

# 5 The shade project

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There are three main stages in a shade project:

**Stage 1: Planning**

**Stage 2: Design**

**Stage 3: Construction.**

This chapter suggests the steps and principles that should be considered during each of these stages. Some organisations will have existing procedures for initiatives such as a shade project. If your organisation does not have such procedures in place, the steps and principles outlined in this chapter will be a useful guide. Four case studies have also been included to demonstrate the practice of implementing a shade project.

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## note

The information contained in this chapter is applicable to both new developments and the redevelopment of existing facilities.

## Planning

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Effective planning is essential for the success of a shade project. The following points can be used as a guide during the planning process.

### Establish a project team

A project team should consist of representatives of key stakeholders such as property owners and managers, site users and other interested parties. By establishing a project team you will help to ensure that these stakeholders are involved throughout the project. A project team will also provide the opportunity to draw upon the expertise of its members.

As conflicts can sometimes occur among stakeholders, it is useful to clearly specify how the team should operate, including the roles and responsibilities of members. Conflicts should not necessarily be resolved in favour of the most influential stakeholder or the cheapest solution.

### Consult with other interested parties

In most situations consultation beyond that which occurs within the project team will be necessary. This is because it may not always be practicable to directly involve all interested parties in the team. It is particularly important that the views and opinions of the people who use the site are considered. This input can be obtained as part of the Shade Audit.

### Conduct a Shade Inventory

For organisations with a number of sites under their control or a large site comprising a number of precincts, eg hospitals or universities, the Shade Inventory provides the means for prioritising the provision of shade.

### Conduct a Shade Audit

The Shade Audit will determine the adequacy of existing shade and whether there is a need for more shade. An accurate assessment of need undertaken early in the project will help to achieve shade that is:

- appropriately located
- of appropriate size
- cost-effective.

The method for conducting a Shade Audit follows in this chapter. An example of a completed Shade Audit can be found in Appendix E.

### Prepare a design brief

The information obtained from the Shade Audit will form the basis of the design brief. The purpose of the design brief is to document the shade needs of the site so that an appropriate solution can be designed. The brief will describe particular requirements of the project, such as the consideration of prevailing climatic conditions and the potential for vandalism.

More detailed information on what information to include in a design brief can be found on page 77.

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#### note

For information on conducting a Shade Inventory see Appendix D.

#### note

The method for conducting a Shade Audit follows in this chapter on page 63.

## Potential sources of assistance for shade projects

There are a number of potential sources of assistance for shade projects. These may offer funding or assistance (resources and advice), or both.

### Federal and State Government

Federal and State Government assistance and funding can be subject to regular change. A number of different programs offer technical advice and financial assistance to individuals, community groups, industry and government bodies.

For example, for natural shade projects that use locally collected seed and plants, Federal and State Government programs that may be able to assist include:

- The Commonwealth Government's 'Natural Heritage Trust' (NHT). It includes a number of programs, such as 'Bushcare', set up to conserve, repair and replenish Australia's environment and natural resources. For more information contact the NHT Coordinator or Greening Australia.
- SA Urban Forest Biodiversity Program (UFBP). The UFBP can provide technical and financial support to vegetation management programs and revegetation projects in Metropolitan Adelaide with an emphasis on the protection of remnant flora and fauna and establishment of local native plants.
- Mount Lofty Ranges Catchment Program (MLRCP). The MLRCP assists the community of the Mount Lofty Ranges to develop and implement on-ground projects through the provision of technical advice. Funding for revegetation projects may also be available.

- Threatened Species Network (South Australia). TSN(SA) aims to increase public awareness of, and involvement with the protection and recovery of threatened species and their habitat. Part of the Network's program in SA is their 'Biodiversity for Backyards' project that has established an information service for biodiversity advice.

### Local Government

Local Councils may be able to provide advice or financial assistance to sporting and community groups for shade projects. The types of eligible projects and extent to which they will be funded vary from council to council. For more information contact your local council.

### Community organisations

Within the community there are a range of community service organisations that will often provide assistance to worthwhile projects.

For natural shade projects, Trees For Life and Greening Australia may be able to assist.

Trees For Life is a non-profit community group. By becoming a member, individuals, community groups, businesses, schools and councils can receive seed and materials to grow plants for themselves or organise for a volunteer to grow plants for them. Trees For Life can also provide details of commercial experts and growers of local species.

Greening Australia is a non-profit organisation that offers revegetation services such as seed collecting, seedling establishment and direct seeding on a fee for service basis. They also administer the Federal Government's Bushcare Support Program

### Planning

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and have representatives in most regions of South Australia that can offer advice on plant selection for natural shade planting. Contact names and telephone numbers can be obtained from Greening Australia's Adelaide office on (08) 8372 0120.

#### **Business sponsorship**

As an alternative to seeking funding through an established grants program, groups could consider approaching local businesses, local government, service groups or individuals for sponsorship of their work. Local companies may provide administrative support, technical support, materials (either as donations or at a reduced cost) or sponsorship in return for commercial benefits. Commercial benefits flow back to the sponsor through advertising and signage, publicity via media coverage of events and acknowledgment in local editorials for association with UVR protection.

Before approaching a local business (or other organisation) for sponsorship, have a definite project worked out and determine what the benefits will be to the sponsor. Sponsorship has to be a "win-win" opportunity, that is, both parties have to derive advantage from the relationship.

