
</tr>
<tr>
<td><strong>Waterproof</strong></td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Light transmission</strong></td>
<td>High depending on tint.</td>
</tr>
<tr>
<td><strong>Solar heat gain</strong></td>
<td>Less heat gain if tinted.</td>
</tr>
<tr>
<td><strong>Structural implications</strong></td>
<td>Talk to manufacturer to select glass appropriate to the job.</td>
</tr>
<tr>
<td><strong>Ease of replacement</strong></td>
<td>Usually readily available and easily re-fitted.</td>
</tr>
<tr>
<td><strong>Maintenance requirements</strong></td>
<td>Needs regular cleaning. Breakage and safety issues if not toughened or laminated.</td>
</tr>
<tr>
<td><strong>Life span</strong></td>
<td>Long life if it doesn’t sustain impact or over-pressurisation.</td>
</tr>
<tr>
<td><strong>Particular properties</strong></td>
<td>Transparency allows wide range of uses, eg. windbreaks.</td>
</tr>
<tr>
<td><strong>Environmental considerations</strong></td>
<td>High embodied energy although small volume of material required. Additives and coatings required to provide UV radiation protection made of oxides of metals: iron, nickel, cobalt, silver halide which complicate the recycling of glass and may have disposal complications. Glass used in buildings is not currently recycled and has very little recycled component.</td>
</tr>
<tr>
<td><strong>Relative cost</strong></td>
<td>Reasonably high compared to other translucent materials. May require more sophisticated support structure.</td>
</tr>
</tbody>
</table>

To access the Cancer Council Australia position statement 'Tinting of car glass and window glass for protection against solar ultraviolet radiation' please visit [www.cancer.org.au](http://www.cancer.org.au).
### Polycarbonate sheeting

<table>
<thead>
<tr>
<th>Suitability</th>
<th>Roofing, walling, louvre systems, awnings, skylights and canopies. Typically used for permanent fixed shade structures, although could be used as adjustable louvres. Most suited to winter shading where warm shade is required.</th>
</tr>
</thead>
<tbody>
<tr>
<td>UV radiation protection</td>
<td>Very high protection.</td>
</tr>
<tr>
<td>Waterproof</td>
<td>Yes.</td>
</tr>
<tr>
<td>Light transmission</td>
<td>High. Differs according to thickness, profile and colour. Clear or opal transmits more light and heat than darker tints.</td>
</tr>
<tr>
<td>Solar heat gain</td>
<td>High. Becomes warm and produces a heating effect.</td>
</tr>
<tr>
<td>Structural implications</td>
<td>Design structure for wind uplift.</td>
</tr>
<tr>
<td>Ease of replacement</td>
<td>Readily available; easily re-fitted.</td>
</tr>
<tr>
<td>Maintenance requirements</td>
<td>Low maintenance. Impact resistant</td>
</tr>
<tr>
<td>Life span</td>
<td>About 10 years. Material may become brittle and discolouration may occur sooner than 10 years.</td>
</tr>
<tr>
<td>Particular properties</td>
<td>Long lengths; range of profiles and colours available.</td>
</tr>
<tr>
<td>Environmental considerations</td>
<td>The environmental problems associated with plastics such as polycarbonate sheeting occur in their manufacture and disposal - they cause fewer problems during construction and use. Toxicity during manufacture depends on the stabilisers used (which is what protects polymer from solar degradation so is necessary for shade provision). These are often environmentally dangerous (especially phosgene). Made from non-renewable resources, high embodied energy offset by low amount of material needed. Can be recycled, but generally down-cycled. Because of long life span and durability, potential for re-use is high; specify shapes/mouldings and support structures with this in mind. Will not decompose. Disposal is to landfill. Good for water collection. Requires less structural support materials.</td>
</tr>
<tr>
<td>Relative cost</td>
<td>Low.</td>
</tr>
</tbody>
</table>
**Fibreglass sheeting**  
*Teflon coated, silicone coated*

