The Shade Handbook

Cancer Council

SunSmart®

Acknowledgements

This booklet has been adapted from *The Shade Handbook: A practical guide for shade development in Western Australia*, 2007, The Cancer Council Western Australia, Perth.

Cancer Council NSW greatly appreciates the support of The Cancer Council Western Australia in allowing us to adapt its handbook.

Materials in The Shade Handbook: A practical guide for shade development in Western Australia, 2007, were adapted from the following publications

- The Cancer Council Victoria. *Shade for everyone: A practical guide for shade development*. Melbourne: The Cancer Council Victoria; 2004
- Greenwood JS, Soulos GP, Thomas ND. *Undercover: Guidelines for shade planning and design.* Sydney; Cancer Council NSW and NSW Health Department; 1998

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153 Dowling Street, WOOLLOOMOOLOO NSW 2011
Phone: 02 9334 1900
Fax: 02 8302 3530
Email: feedback@nswcc.org.au
Internet: www.cancercouncil.com.au
Cancer Council Helpline 13 11 20

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Contents

About this booklet

What is the aim of this booklet?

The handbook aims to help individuals, organisations and local governments who wish to increase quality shade in a range of NSW community settings, such as playgrounds, pools, sporting venues, beaches, parks, schools and childcare centres.

In particular the handbook will help you to:

- understand the issues associated with the sun's UV radiation and shade
- appreciate the importance of providing quality shade
- identify your shade needs, including how to conduct a shade audit
- plan, implement and evaluate a shade project

While it is beyond the scope of this booklet to address the many regional differences in NSW, the information can be easily adapted to each specific environment.

Why is shade important?

Australia has the highest rate of skin cancer in the world. At least one in two people who have grown up in Australia will be diagnosed with skin cancer, and more than 1600 Australians die each year from it. Our health system spends more money on the diagnosis and treatment of skin cancer than on any other cancer.

The major cause of skin cancer is exposure to ultraviolet (UV) radiation from the sun. With good protection against UV radiation, most cases of skin cancer can be prevented.

Shade is one of the best and easiest ways to protect against UV radiation. Most forms of shade can reduce UV exposure by up to 75 per cent. When used in conjunction with other protective measures, such as sun-protective clothing, hats, sunglasses and sunscreen, shade is the best way to provide maximum protection against UV radiation.

Shade is also an important component in the design and creation of safe and healthy communities.

How to use this booklet

The handbook provides general information to help you undertake a shade project.

Part 1, Understanding sun and shade, provides background information about a range of issues relating to the sun and shade:

- understanding UV radiation and shade
- understanding your shade options
- built shade and natural shade

Part 2, Designing your shade project, provides more detailed information to help you plan, implement and evaluate a specific shade project:

- identifying your shade needs
- implementing your shade project
- more information

The Cancer Council NSW website (www.cancercouncil.com.au/sunsmart) contains more information and tools that will help you to develop your shade project. Including:

- ten information sheets about 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, cafes and beer gardens, streetscapes and homes
- a shade priority checklist template
- an information sheet describing qualities of shade materials

Feedback

We welcome any feedback about this booklet as it will help us to continue to improve it in the future.

We would also like to hear from you if you have used this booklet to plan or implement a shade project. Please forward a brief description of the project as well as the name and phone number of a person who can be contacted for further information to:

Community Programs Officer
Skin Cancer Prevention Unit

Cancer Council NSW
153 Dowling Street
WOOLLOOMOOLOO NSW 2011

Phone: 02 9334 1900
Fax: 02 8302 3530
Email: feedback@nswcc.org.au

Part One: Understanding sun & shade

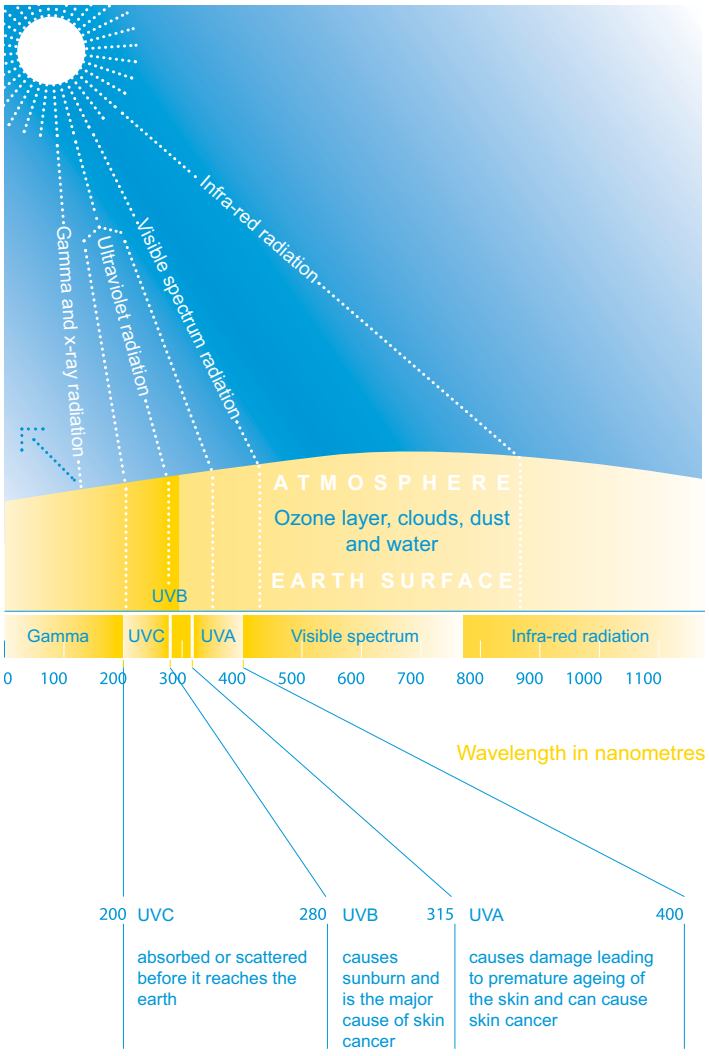
What is ultraviolet (UV) radiation?

The sun emits many different types of radiation. As well as visible light (sunlight), it also gives out ultraviolet (UV) radiation.

But, unlike sunlight, UV radiation can't be seen or felt. There are three types of UV radiation:

- UVA: transmits freely through the earth's atmosphere
- UVB: about 15% of UVB transmits through to the earth's atmosphere. The rest is absorbed by ozone
- UVC: is absorbed by ozone and does not reach the earth's surface

UVA and UVB both contribute to sunburn, skin ageing, eye damage and skin cancer.



The sun and ultraviolet radiation

(Source: The Cancer Council Victoria 2004)

Direct and indirect UV radiation

UV radiation can reach people on the ground from three sources:

- directly, from the sun
- indirectly, scattered by clouds or other particles in the atmosphere.
- indirectly, reflected from surfaces such as water, concrete, sand and snow

This is why you can get sunburnt even when you're in the shade – because of UV radiation reflecting in from the side. Table 1 shows the estimated level of reflected UV radiation from a range of common materials.

Indirect UV radiation can reduce the effectiveness of sun-protective measures such as hats and shade. For example, a person on a boat under a canopy may still receive considerable UV radiation reflected from the water and deck.

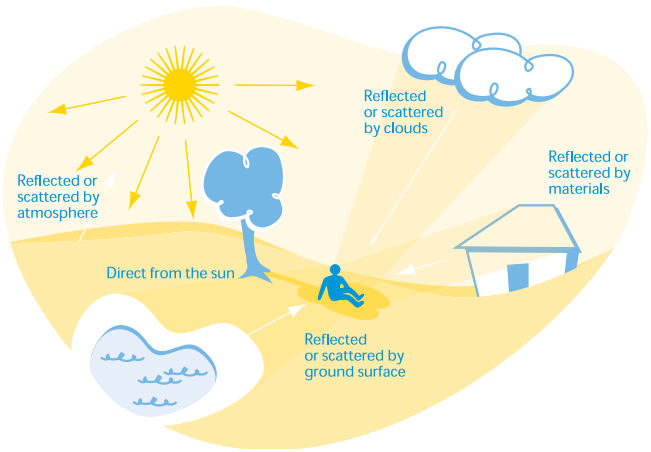
Although indirect UV radiation is generally weaker than direct UV radiation, it can still damage skin and eyes. A mixture of direct and indirect UV radiation will generally result in a higher level of exposure than direct UV radiation alone.