#### **Local plant growers**

The South Australian Indigenous Growers and Revegetators Association (SAIGRA) formed in 1997 to act as an industry association for the rapidly expanding and important field of locally indigenous revegetation. The member organisations provide a complete range of services dealing with native plants and are all active in the field.

Alternatively, contact your local nursery.

# Design

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The design stage will provide solutions to the shade needs as identified in the design brief. Listed below are some key issues to consider during this stage.

## Consult the appropriate authority

You may need to consult your local council to determine which development controls apply to your site, for example heritage restrictions. For government sites, development approval must be obtained from the Development Assessment Commission.

## Think about the type of shade system that may be appropriate for your site

Shade systems can be built, natural or a combination of these. In many situations the shade solution will include a combination of natural and built elements. Built systems can be either purpose-built or 'off-the-shelf'. Information on the selection and purchase of 'off-the-shelf' structures can be found in Chapter 4, Providing shade.

It is rare that a single solution, eg constructing a shade structure, will provide enough shade to protect against direct and indirect UVR. Usually a series of actions will be required to provide adequate shade in a range of situations at a given site.

## Consider whether it is necessary to obtain professional assistance from an architect and/or landscape architect

If you expect that your shade solution will require more than an 'off-the-shelf' structure, it is likely that the expertise of an architect and possibly a landscape architect will be required.

The advantage of obtaining such assistance is that the shade solution is more likely to be designed according to the specific needs of your site. In addition, detailed design plans and documentation will be required by most external funding organisations and if local council development approval is required.

If an architect has been engaged to manage the design and documentation of the project, it is likely that the process of obtaining local council approvals will be facilitated, as architects are familiar with this process. Appendix B contains a list of relevant professional associations.

## Consider the range of shade options and their likely costs

At the design stage it is necessary to compare the costs of alternative solutions and to assess whether these are within your budget.

It is important to keep in mind the long-term costs of alternative solutions. The selection of a particular shade option based only on initial costs may not be cost-effective in the long term. Structures that deteriorate quickly or are susceptible to vandalism will contribute to high ongoing maintenance costs. A more substantial structure may provide additional benefits such as rain protection, despite its higher initial cost.

## Discuss the shade options with relevant stakeholders

The input of stakeholders early in the design stage may help to ensure that all are satisfied with the end result. You may choose to encourage wider input by publicly displaying sketch plans of the options. Remember to involve the architect in discussions with stakeholders.

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## note

See Appendix C for a comparison of shade materials, including their relative costs and durability.

If approval needs to be obtained from within your organisation or from the owners or managers of your site, it is particularly important that they have the opportunity to comment on proposed shade options at an early stage of the project.

#### **Determine the preferred shade option**

Once feedback from stakeholders has been obtained, you will be able to determine the preferred shade option. The architect will then be able to finalise drawings and documentation.

Some shade options, eg tension membrane structures, require specialist engineering input. In these situations, the architect will involve other professionals.

#### **Submit the plans to your local council for approval if necessary**

Before a shade project can commence, development approval from the local council may be required. Your local council will advise on whether development approval is required, the information to be included, the number of copies to be lodged and the fee payable.

The development application will be assessed with regard to its conformity and consistency with the provisions of the relevant Development Plan. This Plan sets out provisions dealing with the design and location of development and includes matters such as zoning and design criteria. Depending on the location, consideration may also be required of the heritage context of a site.

Sometimes development applications will need to be advertised and/or notified to adjoining property owners. Again, the local council will advise you of this requirement. Councils are required to make a decision on the application within eight weeks of receiving a development application. The process may take longer if further information is required, an application needs to be referred to a prescribed body listed in Schedule 8 of the Regulations or the application is for non-complying development.

Following the issuing of provisional Development Plan consent, it may be necessary to obtain provisional Building Rules consent. Provisional Building Rules consent is applicable to all development where building work is involved, unless exempted by the Regulations. Each proposal is assessed with regard to its conformity with the technical requirements of the Building Rules, by either the relevant authority or a private certifier.

The Building Code of Australia (BCA) and the South Australian Housing Code are called up by Regulation 4 as the Building Rules. In general the Building Rules cover structural matters, fire protection, safety of occupants, health and amenity and equitable access. Once the technical requirements of the Building Rules have been satisfied building rules consent can be issued.

When approved building work has been completed the owner must request the council to issue a certificate of occupancy (if relevant).

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1 Australian Uniform Building Regulations Co-ordinating Council. *Building Code of Australia*. Amendment 7, 1990. pg1.

## Construction

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The approach taken during the construction stage will be determined by the degree of complexity of the shade design and whether the proposed structure is to be purpose-built or selected from a range of pre-manufactured shade products. If the design incorporates a complicated structure, it may be cost-effective to enter into a 'design and construct contract' with a specialist firm. If a less complex structure or pre-manufactured product is proposed, a standard construction or purchase contract with a builder, manufacturer or supplier will be sufficient.

There are a number of points which need to be noted during this stage:

- read and understand any contract documents
- develop a checklist system for site visits
- maintain appropriate records
- obtain the builder's construction program
- obtain the builder's anticipated schedule for progress payment claims
- obtain the builder's insurance certificates
- obtain the manufacturers' guarantees on materials.
- obtain a compliance certificate from the contractor.

The construction phase should be monitored by the architect or a member of the project team.

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### note

The completion of the construction stage should not be considered to be the end of the shade project. As site usage patterns often change, ongoing monitoring of the adequacy of shade at the site is essential.