<table>
<thead>
<tr>
<th><strong>Suitability</strong></th>
<th>Roofing, walling, louvre systems, awnings, skylights and canopies. Typically used for permanent fixed shade structures, although could be used as adjustable louvres. Most suited to winter shading where warm shade is required.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UV radiation protection</strong></td>
<td>Very high protection. Differing UV stabilisers and coatings will change level of UPF.</td>
</tr>
<tr>
<td><strong>Waterproof</strong></td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Light transmission</strong></td>
<td>High. Various tints, UV stabilisers and coatings will change level of light transmission. Clear or opal transmits more light and heat than darker tints.</td>
</tr>
<tr>
<td><strong>Solar heat gain</strong></td>
<td>High. Becomes warm and produces a heating effect.</td>
</tr>
<tr>
<td><strong>Structural implications</strong></td>
<td>Design structure for wind uplift.</td>
</tr>
<tr>
<td><strong>Ease of replacement</strong></td>
<td>Readily available.</td>
</tr>
<tr>
<td><strong>Maintenance requirements</strong></td>
<td>Low maintenance. Impact resistant.</td>
</tr>
<tr>
<td><strong>Life span</strong></td>
<td>Coatings (such as teflon/silica) protect the resin/glass fibres from weathering and will extend the life span, as will detailing. Weathering will gradually make material more opaque.</td>
</tr>
<tr>
<td><strong>Particular properties</strong></td>
<td>Fibreglass sheeting consists of glass fibres mixed with polymer resins. Can be bought in sheets or moulded for specific applications.</td>
</tr>
<tr>
<td><strong>Environmental considerations</strong></td>
<td>Material uses non-renewable resources. High embodied energy as well as problems with toxicity and volatile organic compounds in manufacture, although manufacturers are increasingly following best practice initiatives. Pollution and waste during manufacture depends on type of plastic resin and stabilisers used. Currently not recycled in Australia; re-use depends on design specifications, ie. whether bought in sheeting or hand-moulded.</td>
</tr>
<tr>
<td><strong>Relative cost</strong></td>
<td>Low.</td>
</tr>
</tbody>
</table>
### Qualities of shade materials

#### Canvas or similar tightly woven cloths

<table>
<thead>
<tr>
<th><strong>Suitability</strong></th>
<th>Good for adjustable, short-term fixed and demountable structures. Not suitable for large projects.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UV radiation protection</strong></td>
<td>Good protection when new. Prolonged or severe weathering may reduce UPF.</td>
</tr>
<tr>
<td><strong>Waterproof</strong></td>
<td>Watertight up to saturation point. Greater protection can be achieved using coatings.</td>
</tr>
<tr>
<td><strong>Light transmission</strong></td>
<td>Lighter colours transmit greater light.</td>
</tr>
<tr>
<td><strong>Solar heat gain</strong></td>
<td>Darker colours gain more heat.</td>
</tr>
<tr>
<td><strong>Structural implications</strong></td>
<td>Guy ropes cause obstruction.</td>
</tr>
<tr>
<td><strong>Ease of replacement</strong></td>
<td>Readily available. Ease of replacement of individual panels usually means that the whole structure would need to be dismantled.</td>
</tr>
<tr>
<td><strong>Maintenance requirements</strong></td>
<td>Lacks self-cleaning properties. Is not mould resistant. Life span can be extended by regular maintenance and proper drying to inhibit rotting. Will still retain strength even if partially affected by rot.</td>
</tr>
<tr>
<td><strong>Life span</strong></td>
<td>Limited. Susceptible to break down due to UV radiation exposure.</td>
</tr>
<tr>
<td><strong>Particular properties</strong></td>
<td>Wide range of colours and fabric designs; also wide range of proprietary products available using canvas.</td>
</tr>
<tr>
<td><strong>Environmental considerations</strong></td>
<td>Usually made from low grade (otherwise waste material) canvas, although can be made from hemp and flax. Renewable resource although high use of water, fertilisers and pesticides in production. Canvas (especially for outdoor application) usually finished with a waterproofing agent such as aluminium or plastic sprays such as polyurethane (which have high toxic volatile organic compound emissions) to extend life. Low volume of material in relation to area covered and low volume of structural support material needed. At end of life will degrade but waterproof coatings may cause leaching problems in landfills.</td>
</tr>
<tr>
<td><strong>Relative cost</strong></td>
<td>Material cost low, though some proprietary products may be relatively expensive on a square metre basis.</td>
</tr>
</tbody>
</table>
## Teflon coated fibreglass fabric