The ratio of direct and indirect UV radiation varies throughout the day. There is more direct UV radiation when the sun is high in the sky, such as at noon. There is more indirect UV radiation when the sun is low in the sky, such as during the morning and evening, or during winter months compared with summer.

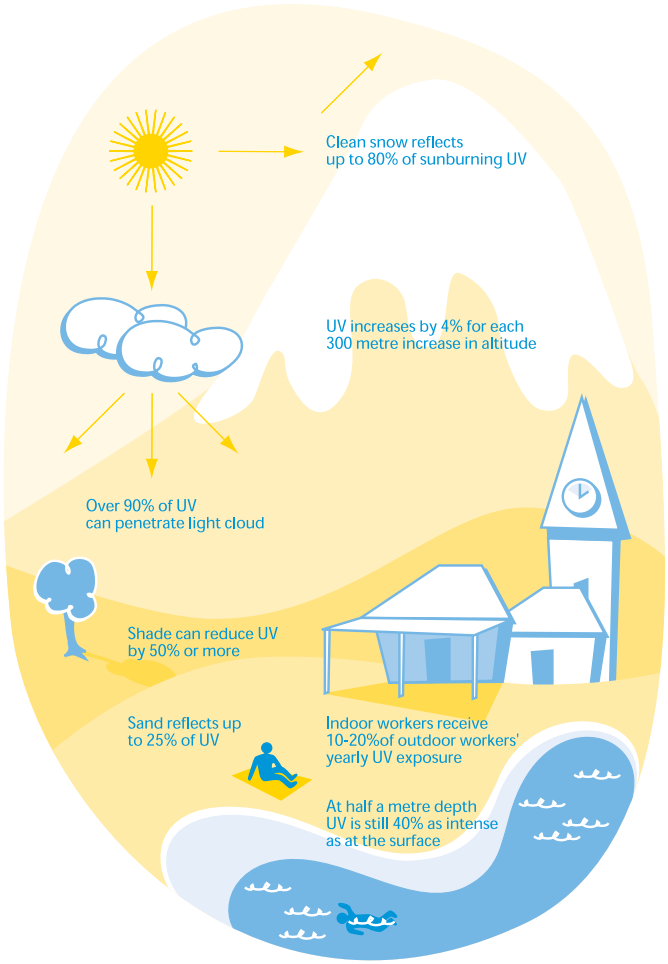
Table 1: Estimated reflected UV radiation from different surfaces

Material	Level of reflected UV radiation
Lawn and grass	2-5%
Grasslands	1-2%
Soil, clay	4-6%
Asphalt road	4-9%
House paint, white	22%
Boat deck (wood or fibreglass)	7-9%
Open water	3%
Open ocean	8%
Sea surf, white foam	25-30%
Beach sand, wet	7%
Beach sand, dry	15-18%
Snow	50-88%
Concrete	8-12%

(Source: Adapted from Slinley 1986)



Direct and indirect sources of UV radiation



Factors affecting UV radiation levels

What affects UV radiation levels?

A number of factors affect UV radiation levels during the day and throughout the year. It is important to understand and consider these when planning a shade project.

1. Height of the sun above the earth

The main factor that affects UV radiation levels is the position of the sun in the sky. UV radiation is most intense when the sun is directly overhead and the path of the radiation through the atmosphere is shortest. When the sun is lower in the sky, the path of the radiation through the atmosphere is much longer so more radiation is absorbed.

- **time of day**

The amount of UV radiation varies throughout the day. On a cloud-free day, the maximum UV radiation level occurs at solar noon, between 12 noon and 1pm, when the sun is directly overhead.

- **time of year**

Generally UV radiation levels are higher during summer when the sun is higher in the sky than in the winter when the sun is lower.

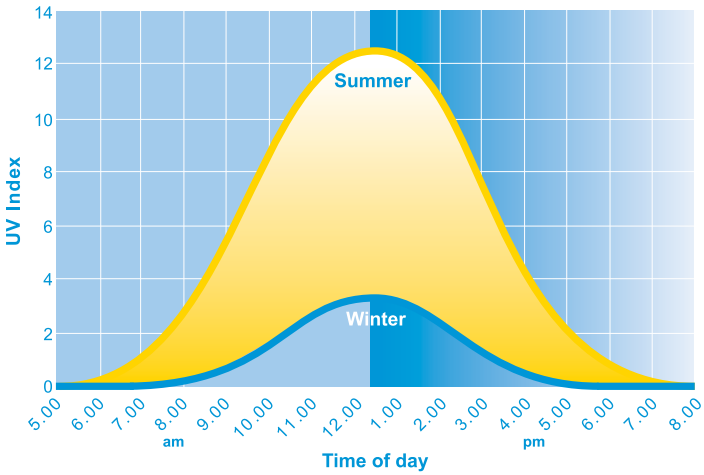
2. Scattered UV radiation

When UV radiation passes through the earth's atmosphere, some of it will collide with molecules and particles in the air, and the UV radiation is bounced around and scattered. This means that even if you are in the shade, you may still be exposed to scattered UV radiation. At times the amount of scattered UV radiation that reaches your skin may be more than the amount of direct UV radiation reaching your skin.

3. Reflected UV radiation

As outlined already, some surfaces, such as water, concrete, snow and sand, reflect large amounts of UV radiation. This means that UV radiation may still reach you even if you are in the shade or wearing a hat.

Refer to page 5 for a list of materials that will reflect UV radiation.



Seasonal variations in UV radiation intensity

4. Geographical location

The closer you live to the equator, the higher the UV radiation levels. Australia has higher levels of UV radiation compared with Europe and North America. Also, during Australia's summer, the earth's elliptical orbit brings us closer to the sun than the northern hemisphere during the northern summer. This means that Australia receives 7% more UV radiation during summer than countries in the northern hemisphere.

5. Cloud cover

Some people don't use sun protection on a cloudy day believing that clouds stop UV rays. Thick clouds do block some UV radiation, but it can get through thin or scattered clouds. Some clouds can actually increase the UV intensity on the ground by reflecting the sun's rays.

6. Ozone layer

Ozone is a gas that occurs naturally in the earth's upper atmosphere and absorbs some UV radiation. Ozone levels vary over the year and even across the day.

7. Altitude

UV radiation is stronger at higher altitudes because there is less atmosphere for the UV radiation to pass through before it reaches the ground, so less UV radiation is absorbed or scattered.

What is the UV Index?

The UV Index is often presented in the shape of a bell curve to show how it changes throughout the day, peaking in the middle part of the day (when the UV is strongest) and gradually dropping again throughout the afternoon.

The UV Alert shows when the UV Index is forecast to be 3 or above for the day. It identifies the hours of each day when the UV Index will be 3 or above, so you can stay inside during those times, or use sun protection if you're outside.

The UV Index indicates the level of UV radiation that reaches the earth's surface on any given day. The UV Index is forecast by the Bureau of Meteorology (BOM) and is posted on their website (www.bom.gov.au/weather/uv) as the daily SunSmart UV Alert. More information and a link to the SunSmart UV Alert for your nearest town can be found at www.cancercouncil.com.au/sunsmart. The UV Index is also reported in some newspaper, radio and television weather reports.

The higher the level of UV radiation the quicker your skin can be damaged by sun exposure and the more protection you need – see diagram right.

Refer to page 35 for more information about the UV Index

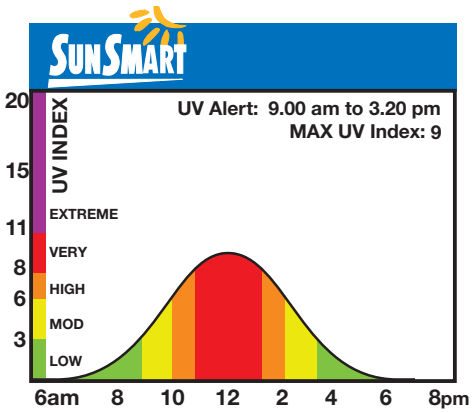
Temperature is not an indicator of UV radiation levels. The temperature does not affect the amount of UV radiation reaching the ground. Therefore it is possible to get burnt on a cool and cloudy day.