## The Shade Audit

The purpose of conducting a Shade Audit is to provide a strategic plan for the provision of sufficient UVR protective shade at a site. This is achieved by:

- establishing the usage patterns at the site
- assessing the quantity and useability of existing shade
- assessing the need for additional shade
- providing recommendations for how to create additional shade (if required) without compromising winter conditions at the site and/or how to modify site usage patterns so that the best use is made of existing shade
- incorporating these recommendations into future development plans for the site and setting a timeframe for their implementation.

### How to conduct a Shade Audit

The Shade Audit comprises four main stages:

**Stage 1: Interviews**

**Stage 2: Site fieldwork**

**Stage 3: Assessment**

**Stage 4: Recommendations.**

It is recommended that a project team be formed to help undertake the Shade Audit procedure. Skills that would be helpful to include in the Audit team are:

- the ability to plot measurements to scale
- knowledge of horticulture
- if using the 'projection method' (see page 61), an understanding of sun angles and the ability to plot shade from a theoretical base.

People who would have some of these skills include tradespeople, eg a builder or plumber, architects, surveyors, engineers, draftspeople, farmers, horticulturalists, nursery attendants, landscape architects and gardeners.

The Shade Audit should be presented in the form of a written report, documenting the findings from Stages 1, 2 and 3 as well as recommending options for additional shade provision at the site. An example of a completed Shade Audit can be found in Appendix E.

#### note

It is recommended that readers familiarise themselves with the rest of this publication prior to commencing a Shade Audit.

#### note

Owners/managers of large or multiple sites, eg universities or local Councils, should conduct a Shade Inventory prior to conducting a Shade Audit. A Shade Inventory provides a procedure for ranking multiple sites (or areas within a site) in order of their need for UVR protective shade. More information on the Shade Inventory can be found in Appendix D.

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## How to measure shade

One of the critical tasks of the Shade Audit (Stage 2: Site fieldwork) is determining the typical existing shade patterns at a site. However as these patterns are subject to seasonal variations, it is essential that this task be conducted for the Critical Protection Time as well as for a typical winter day.

The Critical Protection Time for a site is the time of day and year when protection from solar UVR will be most important at that site. Factors that should be considered when determining the Critical Protection Time include the site usage patterns (especially times of heaviest usage) as well as the levels of UVR.

Information on site usage patterns will be obtained during Stage 1: Interviews. It is important that the Critical Protection Time is determined prior to commencing *Stage 2: Site fieldwork*.

An assessment of existing shade can be made by plotting or 'measuring' a site's shade patterns at the Critical Protection Time, which for sites in use throughout the year or mainly in summer, is on the summer solstice, ie 22 December, or thereabouts.

An assessment of shade at the same time of day on the winter solstice, ie 21 June, or thereabouts, should also be made so that new shade initiatives can be planned to minimise negative effects on winter conditions at the site. In some situations there may need to be a variation from the solstice dates as:

- the Critical Protection Time for the site may not coincide with the period surrounding the 22 December, eg the Critical Protection Time for a school may be at lunchtime in November because the students are on holidays for most of December; the Critical Protection Time at a sports ground used only for first grade rugby league may be early afternoon in winter.
- it may not be convenient to 'measure' the shade at a site during the weeks surrounding 22 December if the 'observation' method (see below) is being used.

There are two methods for assessing shade:

- the 'observation' method: where shade is marked on the ground at the site and measured on two occasions (the Critical Protection Time and at the same time on a typical winter day); or
- the 'projection' method: which involves the use of sun angles and charts to plot where shade will theoretically fall on two occasions (the Critical Protection Time and at the same time on a typical winter day).

The lay shade planner may prefer to use the 'observation' method, as specialist knowledge of shade projection techniques is required for the 'projection' method. When using the 'observation method', shade planners must be able to allow for at least a six month period to lapse so that the shade patterns can be assessed at both the Critical Protection Time and in winter.

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## Stage 1: Interviews

Important background information can be obtained by conducting interviews with site managers, employees and users. The advantage of interviewing representatives from each of these groups is that a range of opinions and observations can be collected for consideration in *Stage 3: Assessment*.

To assist with this stage of the Audit, sample questions for site managers, employees and users have been included on pages 63 to 65 for use in face-to-face or self-completion interview situations. The questions need to be modified to suit the particular issues for different sites or deleted if irrelevant. The information in Chapter 6, Site Specific Considerations, will be a useful starting point for the development of tailor-made questions for different sites. So that the areas of a site can be referred to with minimal confusion during the interviews, it is suggested that a site plan (roughly drawn if an existing plan is not available) be used for reference.

Information obtained during the interviews will include:

- the availability of a site plan or survey including the location of services, eg pipes and underground cables, and other relevant site data
- site usage patterns, ie the main outdoor activities undertaken at the site, where they occur and when they occur
- the time of year the site is most in use
- the number of people using the site and their age breakdown
- opinions on the adequacy of existing shade at the site and the need for more shade
- long-term development plans for the site, ie building, landscaping, shade provision
- required performance characteristics of new shade structures, eg rain protection
- other considerations, eg vandalism, areas that cannot be accessed by users.

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### note

So that information obtained from the interviews is as valid and reliable as possible, it is important that the people selected for interviewing are representative of their group and that enough interviews per group are conducted. As a general rule of thumb, the larger the group or more diverse the group, the more interviews that need to be conducted.