### (PTFE)

<table>
<thead>
<tr>
<th><strong>Suitability</strong></th>
<th>Large span canopies - able to achieve lower curvatures than PVC coated polyester. Fixed permanent structures - not recommended for retractable systems or flat surfaces</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UV radiation protection</strong></td>
<td>Very high.</td>
</tr>
<tr>
<td><strong>Waterproof</strong></td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Light transmission</strong></td>
<td>Translucent.</td>
</tr>
<tr>
<td><strong>Solar heat gain</strong></td>
<td>Less heat gain if tinted.</td>
</tr>
<tr>
<td><strong>Structural implications</strong></td>
<td>Structures must resist wind loads, especially uplift.</td>
</tr>
<tr>
<td><strong>Ease of replacement</strong></td>
<td>Fully imported. Consider using smaller panels for ease of replacement in the case of damage and to ensure continuous use of the covered space.</td>
</tr>
<tr>
<td><strong>Maintenance requirements</strong></td>
<td>Beware of potential for water ponding in sudden downpours.</td>
</tr>
<tr>
<td><strong>Life span</strong></td>
<td>Very durable. Design life of 20 to 30 years.</td>
</tr>
<tr>
<td><strong>Particular properties</strong></td>
<td>More difficult to fabricate and erect than PVC polyester. Non-combustible - satisfies Building Code requirements for fire protection in enclosed spaces, eg. shopping malls. Resistant to UV radiation exposure and airborne pollution.</td>
</tr>
<tr>
<td><strong>Environmental considerations</strong></td>
<td>Non-renewable resource. High embodied energy in production. Low volume of material needed in relation to area, and minimal support structures. Toxicity in production, though is generally contained. Cannot be incinerated or recycled, usually goes to landfill where there may be some problems with leaching.</td>
</tr>
<tr>
<td><strong>Relative cost</strong></td>
<td>About two to three times the cost of PVC coated polyester fabric structures.</td>
</tr>
</tbody>
</table>
PVC coated polyester fabric

<table>
<thead>
<tr>
<th>Suitability</th>
<th>Canopies and side panels. Highly curved structures - not suitable for flat surfaces. Typically used for fixed permanent structures though can be retractable or demountable. Most popular material in use for construction of fabric structures.</th>
</tr>
</thead>
<tbody>
<tr>
<td>UV radiation protection</td>
<td>Very good.</td>
</tr>
<tr>
<td>Waterproof</td>
<td>Yes.</td>
</tr>
<tr>
<td>Light transmission</td>
<td>High.</td>
</tr>
<tr>
<td>Solar heat gain</td>
<td>Heat transmission is similar to glass.</td>
</tr>
<tr>
<td>Structural implications</td>
<td>Structures must resist wind load, especially uplift. Ease of replacement Fully imported material, though readily available. Ease of re-fitting depends on use; 'structural' fabrics may require dismantling of structure for full replacement. Can be readily patched.</td>
</tr>
<tr>
<td>Maintenance requirements</td>
<td>High gloss self-cleaning surfaces.</td>
</tr>
<tr>
<td>Life span</td>
<td>Minimum 7-8 years in zones experiencing intense UV radiation. Effective life is very dependent on location and environment; in excess of 20 years likely in areas of low pollution. Pollution acts as a corrosive agent on PVC surface causing erosion. Vehicle emissions are among the worst polluting agents. Manufacturers usually provide 5 year guarantee.</td>
</tr>
<tr>
<td>Particular properties</td>
<td>Usually white or light cream in colour. Usually coated with clear Tedlar film which assists cleanability and prolongs the life of the PVC medium. Easy to work with. Fire resistant - fabric will char or holes will be formed if placed over a flame source but is not likely to ignite.</td>
</tr>
<tr>
<td>Environmental considerations</td>
<td>PVC and polyester are from non-renewable resources. Problems in production due to stabilisers/additives such as fire retardants, which may also leach in landfills. High pollution and toxicity during manufacture of PVC (though closed systems can minimise escape of dioxins). Support structure needed is minimal and volume of material is small in relation to the area covered. After use, product can be re-used unless is too degraded. PVC can theoretically be ‘downcycled and polyester recycled, but combination of the two cannot be recycled. Both are thought to release dioxins in landfill.</td>
</tr>
<tr>
<td>Relative cost</td>
<td>Relatively expensive.</td>
</tr>
</tbody>
</table>
### Knitted Polyethylene (shade cloth)