How to read the SunSmart UV Alert

This shows the time period you need to be SunSmart on this day: from 9am – 3.20pm

UV Index ranges from:

- Extreme (11+)
- Very high (8–10)
- High (6–7)
- Moderate (3–5)
- Low (0–2)



Issued by the Bureau of Meteorology

The maximum UV Index level for this day is forecast to be 9, which is very high.

The varying levels of UV radiation expected at different times of the day are displayed along the bottom of the graph.

The UV Index:

11+ EXTREME
Extra protection.

8-10 VERY HIGH
Extra protection.

6-7 HIGH
Protection required.

3-5 MODERATE
Protection required.

1-2 LOW
No protection required.

When the UV forecast is 3 (yellow) or above, you need to protect yourself from the sun because the UV rays are strong enough to damage your skin.

When the UV forecast is over 8 (red or purple), avoid being outside during midday hours. Make sure you seek shade. Shirt, sunscreen and hat are a must.

In summer most of NSW has UV radiation levels in the extreme range (11+). Even in winter some northern areas of NSW have moderate UV radiation levels of 3+.

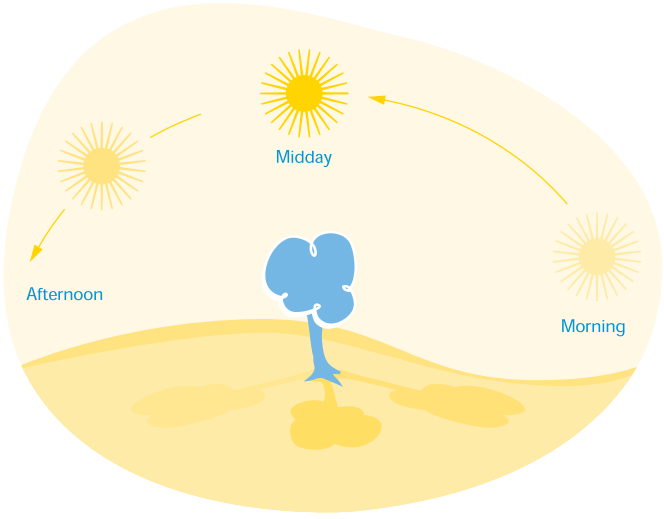
The path of the sun and its effect on shade

It is important to understand the sun's path to predict where a tree or shade structure will cast its shadow.

The sun moves continuously across the sky during the day, from rising in the east to setting in the west. There are three basic shade patterns every day:

1. **Morning:** the shadow falls in a westerly direction away from the object casting the shadow
2. **Midday:** the shadow will be under the object casting the shadow
3. **Afternoon:** the shadow falls in an easterly direction away from the object casting the shadow

This constant movement of the sun makes it difficult to predict where the shade cast by an object will fall. For this reason, a lot of shade is incorrectly located and poorly designed, resulting in built or natural shade that does not shade an area where it is needed most. To ensure that your shade falls in the right place at the right time, you may decide to seek professional advice.



Three daily shade patterns

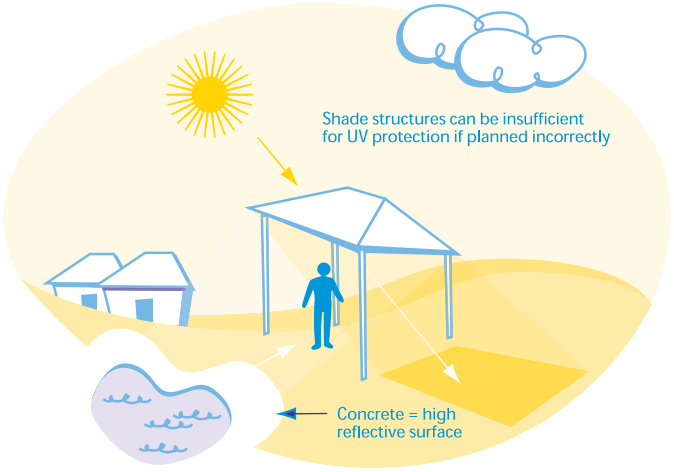
Understanding your shade options

What is quality shade?

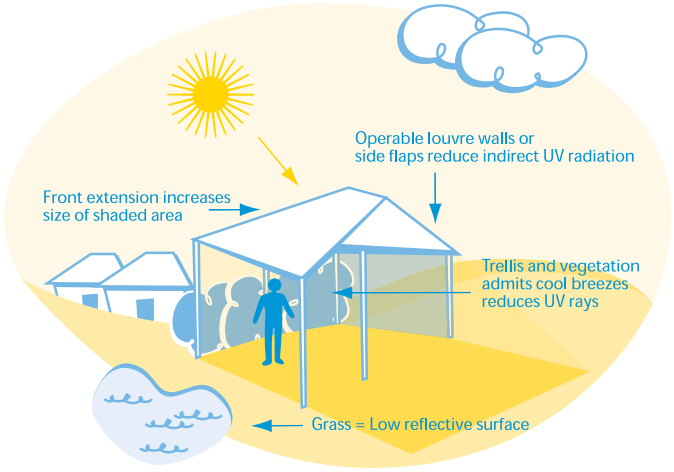
Quality shade provides protection from UV radiation where it is needed, at the right time of day and at the right time of year.

Well-designed shade ensures that:

- the outdoor space is comfortable to use in all seasons
- a barrier protects users from direct and indirect sources of UV radiation
- the shade is attractive, practical and environmentally friendly



Poorly designed shade



Well designed shade

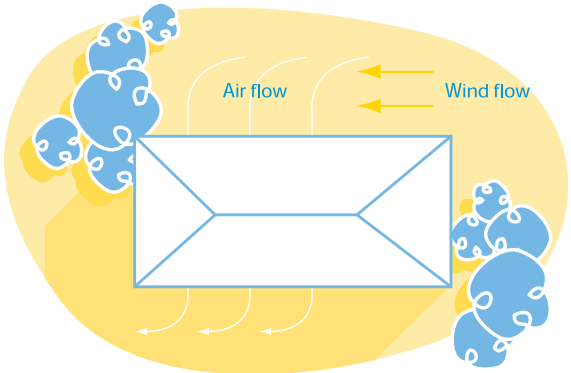
Climate and comfort

Shade structures need to be comfortable and attractive so that people will want to use it. You need to consider four key elements when ensuring a shade structure is comfortable:

- air temperature
- humidity
- air movement
- heat radiated from the sun and surroundings

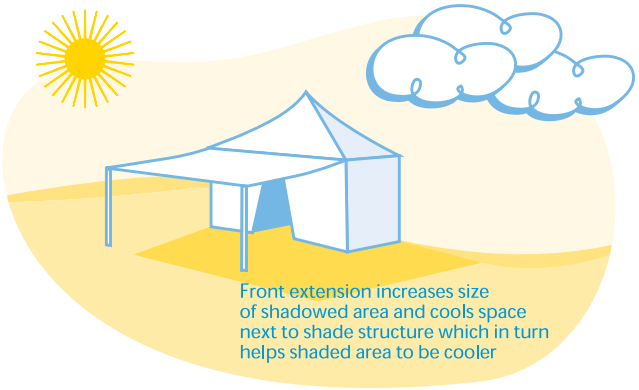
You can then design the shade structure to best suit your climate. For example, if it is hot and sticky, provide shade to block out the sun and allow cross ventilation to capture the breeze for cooling. If it is cold and windy, provide windbreaks to keep out the breeze and use north-facing openings to collect the warmth and light from the sun.