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### note

It is also important to confirm the information obtained from the interviews during *Stage 2: Site Fieldwork*, as the perceptions of the interviewees may vary, as can the accuracy of their responses.

### Sample questions for site management eg a school principal

The following questions are indicative of the questions that should be asked of site management representatives. They need to be modified to suit the particular issues for different sites or deleted if irrelevant. The information in Chapter 6, Site Specific Considerations, will be a useful starting point for the development of tailor-made questions for the managers of different sites.

- What are the main outdoor activities undertaken at the site? *(Try to be as specific as possible eg school assemblies, children eating and playing at recess and lunch, educational activities etc)*
- Where do they occur? *(Again, try to be as specific as possible eg school assemblies take place at point X, etc. It may be helpful to mark where different activities occur on a plan of the site.)*
- What time/s of day do the activities occur?
- What areas of the site aren't available for use? *eg out-of-bounds areas*
- Generally speaking, what time/s of year is the site most in use?
- Approximately, how many people use the site on:
  - (a) an average weekend day?
  - (b) an average week day?
- What is the approximate age distribution of the users of the site?
 

Babies/toddlers (0-2 yrs) \_\_\_\_\_%

Children (3-11 yrs) \_\_\_\_\_%

Adolescents (12-18 yrs) \_\_\_\_\_%

Adults (19-59 years) \_\_\_\_\_%

Adults (60+ years) \_\_\_\_\_%
- In your opinion, how adequate is existing shade at the site, particularly during summer? *(For large or complex sites, it may be helpful to divide the site into zones and then consider the adequacy of shade for each zone.)*
- Could site usage and/or management practices be modified to optimise the use of existing shade? If yes, how could they be modified? *eg allow access to out-of-bound areas, reschedule outdoor activities, move children's lunch area*
- Do you think there is a need for more shade at this site (or any part of it)? If 'yes', what kind of additional shade should be provided and where should it be located?
- Do you think rain protection is needed at the site? If 'yes', how do you think this should be addressed?
- Is vandalism an issue that needs to be considered?
- Are there any barriers to the provision of shade at this site? If 'yes', what are they?
- How do you think the site users would feel about the provision of more shade?
- What are the long-term plans for the site:
  - (a) new building works?
  - (b) landscaping works?
- Are there any specific plans for the provision of increased shade at the site? If 'yes', what is planned for the site?
- Can you make available:
  - (a) a site plan?
  - (b) a survey plan?
  - (c) services layout?
  - (d) other site data that may assist?

## The Shade Audit

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### Sample questions for site employees eg a school teacher

The following questions are indicative of the questions that should be asked of site employee representatives. They need to be modified to suit the particular issues for different sites or deleted if irrelevant. The information in Chapter 6, Site Specific Considerations, will be a useful starting point for the development of tailor-made questions for employees from different sites.

- What are the main outdoor activities undertaken at the site? *(Try to be as specific as possible eg school assemblies, children eating and playing at recess and lunch, educational activities, etc.)*
  - Where do they occur? *(Again, try to be as specific as possible eg school assemblies take place at point X, etc. It may be helpful to mark where different activities occur on a plan of the site.)*
  - What time/s of day do the activities occur?
  - What areas of the site aren't available for use? eg *out-of-bounds areas*
  - Generally speaking, what time/s of year is the site most in use?
  - Approximately, how many people use the site on:  
(a) an average weekend day?  
(b) an average week day?
  - What is the approximate age distribution of the users of the site?  
Babies/toddlers (0-2 yrs)\_\_\_\_\_ %  
Children (3-11 yrs)\_\_\_\_\_ %  
Adolescents (12-18 yrs)\_\_\_\_\_ %  
Adults (19-59 years) \_\_\_\_\_ %  
Adults (60+ years)\_\_\_\_\_ %
  - In your opinion, how adequate is existing shade at the site, particularly during summer? *(For large or complex sites, it may be helpful to divide the site into zones and then consider the adequacy of shade for each zone.)*
  - Could site usage and/or management practices be modified to optimise the use of existing shade? If yes, how could they be modified? eg *allow access to out-of-bounds areas, reschedule outdoor activities, move children's lunch area.*
  - Do you think there is a need for more shade at this site (or any part of it)? If 'yes', what kind of additional shade should be provided and where should it be located?
  - Do you think rain protection is needed at the site? If 'yes', how do you think this should be addressed?
  - Is vandalism an issue that needs to be considered?
  - Do you think there are any barriers to the provision of shade at this site? If 'yes', what are they?
  - How do you think the site users would feel about the provision of more shade?
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## Stage 2: Site fieldwork

### Sample questions for site users eg school children/students

The following questions are indicative of the questions that should be asked of site user representatives. They need to be modified to suit the particular issues for different sites or deleted if irrelevant. The information in Chapter 6, Site Specific Considerations, will be a useful starting point for the development of tailor-made questions for the users of different sites.

- Which of the following age categories do you fit into?
  - 5-11 years
  - 12-18 years
  - 19-59 years
  - 60+ years
- Do you make use of the available shade when you are at this place?
  - All of the time
  - Most of the time
  - Some of the time
  - Occasionally
  - Never
- Are there areas of the site that cannot be used?
  - If 'yes', what do you understand is the reason?
- In your opinion, how adequate is existing shade at this place, particularly during summer?
- Do you think there is a need for more shade at this place (or any part of it)? If 'yes', what kind of additional shade should be provided and where should it be located?
- Are there any shaded areas at this place that you prefer not to use? If 'yes', why?
- Do you think rain protection is needed at this place? If 'yes', how do you think this should be addressed?