<table>
<thead>
<tr>
<th><strong>Suitability</strong></th>
<th>Proprietary products such as canopies and freestanding pavillons. Commonly used for shade in car yards or pergola covering.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UV radiation protection</strong></td>
<td>UPF varies according to colour, fabric density and degree of stretch. Only the solid sections form a barrier to UV radiation. Typically, cover factors vary from less than 50% UV radiation protection to more than 90%. Shade cloths with a rating of 90% give only medium UV radiation protection or UPF 10. Double knits or double layers may give higher UPF. Use only fabric that provides 94% or greater protection from direct UV radiation.</td>
</tr>
<tr>
<td><strong>Waterproof</strong></td>
<td>Porous, lacks rain protection.</td>
</tr>
<tr>
<td><strong>Light transmission</strong></td>
<td>Lighter colours allow more light but reflect and scatter more UV radiation.</td>
</tr>
<tr>
<td><strong>Solar heat gain</strong></td>
<td>Darker colours are hotter but reflect less UV radiation.</td>
</tr>
<tr>
<td><strong>Structural implications</strong></td>
<td>Minimal down or uplift force due to porous nature of the material.</td>
</tr>
<tr>
<td><strong>Ease of replacement</strong></td>
<td>Readily available - many different sources and countries of origin. Re-fitting generally easy.</td>
</tr>
<tr>
<td><strong>Maintenance requirements</strong></td>
<td>Keep clear of tree debris to avoid sagging problems. Susceptible to mould growth and dirt pick-up.</td>
</tr>
<tr>
<td><strong>Life span</strong></td>
<td>About 5 years depending on location. It should be noted that shade cloth may be characterised by poor durability if used in a location that is subject to windy conditions. Prone to vandalism.</td>
</tr>
<tr>
<td><strong>Particular properties</strong></td>
<td>Easier to fabricate than solid fabrics. High strength fabric. Curved surfaces can be formed easily.</td>
</tr>
<tr>
<td><strong>Environmental considerations</strong></td>
<td>Non-renewable resource, made in Australia and imported. Contains no chlorides, however additives to ensure low flammability are often highly toxic and can emit volatile organic compounds. Short life span means regular replacement. Less structural material needed due to small weight. After use it is too degraded to be recycled and usually goes to landfill; it can be incinerated depending on additives. Easily transported. Not suitable for water collection/other uses.</td>
</tr>
<tr>
<td><strong>Relative cost</strong></td>
<td>Inexpensive. Cost of different cloths is directly proportional to quality.</td>
</tr>
</tbody>
</table>
**Woven PVC coated yarn (shade cloth)**