The following methods can be used to provide a cool place when it is hot:

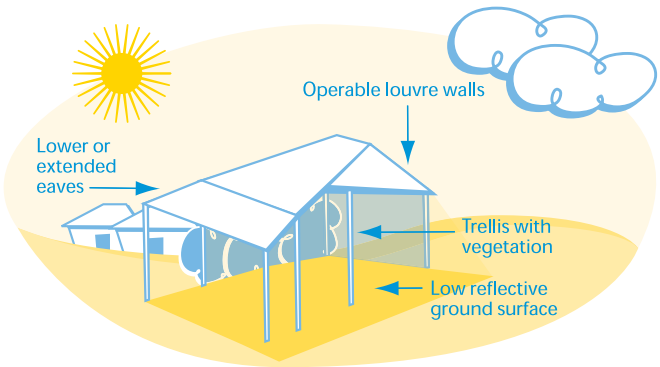


Design the shaded space to capture and channel breezes. For example, orientate openings towards incoming breezes.

Provide shade to the openings of shade structures. For example, when putting up a marquee, place it so a nearby tree will shade the entrance.

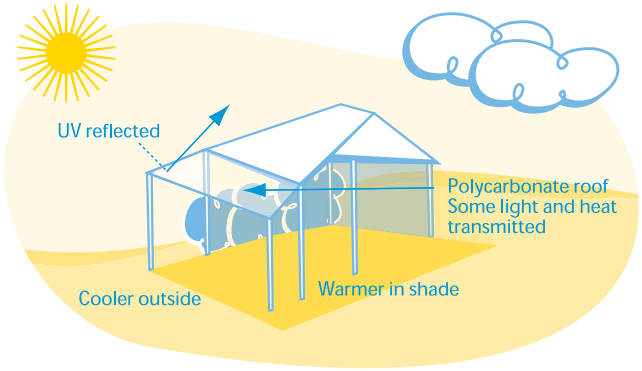


Add eaves to the design of built shade. This will cool the space immediately outside the shade structure, which will help the shaded area to be cooler.

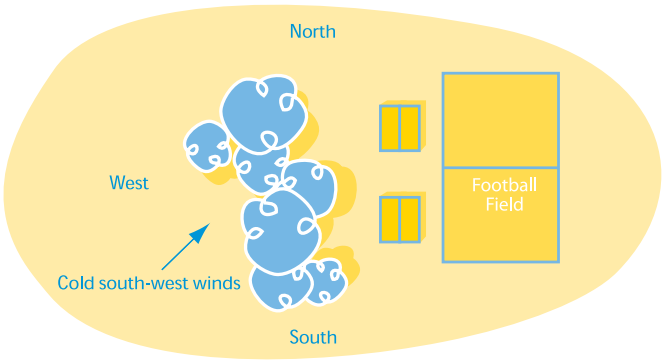


Prevent surfaces such as sand or concrete from heating up, as this can cause the air surrounding these surfaces to become hotter, which may make a nearby shade structure hotter. Shade the surface, change it or select a surface that does not get too hot.

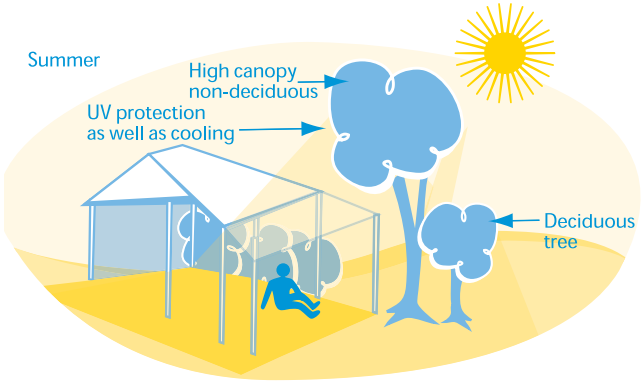
The following methods can be used to provide warmth and light when it is cooler:

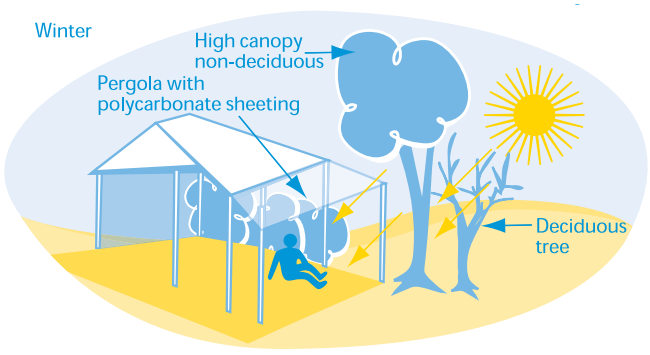


Provide shade that blocks out UV radiation but lets in warmth and light from the sun. For example, use see-through shade material.



Plant windbreaks to stop cold winds.





Plant deciduous trees and shrubs that lose their leaves in winter to let in the sun's warmth and light in cooler months but provide shade during warmer months.

Control of direct and indirect UV radiation

The most common method of controlling direct UV radiation is to create a barrier (built or natural) that intercepts the sun's rays, creating shade. These design strategies can help to reduce an area's exposure to both direct and indirect UV radiation.

Ensure the shade structure is an adequate size

Larger shade structures have more area that is not affected by indirect UV radiation reflecting in from the sides.

Consider the arrangement of existing structures

For example, if there are a large number of small umbrellas, group them together to form a single larger canopy for greater protection.

Consider using barriers for side as well as overhead protection

Vertical screening with plants and trellises or opaque louvres can help to block indirect UV radiation while still allowing breezes to flow through.

Extend overhead barriers past use areas

A simple rule of thumb is to make sure there is at least one metre of overhang past the actual area of use.

Avoid highly reflective surfaces

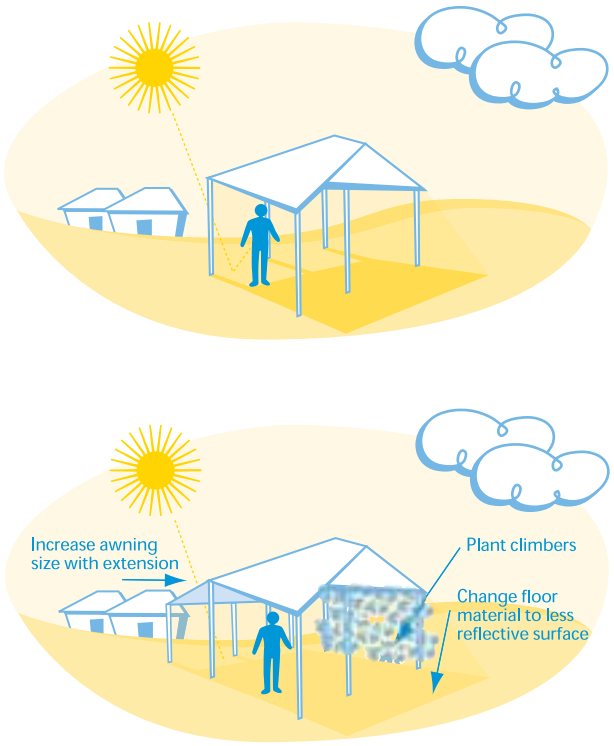
Where possible choose surfaces that reflect minimal UV radiation. Generally, soft or rough surfaces such as brick pavers and grass reflect less UV radiation than hard or smooth surfaces such as concrete.

Change existing surfaces

Depending on the site it may be possible to change an existing surface that reflects high levels of UV radiation. For example, in a playground, replace asphalt or concrete with rubber matting, which reflects less UV radiation and is also a soft fall material.

If the property next door has a large reflective wall facing your site, you will need to design a shade system that blocks the reflected UV radiation.

Refer to page 5 for a list of materials that reflect UV radiation.



Reducing scattered and reflected UV radiation

Built shade

An overview of built shade

Built shade can be stand alone or it can be built onto existing buildings or structures. All built shade consists of two parts: the supporting structure that keeps the shade structure in place and holds it up and the primary shading element, which is the material that makes up the canopy or roof of the shade device.

Built shade structures have the following advantages over natural shade:

- the shade they cast is more predictable
- they can provide protection from the rain
- some types can be erected quickly
- they have a range of alternative uses, for example, to collect rainwater for irrigation or to support a solar power device

For all built structures, no matter what the size, it is vital to seek professional advice. Certification from a qualified structural engineer may be required to ensure structural integrity and safety. Additionally, to build any permanent shade structure, you will need approval from your local council.