This stage of the Audit involves the collection of site data, as well as the confirmation of information obtained during the interviews. As both observation and detailed measurement need to be made, it is recommended that two site visits be conducted:

- the first, at a time of typical site use so that observations of usage patterns can be made and the Critical Protection Time confirmed (This step could coincide with *Stage 1: Interviews*.)
- the second, at a time when users will not be inconvenienced so that measurements can be made.

If the 'observation' method is being followed, additional site visits may need to be conducted so that shade patterns are measured at both the Critical Protection Time and at the same time of day during winter.

The main tasks for the site fieldwork are outlined on pages 66 to 67. Most tasks need to be completed regardless of which shade measurement method is being followed. This is indicated by a ✓ appearing under both headings for the particular task. Some of the tasks however are relevant for only one of the shade measurement methods, ie either the 'observation' method or 'projection' method. Where this is the case, a ✓ will appear under the heading to which the task applies, and a ✗ will appear under the heading to which the task does NOT apply.

The site fieldwork will require the use of a measuring tape and camera.

### note

It is crucial that any data and information collected during this stage of the Audit is accurate and complete. This is because it will be used as core information in the Assessment stage of the Audit.

## The Shade Audit

Observation Method	Projection Method	Tasks	Comments
✓	✓	<p><b>Observing site usage patterns</b></p> <p>1 Pay particular attention to the type and location of outdoor activities and where people tend to congregate.</p>	The purpose of this task is to confirm the information gained from the interviews.
✓	✓	2 Consider if people gather in a location because it is the only place where they can undertake a particular activity, or if the activity could be moved to a shaded area.	The observations should be made at a time of typical site use.
✓	✓	3 Make a note of whether people are using the available shade.	If there are any discrepancies between your observations and the information obtained during the interviews, consider whether they should be discussed with some of the interviewees.
✓	✓	<p><b>Preparing the site plan</b></p> <p>1 Obtain a copy of an accurate, scaled site plan (if available):</p> <ul style="list-style-type: none"> <li>confirm the accuracy of the site plan by making some random measurements and checking that all buildings appear on the plan</li> <li>if all the buildings do not appear on the plan, measure, locate and plot the measurements to scale</li> </ul> <p><i>If a site plan is not available</i></p> <ul style="list-style-type: none"> <li>firstly, draw a freehand plan of the site and record the overall dimensions of the land, as well as the length and width of buildings and their distance from each other and from the site boundaries</li> <li>draw an accurate site plan by plotting the measurements to scale</li> </ul>	The purpose of this task is to prepare the site plan for the site investigation and shade measurement stages of the Audit.
✓	✓	2 Mark on the site plan the direction of north, noting whether it is 'magnetic' or 'true' north.	If an accurate site plan is available, the time consuming task of comprehensively measuring the site and drawing up a plan to-scale will be avoided. See example sketch on page 69
✓	✓	2 Mark on the site plan the direction of north, noting whether it is 'magnetic' or 'true' north.	Refer to the Glossary for an explanation of 'true north' and 'magnetic north'.

Observation Method	Projection Method	Tasks	Comments
✓	✓	<b>Investigating the site</b> 1 During the site fieldwork, take photographs of the following for your records: <ul style="list-style-type: none"> <li>• the site and patterns of usage</li> <li>• trees (to assist identification)</li> <li>• existing shade structures</li> <li>• problem areas, eg unshaded seats</li> <li>• shade opportunities.</li> </ul>	A photographic record of the site will assist in Stage 3: Assessment as it may help to reinforce data and prompt memory. Photographs can also be helpful for presentation purposes as they illustrate particular aspects of a site.
✓	✓	2 Record the location of the following items on the site plan with a name or number: <ul style="list-style-type: none"> <li>• buildings, eg assembly hall,</li> <li>• canteen or B1, B2, etc</li> <li>• other built items, eg pools,</li> <li>• play equipment etc</li> <li>• existing shade structures, eg S1, S2.</li> </ul>	See sample plans on pages 69 and 71.
✓	✓	3 Divide the outdoor areas between buildings and other built items into zones, based on the site usage patterns.	Refer to Chapter 6 for information on the typical usage patterns for different sites.
		Record each zone on the site plan with numbers, eg Z1, Z2 or names, eg assembly area, lunch area, etc.	See sample plans on pages 69 and 71.
✓	✓	4 Record on the site plan any significant ground level changes, ie in excess of 600mm.	This task will help with the planning and location of new shade structures.
✓	✓	5 Record on the site plan any special site conditions that may impact on the design of new shade structures, eg emergency access points, topography.	
✓	✓	6 Make a note of the ground surface/s within each outdoor zone, eg concrete, grass. Pay particular attention to ground surface changes within a zone.	These tasks will assist with the assessment of the degree of reflected UVR at a site. See sample on page 71.