<table>
<thead>
<tr>
<th><strong>Suitability</strong></th>
<th>Adjustable and fixed systems, outdoor furniture and other proprietary products.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UV radiation protection</strong></td>
<td>UPF varies according to colour, fabric density and degree of stretch. Only the solid sections form a barrier to UV radiation. Typically, cover factors vary from less than 50% UV radiation protection to more than 90%. Shade cloths with a rating of 90% give only medium UV radiation protection or UPF 10. Double knits or double layers may give higher UPF. Use only fabric that provides 94% or greater protection from direct UV radiation.</td>
</tr>
<tr>
<td><strong>Waterproof</strong></td>
<td>Porous, lacks rain protection.</td>
</tr>
<tr>
<td><strong>Light transmission</strong></td>
<td>Lighter colours allow more light but reflect and scatter more UV radiation.</td>
</tr>
<tr>
<td><strong>Solar heat gain</strong></td>
<td>Darker colours are hotter but reflect less UV radiation.</td>
</tr>
<tr>
<td><strong>Structural implications</strong></td>
<td>Minimal down or uplift force due to porous nature of the material.</td>
</tr>
<tr>
<td><strong>Ease of replacement</strong></td>
<td>Readily available, many different sources and countries of origin. Re-fitting generally easy.</td>
</tr>
<tr>
<td><strong>Maintenance requirements</strong></td>
<td>Keep clear of tree debris to avoid sagging problems. Susceptible to mould growth and dirt pick up.</td>
</tr>
<tr>
<td><strong>Life span</strong></td>
<td>About 5 years depending on location. It should be noted that shade cloth may be characterised by poor durability if used in a location that is subject to windy conditions. Prone to vandalism.</td>
</tr>
<tr>
<td><strong>Particular properties</strong></td>
<td>Easier to fabricate than solid fabrics. High strength fabric. Curved surfaces can be formed easily.</td>
</tr>
<tr>
<td><strong>Environmental considerations</strong></td>
<td>PVC is made from non-renewable resources. The type of yarn used may either be renewable or non-renewable. High toxicity during manufacture of PVC (though closed systems can minimise escape of dioxins). Its short life span means regular replacement and thus more material. Volume of materials is small in relation to the area covered. After use, this product is usually too degraded to be recycled. Not suitable for water collection/other uses.</td>
</tr>
<tr>
<td><strong>Relative cost</strong></td>
<td>Inexpensive. Cost is directly proportional to quality.</td>
</tr>
</tbody>
</table>
| **Shingles**  
**Timber, fibre-cement**  
| **Suitability** | Roofing and walling. Aesthetic suitability in some contexts. Fixed permanent structures. |
| **UV radiation protection** | Excellent protection, UPF 50+. |
| **Waterproof** | Yes. |
| **Light transmission** | Opaque. |
| **Solar heat gain** | Better thermal performance if lined. |
| **Structural implications** | Structural framework required. |
| **Ease of replacement** | Material may not be readily available; high degree of skill required. |
| **Maintenance requirements** | High. Shingles may require fireproofing treatments. |
| **Life span** | Long. |
| **Particular properties** | Available in timber, usually Western Red Cedar, or fibre-cement. |
| **Environmental considerations** | Timber shingles may be derived from a renewable resource (which depends upon timber source). They require little energy in manufacture, are biodegradable and able to be re-used. Fibre-cement products (both shingles and sheets) have relatively minimal environmental impact and are otherwise resource efficient. As fibre-cement products are durable they should be used in long life applications as their potential for re-use and recycling is poor. |
| **Relative cost** | Expensive, labour intensive to install. |
### Thatch

<table>
<thead>
<tr>
<th><strong>Suitability</strong></th>
<th>Roofing, screens and windbreaks. Suitable for fixed permanent structures.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UV radiation protection</strong></td>
<td>Excellent protection, UPF 50+.</td>
</tr>
<tr>
<td><strong>Waterproof</strong></td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Light transmission</strong></td>
<td>Opaque.</td>
</tr>
<tr>
<td><strong>Solar heat gain</strong></td>
<td>Excellent thermal insulator, cool in summer.</td>
</tr>
<tr>
<td><strong>Structural implications</strong></td>
<td>Structural framework required.</td>
</tr>
<tr>
<td><strong>Ease of replacement</strong></td>
<td>Material may not be readily available - special skill required.</td>
</tr>
<tr>
<td><strong>Maintenance requirements</strong></td>
<td>Relatively high.</td>
</tr>
<tr>
<td><strong>Life span</strong></td>
<td>Greatly depends on the type of reed or grass used and the craftsmanship in construction. Life span of 50 years or more, which is comparable with metal sheet, fibre cement and concrete tiles.</td>
</tr>
<tr>
<td><strong>Particular properties</strong></td>
<td>May attract insects and termites. Excellent insulating properties.</td>
</tr>
<tr>
<td><strong>Environmental considerations</strong></td>
<td>Environmentally advantageous material as it is renewable and often a locally available resource. No manufacturing impacts and is extremely low in embodied energy (especially if sourced locally). As an organic material it is easily disposed of, and can act as a nutrient. Possible problems with flammability in dense urban areas.</td>
</tr>
<tr>
<td><strong>Relative cost</strong></td>
<td>Reasonable. Material is inexpensive though labour component during fixing is intensive and costly.</td>
</tr>
</tbody>
</table>

*Updated February 2013*