Different types of built shade

Built shade structures are often described using one or more of the following terms:

1. permanent systems
2. demountable systems
3. adjustable systems
4. shade sails (also known as tension membrane structures)
5. portable shade

1. Permanent systems

Permanent shade systems are designed to last at least 10 years. Examples include pergolas and verandahs. It is important that permanent systems are durable as they need to withstand all weather conditions. Regular maintenance is essential to ensure their long lifespan. The components of a permanent shade system should be cheap and easy to replace.

2. Demountable systems

A demountable shade structure can easily be put up and pulled down. Examples include tents, marquees and lightweight shade sails. Some demountable systems can be used on a variety of ground surfaces, such as grass, sand or concrete.

A demountable shade system is ideal when:

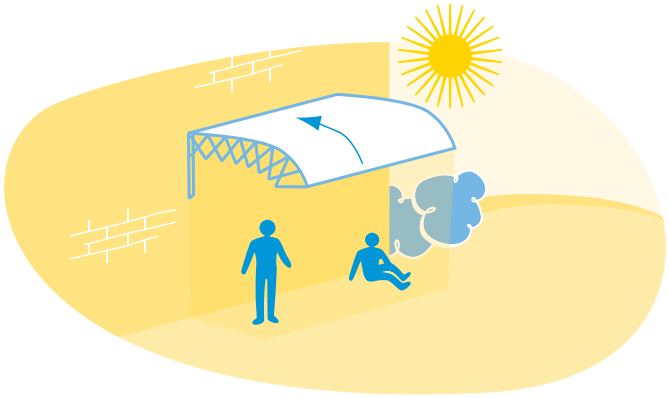
- a site only needs shade occasionally
- temporary shade is required at different places at the same time
- a permanent structure is not suitable because of the type of activities that take place at the site

Demountable systems need to be strong enough to withstand frequent transportation, assembly and dismantling.

3. Adjustable systems

These systems can be modified to provide effective shade as the sun moves during the day and at different times of the year. Adjustable systems are often attached to buildings and include retractable devices, such as canvas awnings or louvres.

Adjustable systems should be easy and convenient to operate and should have stainless steel parts so that pulleys and cables will not rust or wear out quickly.



4. Shade sails

Shade sails (tension membrane structures) are increasingly used in shade projects and can be permanent or demountable.

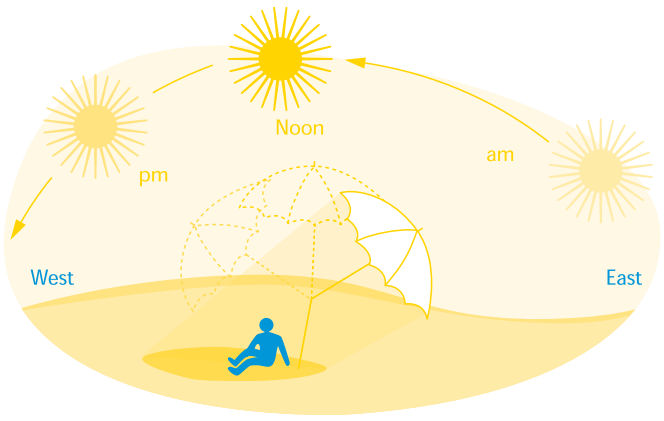
Shade sails have several advantages – they look good, they usually require minimal support structures, and can be cost-effective where shade is required for large areas that need to be column-free, such as playgrounds and swimming pools.

However, UV radiation can still enter the site through the open spaces between the sails.

The design and construction of shade sails is a specialised field. Consult a professional if you're considering this type of shade structure.

5. Portable shade

Portable shade is ideal for places where other shade options are not available, such as on the beach. These structures provide a quick and often cheap solution to a shade problem. There is a wide range of portable shade structures available in many different sizes, shapes and designs, such as small tents, beach shelters and umbrellas. Keep in mind that umbrellas provide limited protection from indirect UV radiation.



Selecting the right shade material

Below are some basic guidelines to help you select appropriate materials for your shade project. Please refer to the website www.cancercouncil.com.au/sunsmart for a comprehensive information sheet 'Qualities of shade material'.

Table 2: Guidelines for Selecting Shade Materials

	Glass	Polycarbonate and fibreglass sheeting	Canvas or other tightly-woven cloths	Knitted polyethylene or woven PVC shadecloth	Timber	Steel roof sheeting
Suitability	Good windbreak where visibility and light are required.	Roofing, walling louvre, awnings, skylights, canopies.	Good for small, low-budget jobs.	Canopies.	Pergolas, trellis screens.	Roofing, walling. Steep or low pitches.
Approximate Ultraviolet Protection Factor (UPF)	Depends on thickness. House window glass absorbs 90% of UV radiation.	Very high.	Very high when new, lower if material deteriorates over time.	moderate UV radiation protection. Double knits or double layers may give higher protection.	Very high. Direct barrier to UV radiation.	Very high. Direct barrier to UV radiation.
Waterproof	Yes.	Yes.	Yes, watertight up to saturation point.	Porous, lacks rain protection.	Depends on detailing and use.	Yes.
Light transmission	High, depending on tint.	High, but varies according to thickness, profile and colour.	Light colours allow more light.	Light colours allow more light but reflect and scatter more UV radiation.	Depends on detailing.	No light transmission.
Solar heat gain*	Less heat gain if tinted.	High.	Dark colours are hotter.	Darker colours are hotter but reflect less UV radiation.	Does conduct heat.	High if not insulated.
Structural implications	Need to select glass appropriate to the site.	Need to incorporate wind uplift considerations into design.	Guy ropes (if present) can cause obstruction.	Wind drags through porous material.	Need to incorporate wind uplift considerations into design.	Need to incorporate wind uplift considerations into design.
Life span	Long life, if does not sustain impact.	About 10 years. Discolouration may occur sooner.	Limited. Susceptible to breakdown due to UV radiation exposure	5-10 years.	Long life if well maintained.	Long life if well maintained.
Maintenance requirements	Needs regular cleaning.	Low maintenance. Impact resistant.	Without specific treatment is not mould resistant.	Susceptible to mould growth and dirt accumulation.	Guard against termites.	Subject to moisture and condensation conditions.

(Source: The Cancer Council Victoria 2004)

** Solar heat gain is an important consideration when selecting shade materials but it must be remembered that heat or temperature is not related to UV radiation levels.*

The Ultraviolet Protection Factor (UPF)

The Ultraviolet Protection Factor (UPF) is a scale that rates the protection provided by clothing materials. A material's UPF rating is based on the percentage of UV radiation transmitted through the material. As Table 3 shows, the higher the rating the greater UV radiation protection offered.

Some shade cloth is labelled with a UPF rating system as outlined in the Australian Standard AS/NZS 4399: 1996. However, many manufacturers use a percentage figure to describe the amount of protection provided against UV radiation. For example:

- If the shade cloth is rated at 50%, it absorbs 50% of UV radiation (and transmits 50% and has a UPF of 2).
- If the shade cloth is rated at 95%, it absorbs 95% of UV radiation (and transmits 5% and has a UPF of 20).