## The Shade Audit

Observation Method	Projection Method	Tasks	Comments
✓	✓	7 Make a note of the buildings' surfaces/ finishes (wall and roof) as well as their roof shapes. Pay particular attention to walls that may reflect high levels of UVR, due to their material/finish and the direction they face, ie north or up to 45° either side of north.	See sample on page 69.
✗	✓	8 Measure the heights of buildings at the eaves and ridges.	You do NOT need to do this if you are using the observation method.
✗	✓	9 Measure the length, width and height of existing shade structures.	You do NOT need to do this if you are using the observation method.
✓	✓	10 Record on the site plan, the location of trees or groups of trees. <ul style="list-style-type: none"> <li>• For <i>small or simple sites</i>, it may be possible to number each tree, eg T1, T2, etc.</li> <li>• For <i>large or complex sites</i>, it is easier to nominate areas of planting, eg P1, P2, etc, than to number individual trees.</li> </ul>	See sample on page 71.
✓	✓	11 Note details of each tree or planted area as follows: <ul style="list-style-type: none"> <li>• the species, or within each planted area, the predominant tree/shrub species</li> <li>• estimated height (metres)</li> <li>• maturity, eg 3 years old</li> <li>• condition (particularly any problems)</li> <li>• the density of the canopy (see p73)</li> <li>• the estimated canopy diameter (metres)</li> <li>• whether it is deciduous or evergreen.</li> </ul> <p>Also, for planted areas, assess any particularly significant individual trees/shrubs within the group eg a large tree with dense foliage and a wide spreading canopy, or that are situated by themselves.</p>	This task will require some horticultural knowledge. So that existing natural shade is correctly documented, try to include a person with such expertise in your Shade Audit team, eg. landscape gardener, nursery attendant. See sample on page 72.



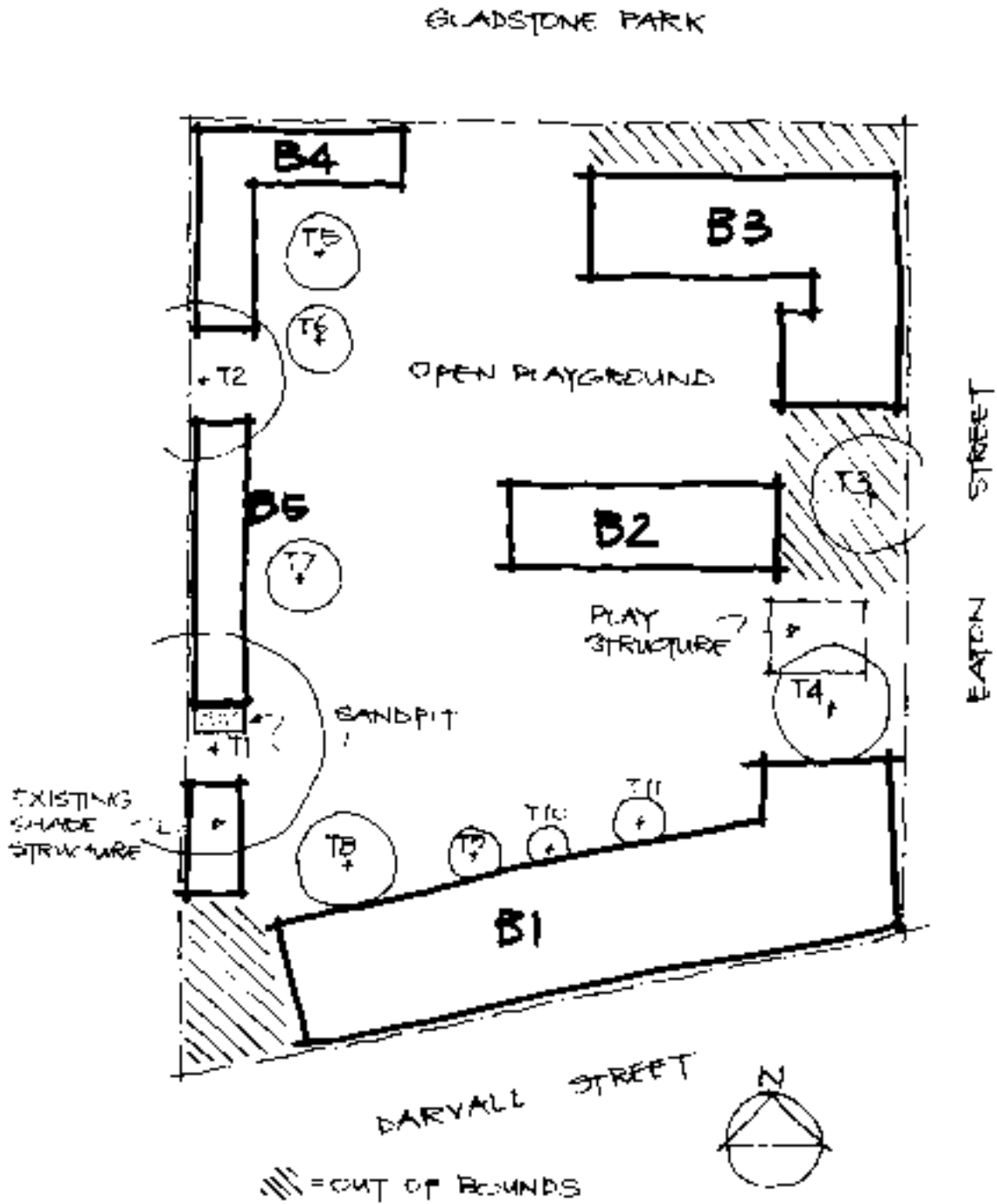
## The Shade Audit

Sample  
Ground surfaces/finishes

ZONE NO	DESCRIPTION	PREDOMINANT SURFACE
Z1	OPEN PLAYGROUND	BITUMEN
Z2	OPEN PLAYGROUND	GRASED LAWN.