Different fabrics have different UV radiation-absorbing properties:

- less UV radiation passes through tightly woven fabrics
- darker colours usually block more UV radiation than light colours
- heavier-weight fabrics usually block more UV radiation than light-weight fabrics of the same type
- fabrics that are overstretched, wet or worn out may have reduced UV radiation protection

Table 3: The Ultraviolet Protection Factor (UPF) rating

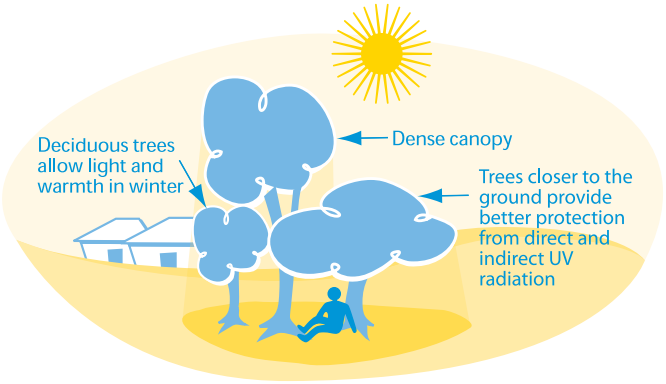
Protection Category	UPF ratings	UV radiation blocked
Excellent protection	40, 45, 50, 50+	More than 97.5%
Very good protection	25, 30, 35	95.9% to 97.4%
Good protection	15, 20	93.3% to 95.8%

(Source: AS/NZS 4399:1996)

Natural shade

An overview of natural shade

Vegetation is an essential part of shade planning as it is one of the most effective and attractive ways of providing shade. The effectiveness of natural shade depends on the density of the foliage and the size of the canopy. As a general rule, trees with a canopy that is dense and closer to the ground provide the best protection from direct UV radiation. The larger the canopy, the greater protection from both direct and indirect UV radiation.



Natural shade has many advantages:

- Vegetation makes an area pleasant for users – plants provide seasonal variation in perfume and colour as well as attractive flowers, bark and foliage.
- Using vegetation for shade has environmental benefits, such as providing habitat for local wildlife, enriching the soil and absorbing carbon dioxide in the atmosphere.
- Vegetation can be used to screen unwanted views and provide privacy.
- Vegetation can provide protection from the wind.
- Carefully chosen trees can cool an area by reducing the air temperature in summer by up to 30%.

Some issues to consider when providing natural shade

- Planting should be consistent with the character of the surrounding environment, both natural and built.
- Find out about local conditions, such as soil type, climate and salinity, before choosing plants.
- Check that the size and shape of a plant when it is fully grown is appropriate for the space available.
- Avoid plants that are toxic, attract bees, drop limbs, have thorns or spikes or cause adverse health effects such as asthma and skin irritation.
- Avoid plants that are harmful to children, such as angel's trumpet, rhododendron, black locust, cotoneaster, duranta, oleander, rhus and white cedar.
- Avoid trees with roots that may invade nearby buildings, paths and drains.
- Consider whether deciduous or evergreen plants are more suitable. Deciduous plants allow winter sun, while evergreen plants are best when screening is needed.
- Check that the plant is not an environmental weed or has the potential to spread rapidly and become a weed problem on the site.
- Take care not to use trees or plants that will obstruct thoroughfares or create tripping or slipping hazards, such as when berries or seeds fall on the ground.
- Keep large trees away from powerlines and underground services such as water and gas.
- Consider the costs associated with maintaining vegetation, such as watering, fertilising and pruning.
- Plan natural shade requirements long before starting any construction work.

Selecting shade trees

It is important to consider trees that will suit your area. If you are considering an Australian native (indigenous) tree or an exotic (introduced) species, keep these points in mind:

- how much shade will they create
- climate
- physical conditions of the site, such as soil type and aspect
- the landscape character of the setting

Canopy density guide

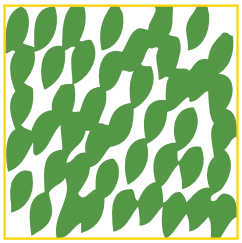
To help assess the level of UV radiation protection provided by different trees keep in mind the three types of canopy density provided by most tree types as detailed below. View the tree canopy against the sky and compare it with the illustrated leaf and canopy patterns below.

HEAVY - more than 90% UV radiation protection

Good protection from direct UV radiation. Protection of indirect UV radiation will depend on canopy size, where a person is positioned under the canopy and type of reflective surfaces around the tree. Suitable for long-stay use if personal protection measures are also used.

MEDIUM - around 60% UV radiation protection

Filtered shade provides low levels of protection from direct and indirect UV radiation. Suitable for short-stay use only. Personal sun protection measures should also be used.



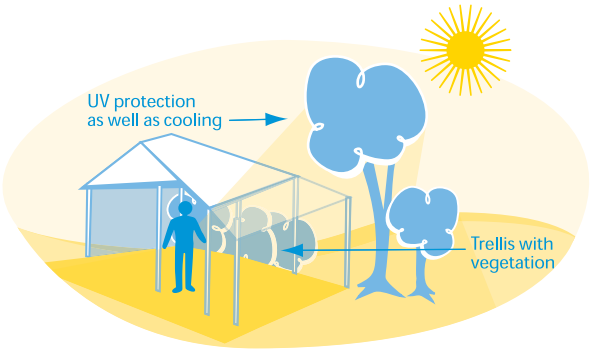
LIGHT - less than 30% UV radiation protection

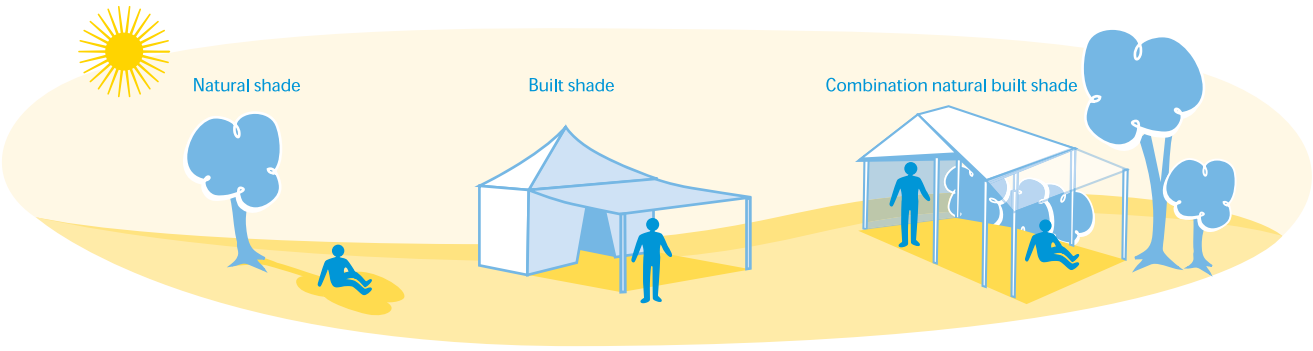
Poor protection from direct and indirect UV radiation. Suitable for very brief use only.

Combining natural and built shade

Combining natural and built shade, such as growing plants onto a pergola or lattice, has many benefits and is often the best solution for a site.

- Built shade structures protect people from direct UV radiation while the vegetation reduces exposure to indirect UV radiation and helps cool the space by letting in breezes.
- Temporary built structures can be used to provide shade until shade trees mature.





Part Two:
Designing your shade project

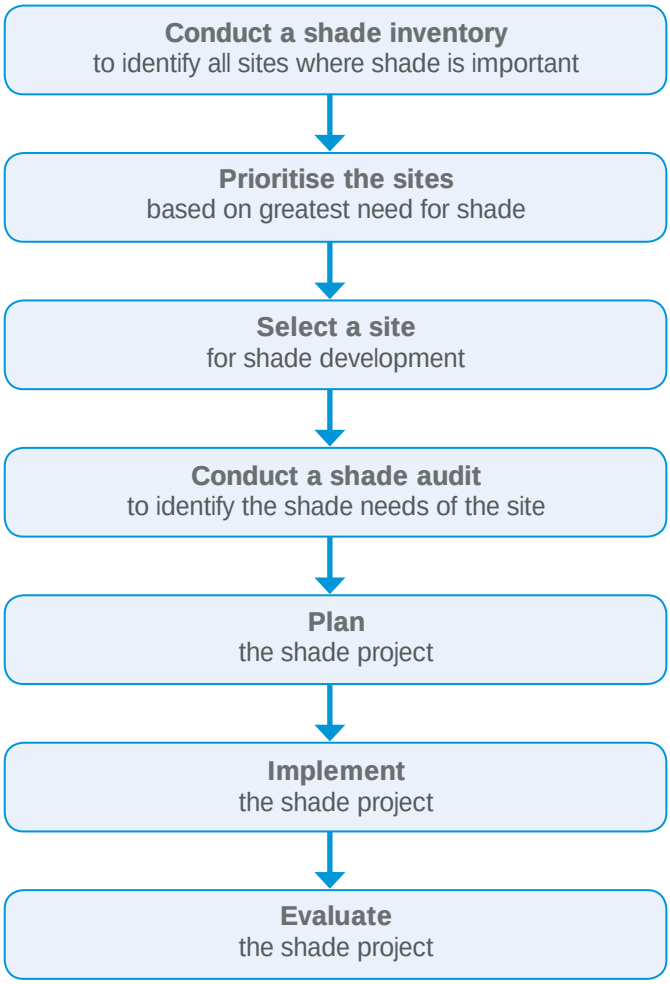
Identifying your shade needs

Where should shade be?

Shade is needed in all outdoor areas where people gather and spend time during the day. Some areas have a greater need for shade than others. This section will help you identify and prioritise sites for shade development.

The next section, 'implementing your shade project' outlines how to plan, implement and evaluate your shade project. This process is outlined in this flow chart.

Refer to page 33 for information on how to implement your shade project.



Conducting a shade inventory

The first step in developing a shade strategy is to do an inventory of sites where shade is important. This will include all sites where any outdoor activity takes place. This list should be comprehensive and include such sites as swimming pools, parks, reserves, bicycle and pedestrian paths, public mall areas, playgrounds, beaches, ovals and tennis courts.

Prioritising shade sites

After you've identified all potential sites, assess each site individually using these five criteria.

1. Age of user

Exposure to UV radiation in the first 15 years of life greatly increases the risk of developing skin cancer later in life, so shade is a priority in areas often used by children and young people.

2. Time of use

UV radiation levels are highest between 10am and 3pm, when about 70% of the total daily UV radiation reaches the earth's surface. Sites most used between these times have a greater need for shade.

UV radiation is generally highest in summer. Therefore, sites used extensively in summer have greater priority for shade than those used mainly in winter.

3. Duration of use

The length of time that outdoor activity takes place is an important factor when determining priority. Damage from UV radiation is cumulative, which means the longer the exposure to UV radiation the greater the risk of harm.

4. Level of use

Sites that are used a lot should take priority over sites that are used less often.

5. Nature of the activity

Sites such as swimming pools, lakes, rivers and beaches are a high priority because they generally involve considerable risk of sun damage due to high levels of reflected UV radiation from water and sand and because many people are wearing minimal clothing.

Shade priority checklist

Use the shade priority checklist below to prioritise each site.

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

Sites with the highest scores have a high priority for shade. Shade is still an important issue at sites with a lower score but they can wait until you deal with the high-priority sites. This prioritising system can be useful when deciding on the budget and timetable.

Key factor relating to shade priority	No never	Sometimes	Yes always	Overall score
Age of users:				
30% or more of regular users are aged 0-18 years	1	2	3	
Time of use:				
Activity at the site is likely to occur between 10am and 3pm	1	2	3	
The site is used over summer	1	2	3	
The site is used over spring and autumn	1	2	3	
Duration of use:				
Activity at the site occurs for 15 minutes or more at a time	1	2	3	
Level of use:				
The site is well used on weekends	1	2	3	
The site is well used on weekdays	1	2	3	
Nature of the site and the activity:				
Users of the site are exposed to high levels of indirect UV radiation	1	2	3	
Activity at the site is likely to occur in minimal clothing	1	2	3	
Grand total				

Conducting a shade audit

Once you have decided that a site is a high priority for shade development, it is important to study the site in detail to ensure shade is placed where it will have the most benefit. A shade audit will help you to identify the shade needs of a site and will provide you with the basis of a detailed project brief which may be used to apply for funds, to gain organisational endorsement or to engage a contractor.

A shade audit has five steps:

Step 1: Determine the usage patterns of the site

Step 2: Determine the amount and useability of existing shade at the site

Step 3: Consider the effects of reflected UV radiation

Step 4: Assess the need for improved or increased shade at the site

Step 5: Identify possible options to improve shade at the site

You will need a copy of a site plan to do a shade audit. The site plan should include the perimeter of the site, an outline of any buildings and the location of any features that will affect the shade and useability of the site, such as garden beds, trees, fences and car parks.

Remember to include any underground services, as well as emergency or access routes that must be maintained. As you progress through the five stages of the audit, remember to plot any new information onto the site plan.

Critical Protection Time

The Critical Protection Time is the time of day and year when sun protection is most important at the site. UV radiation levels are highest between 10am and 3pm each day when the sun is closest to being directly overhead.

It is important to assess shade at a site during the Critical Protection Time. It is also advisable to assess the shade at the same time of day on a ‘typical’ winter day so that summer shade initiatives do not negatively affect winter conditions at the site.

Step 1: Determine the usage patterns of the site

Usage patterns can be obtained by observing users during the Critical Protection Time and also by interviews with users, managers and staff.

Examples of questions you might like to ask are summarised below.

Users of the site:

- What time do you usually arrive to use the site?
- How long do you usually stay?
- How often do you visit the site?
- What areas do you mostly use?
- Do you avoid any shaded areas? If yes, why?
- Is there enough shade?
- How could the shade be increased or improved?

Managers and staff of the site:

- Is the existing shade adequate? If not, how can available shade be increased?
- Is there a need to move activities to make better use of existing shade?
- Is there a need to reschedule activities to avoid peak UV radiation times of the day (10am- 3pm)?
- Do you know of any future plans for the site or the general area?

Some points to consider at this stage:

- Identify the main outdoor activities at the site and when and where they occur.
- Identify the time of year the site is most in use.
- Identify the time of day the site is most in use.
- Identify where people tend to gather. Consider if people gather in a location because it is the only place where they can do a particular activity or if the activity could be moved to a shaded area.
- Note whether people are using the available shade.
- Identify the number of people using the site and their age.
- Consider if people are wearing sun protective clothing or using portable shade.

Step 2: Determine the amount and useability of existing shade at the site

This step involves determining the extent of existing shade structures and how often they are used. Observe, measure and record the way existing shade changes during the day and the seasons. It may be necessary to engage a professional or use a computer program to project shade patterns throughout the year.

Ensure the site plan records the existing natural shade, such as the location of trees or groups of trees. Note details of each tree or planted area such as maturity, density of canopy and whether it is deciduous or evergreen.

Some points to consider at this stage:

- Where is shade available at the site, for example from buildings, verandahs, shade structures, fences, adjoining walls or neighbouring properties?
- Can people easily access the existing shade? A garden bed or car park may occupy the best shaded position.
- Ask users, managers and staff about the adequacy of shade at the site and the need for more shade.

Step 3: Consider the effects of reflected UV radiation

When identifying existing shade, you will also need to consider the potential for adjacent surfaces (walls or roofs) to reflect UV radiation into a shaded area.

Some points to consider at this stage:

- Note the ground surface of each outdoor zone, for example concrete or grass.
- Note the surfaces of adjacent buildings and the direction they face.
- Consider if any of these surfaces can be modified to reduce reflection.

Step 4: Assess the need for improved or increased shade at the site

The next stage of the shade audit involves comparing the amount and useability of existing shade (Step 2) to the usage patterns (Step 1) while considering reflected UV radiation (Step 3). This will indicate if there is a need for additional shade.

Some points to consider at this stage:

- Consider the amount of existing shade at the Critical Protection Time and compare this with the need for shade.
- Consider whether the location of existing shade is appropriate, given the usage patterns at the site.
- Consider the likely impact of future tree growth on the amount of shade at the site. You may need to provide interim shade until trees have matured.
- Examine opportunities to better use or access existing shade.
- If additional shade is required, consider where it should be located, keeping in mind the site usage patterns and winter shade patterns.
- Consider reflected UV radiation at the site and ways to reduce its impact.