Sample  
Buildings: wall and roof surfaces/finishes; roof shape

BUILDING NO	DESCRIPTION	WALLS	ROOF	ROOF FORM.
B1	MAIN BUILDING	BRICK	TILES	PITCHED GABLE
B2	INFANTS BLOCK	PAINTED BRICK	CORR. IRON	PITCHED GABLE
B3	ASSEMBLY BLDG.	SANDSTONE	CORR. IRON	PITCHED GABLE
B4	AFTERSCHOOL	BRICK	TILES	PITCHED
B5	TOILET BLOCK	PAINTED BRICK	CORR. IRON	PITCHED.
S1	SHADE STRUCTURE	-	CORR. IRON	FLAT.



Rough sketch of a school site showing site details, trees, building numbers and outdoor zones

## The Shade Audit

## Sample

Tree identification, assessment and measurement

TREE NO	SPECIES	HEIGHT (M)	MATURITY	CONDITION	CANOPY DENSITY	CANOPY DIAMETER	DECIDUOUS/ EVERGREEN
1	PLANE TREE	20	MATURE	GOOD	HEAVY	17M	DEC
2	LILYPILLY	10	MATURE	AVERAGE	HEAVY	11M	EVER
3	BRUSH BOX	10	MATURE	GOOD	HEAVY	8M	EVER
4	EUCALYPT	15	OLD	POOR	MEDIUM	9M	EVER
5	TALLOWOOD	10	SEMI	GOOD	HEAVY	6M	EVER
6	TALLOWOOD	10	SEMI	GOOD	HEAVY	6M	EVER
7	BRUSH BOX	8	SEMI	GOOD	HEAVY	6M	EVER
8	BLACKWATTLE	8	OLD	POOR	HEAVY	7M	EVER
9	EVERGREEN ALDER	6	SEMI	AVERAGE	HEAVY	4M	EVER
10	FIDDLEWOOD	8	SEMI	AVERAGE	HEAVY	3M	EVER
11	EVERGREEN ALDER	6	SEMI	AVERAGE	HEAVY	4M	EVER

## Canopy density guide

The canopy density guide will help you to assess the level of UVR protection provided by different trees.

View the tree canopy against sky and compare with illustrated leaf/canopy patterns. Estimate which pattern of sky and leaves most closely approximates the observed canopy.

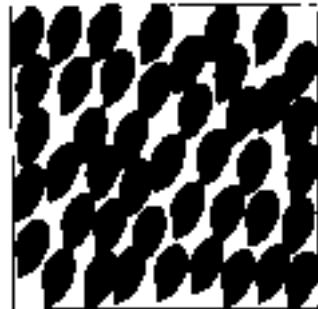
### Heavy—over 90% UVR protection

Good protection from direct UVR. Protection from indirect UVR will depend on canopy size and where a person is positioned under the canopy. Suitable for long-stay use if personal sun protection measures are also used.



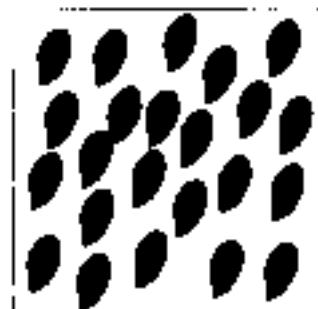
### Medium—around 60% UVR protection

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



### Light—less than 30% UVR protection

Poor protection from direct and indirect UVR. Suitable for transit shade only.



The Shade Audit

Observation Method	Projection Method	Tasks	Comments
✓	✗	<p><b>Measuring existing shade - 'observation' method</b></p> <p>1 Mark the shade patterns at the site on the ground using chalk, rope or a similar method (at the Critical Protection Time as well as at the same time of day during winter).</p>	<p>This task must be conducted twice, once at the Critical Protection Time and again during winter (typically 21 June).</p>
✓	✗	<p>2 Measure the dimensions of the shade outline.</p>	
✓	✗	<p>3 Plot the data to scale on the site plan.</p>	<p>Refer to pages 178 and 179 in Appendix E for an example of the completed task.</p>
✗	✓	<p><b>Measuring existing shade - 'projection' method</b></p> <p>1 Project the shade patterns at the site using sun angles (at the Critical Protection Time as well as at the same time of day during winter).</p>	<p>This task is necessarily technical as it involves the projection and drafting of theoretical shade patterns and will require a detailed knowledge of sun projection techniques.</p>
✗	✓	<p>2 Plot the data to-scale on the site plan.</p>	<p>Refer to pages 178 and 179 in Appendix E for an example of the completed task.</p>

## Stage 3: Assessment

By this stage of the Shade Audit, the shade patterns at the Critical Protection Time and in winter will have been plotted to scale on the site plan. The next stage of the Audit involves an assessment of the quantity and useability of existing shade and the need for additional shade.

There are a number of tasks that need to be completed. They are as follows:

### Consider the likely impact of *future tree growth* on the amount of shade at the site

Will tree growth significantly alter the amount or distribution of shade?

If it will, how long will it take before significant changes occur? It may be necessary to consult a person with horticultural expertise for information regarding tree growth rates.

### Consider the amount of *existing shade* at the Critical Protection Time and compare this with the need for shade, taking into account the additional shade that may result from tree growth

Is the amount of shade adequate for the number of people using the site?

How much additional shade is likely to be required to provide an adequate amount of shade for the number of people using the site?