Step 5: Identify possible options to improve shade at the site

An increase in protective shade at sites can be achieved in several ways, including:

- building permanent shade
- using temporary shade
- planting trees or natural shade
- increasing access to shade
- moving or rescheduling activities

Different settings will have different issues that need to be considered when making decisions about shade design. Information sheets that cover specific settings where shade is a priority can be downloaded from www.cancercouncil.com.au/sunsmart:

- early childhood centres
- schools
- public swimming pools
- beaches and other waterside recreation areas
- parks and reserves
- playgrounds
- sports grounds and facilities
- outdoor restaurants, cafes and beer gardens
- streetscapes
- homes
- shade priority checklist template
- qualities of shade materials

Some points to consider at this stage:

- If you've decided to create new shaded areas, you need to consider the amount of additional shade needed, where it is needed and when it is needed (the times of day and year that the shade is required). Also think about the range of shade options (both natural and built) that may be appropriate and their likely costs.
- Optimise the use of existing shade. For example: moving activities or outdoor equipment to shaded areas, moving seating to shaded areas, pruning low branches of trees to allow access, or moving garden beds that take up shaded areas.
- Investigate ways to improve access to shade – for example, open up shaded areas that are out of bounds or reschedule outdoor activities to avoid peak UV times.
- Minimise the effects of reflected UV radiation by modifying surfaces or designing shade structures that protect from indirect UV radiation.
- Ensure that shade structures do not create safety hazards. For example, support systems such as upright posts should be clearly visible and ideally have rounded edges or padding. Also, shade structures should not obstruct views where adults are supervising children, particularly around playgrounds, childcare centres and swimming pools.

Implementing your shade project

Once you have completed the shade audit, you will have a comprehensive picture of the needs of the site. The next step is to plan, implement and evaluate your shade project.

Planning your shade project

Effective planning is essential to the success of any shade project. While the degree of planning depends on the size and setting of your shade project, the following points outline general issues you should consider.

- Form a project team to develop the project. If possible, include people with skills in areas such as architecture, engineering, horticulture and landscape architecture, and people interested in the project or affected by it.
- Read and work through parts 1 and 2 of this booklet to increase your understanding of sun and shade issues as well as the characteristics of your site.
- Draw up a detailed site plan to identify features of the site.
- Estimate the costs of design and implementation. Explore sources of funding.
- Identify what permits, approvals and documentation are required. It is important to consult the building and planning departments of your local council to ensure you comply with regulations and requirements. The regulations may vary depending on the council, the setting and type of construction. You may also need a permit to prune trees and other vegetation.
- Determine any external constraints such as heritage issues, environmental impact considerations and local community reaction.
- Develop a timetable for the shade project. Identify any time constraints on construction, such as difficulty in accessing a school site during a school term.

Preparing a design brief

You will need to draw up a detailed design brief to assist in applying for funding, tendering or constructing your shade project. The design brief should include:

- the overall site plan
- shade needs
  - the Critical Protection Time
  - where and when you would like the shade to fall
  - preferred shade types, for example, built or natural, permanent or demountable
  - the need for shelter from the wind or rain
  - the nature of activities, for example, children at play or vehicle movements
  - climate
  - likely security or vandalism issues
  - maintenance needs
  - shade lifespan
- money and labour requirements
  - project budget
  - how the project will be overseen and monitored
  - additional costs such as insurance, liability and approval permits
- timeframe for completing the project

Selecting a company to implement a shade project

If you decide to engage a company to do all or part of your shade project, it is useful to consider these questions:

- Does the company specialise in shade structures?
- Can the company provide a list of previous projects and clients who can act as referees?
- Does the company's submission include certification by a structural engineer, the acquisition of permits and approvals, and outline relevant standards?
- What insurance (for example, public liability) is provided?
- Do you receive product warranties upon completion?
- What ongoing services (for example, safety checks, maintenance and cleaning) are offered and what fees are involved?
- What are the specifications of the materials proposed? For example, what is the durability and Ultraviolet Protection Factor (UPF) of the shade material?

Where more than one company or supplier has been contracted to provide services for a project, careful co-ordination and management is needed to ensure your project goals are met. Keep a written record of the progress of the project. This will help if the management of the project needs to be handed over to someone else and also with evaluating the project.

Refer to page 20 for the definition of UPF and page 26 for information on how to identify your shade needs

Evaluating your shade project

After your shade project is completed, it is a good idea to evaluate how well it meets the shade requirements of the site and its users. Evaluation will help in planning future shade projects and can be done using the same approach as when you identified your shade needs.

For more information

Cancer Council New South Wales

153 Dowling Street
WOOLLOOMOOLOO NSW 2011

Phone: 02 9334 1900
Fax: 02 8302 3530
Email: feedback@nswcc.org.au
www.cancercouncil.com.au

Cancer Council Helpline 13 11 20

Information about ultraviolet (UV) radiation and the UV Index

Australian Radiation Protection and Nuclear Safety Agency
www.arpansa.gov.au/uvindex

Bureau of Meteorology
www.bom.gov.au/weather/uv

INTERSUN, the global UV project
World Health Organisation (WHO)
www.who.int/uv/en/

Contact details for local government

Local Government and Shires Association

Level 8, 28 Margaret Street
SYDNEY NSW 2000

GPO Box 7003
SYDNEY NSW 2001

Phone: (02) 9242 4000
Fax: (02) 9242 4111
Email: lgsa@lgsa.org.au

www.lgsa.org.au

Department of Local Government

Head Office
5 O'Keefe Avenue

Locked Bag 3015
NOWRA NSW 2541

Phone (02) 4428 4100
Fax: (02) 4428 4199
TTY: (02) 4428 4209
Email: dlg@dlg.nsw.gov.au

www.dlg.nsw.gov.au

UTS Centre for Local Government

University of Technology, Sydney
Level 11, Building 10
235 Jones Street
Ultimo NSW 2007

PO Box 123
Broadway NSW 2007

Phone: (02) 9514 7884
Fax: (02) 9514 2274
Email: clg@uts.edu.au

Advice on planning, designing and implementing your shade project

Archicentre (building advisory service of the Royal Australian Institute of Architects)

Phone: 1300 13 45 13
www.archicentre.com

Australian Institute of Landscape Architects (NSW Group)

PO Box 655
LANE COVE NSW 2066

Phone: (02) 9427 4669
Fax: (02) 9427 7419
Email: aila.nsw.group@bigpond.com

www.aila.org.au/nsw

Planning Institute Australia (NSW Division)

Level 7, 77 Berry Street
NORTH SYDNEY NSW 2060

Phone: 1300 PIA NSW
Phone: (02) 9409 4954
Fax: (02) 9954 5503
Email: nswmanager@planning.org.au

www.planning.org.au/nsw

The Royal Australian Institute of Architects (NSW chapter)

'Tusculum'
3 Manning Street
POTTS POINT NSW 2011

Phone: 0(2) 9246 4055
Fax: (02) 9246 4030
Email: nsw@raia.com.au

www.architecture.com.au

WebShade (shade audit software company)

Suite 1, 340 Darling St
BALMAIN NSW 2041

Phone: (02) 9818 2177
Fax: (02) 9818 3461
Email: info@webshade.com.au

www.webshade.com.au

Your local council may also be able to help you develop your shade project.

Natural shade issues and horticultural/vegetation advice

Greening Australia (NSW)

142 Addison Road
MARRICKVILLE NSW 2204

Phone: (02) 9560 9144
Fax: (02) 9550 0576
Email: info@ga.org.au

www.greeningaustralia.org.au

Your local nursery or government parks department may also be able to help with vegetation issues and plant selection.

Grant directories and assistance

GrantsLink - Australian Government

Free call 1800 026 222
www.grantslink.gov.au

Your local council community services section may also be able to advise about potential sources of funding.

Australian standards relating to UV protection and play equipment

Standards Australia

www.standards.com.au

Relevant standards include:

- AS/NZS 4399:1996 Sun protective clothing – evaluation and classification
- AS 4174-1994 Synthetic shadecloth
- AS/NZS 2604:1998 Sunscreen products – evaluation and classification
- AS/NZS 1067:2003 Sunglasses and fashion spectacles
- AS/NZS 1337:1992 Eye protectors for industrial applications
- AS/NZS 4422:1996 Playground surfacing – specifications, requirements and test method
- AS/NZS 4486.1:1997 Playgrounds and playground equipment - development, installation, inspection, maintenance and operation

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CAN 434 12/08