Are there opportunities to better utilise or access existing shade?

### Consider whether the *location of existing shade* is appropriate, given the usage patterns at the site

Are there areas of use where shade is inadequate? Is adequate shade provided in areas of non-discretionary use, ie areas where people are compelled to be? (In non-discretionary use areas, eg numbered seating in grandstands at sports grounds, most of the patrons should be able to access shade, particularly during summer.)

Are there adequate opportunities for people to find shade in discretionary use areas, ie areas where people choose to go? (In discretionary use areas, eg grassed spectator areas at sports grounds, at least 50% of the patrons should be able to access shade, particularly during summer.)

Are there priority areas for further shade provision, given site usage patterns?

Should/can existing shade be re-located to be more compatible with site usage patterns?

### If *additional shade* is required, consider where it should be located, keeping in mind the site usage patterns and winter shade patterns

Are there locations that will allow additional summer shade to be achieved without creating excessive shaded areas in winter?

Are these locations compatible with site usage patterns?

### Consider the *impact of indirect UVR* on the site and possible means of reducing its impact

Are some areas of the site likely to have high levels of indirect UVR as a result of surface finishes, eg smooth paving, reflective walls?

Can these surfaces be modified to reduce the likelihood of indirect UVR?

Can other measures be adopted to minimise the impact of indirect UVR?

## note

During Stage 3: Assessment it is important to draw upon the data collected during the interviews and site fieldwork. The site specific issues and recommendations in Chapter 6 should also be considered.

## Stage 4: Recommendations

The Recommendations stage of the Shade Audit involves documenting the potential strategies to achieve a site's shade requirements. Specific recommendations should be made regarding each of the following:

- the desired shade goal/s for the site, eg increase shade over passive playground areas (where children eat their lunch, where assemblies are held)
- the strategies for achieving the goal/s, including:
  - revising site management practices, eg accessing shaded 'out-of-bounds' areas, rescheduling outdoor activities
  - optimising the use of existing shade eg relocating activities or outdoor equipment to shaded areas, removing low branches from trees to allow access
  - creating new shaded areas (include information on the performance characteristics of the proposed shade ie amount of additional shade that is needed, where it should be located, the time/s 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)
  - minimising the effects of indirect UVR on the site (or areas within it), eg modifying surfaces by planting ground covers or covering concrete with synthetic turf, designing shade structures that protect from indirect UVR.
- the desired timeframe for achieving the shade goal/s for the site
- the project management options for achieving the shade goal/s, for example:
  - organising a working bee with volunteers to relocate seating and lop low branches off trees
  - engaging an architect to manage the design and construction stages of the shade project
  - asking a project team member with an interest in landscaping to recommend a tree planting strategy
  - inviting shade manufacturers to submit a proposal for supply and installation of a shade structure
  - implementing a staged shade project (to allow for fundraising).

A Shade Plan should be prepared (based on the site plan), indicating where the above strategies will be implemented. An example of a Shade Plan can be found on page 183 in Appendix E.

The recommendations and the Shade Plan should be incorporated into the design brief, a document that is provided to professionals such as architects and shade manufacturers. A comprehensive design brief will help to ensure that the shade solution/s for a site (off-the-shelf or custom made) will meet a site's shade requirements. More information on preparing a design brief can be found on the following page.

### note

Because of the effects of indirect UVR and climate, it is rare that the shade goal/s for a site can be achieved by a single action, eg. the construction of a shade structure. More commonly, a series of actions will be required to address the complex factors present at most sites.

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## A design brief for your shade project

The purpose of the design brief is to set the parameters within which the designer or supplier must work.

You are aware of your needs, you know the special aspects of your site and you may have skills within your group that could be used during the project.

The Shade Audit will have provided you with a range of shade options for the site, and you should have determined which of these you prefer.

The design brief is intended to convey this information to the person you have selected to assist you with designing the project. Information required for the design brief includes, but is not limited to the following points:

### site information

Provide information regarding the site, preferably in the form of a site plan, showing:

- location of proposed project
- location of underground services if known
- emergency or other access routes that must be maintained
- any particular site constraints that may impact upon the design, eg future projects, ground conditions.

### performance characteristics

Set out your requirements with regard to the performance of the shade:

- area to be protected by shade
- Critical Protection Time
- type of shade required, eg built or natural, permanent or demountable
- need for rain shelter
- nature of activities in the proximity of the project, eg children at play, vehicle movements
- special climatic conditions
- likely vandalism threat
- maintenance needs
- longevity.

### financial and human resources

- Provide information about the budget for the project.
- Advise if there are skills within your organisation or group that may be used in the design or development of the project. If skilled labour, eg carpenters or sail makers, is available, this is likely to influence the choice of construction method.

## Shade project case studies

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The following case studies illustrate various aspects of the shade project.

- **Balmain Public School**

This study demonstrates the benefits of the Shade Audit as a planning tool and a means of raising funds. It also exemplifies the wide-ranging strategies that can be adopted to provide more protective shade.

- **Baradine Multipurpose Courts**

The Baradine study demonstrates how fostering support in the community can overcome apparent obstacles such as limited funding.

- **Springwood High School**

This study demonstrates the benefits of collaborating with the community in a project initiated by the students.

- **Western Suburbs Olympic Pool (Unanderra)**

The Unanderra study shows how a shade project can achieve additional objectives to that of providing shade.

## Balmain Public School

Balmain Public School is located in an inner city suburb of Sydney. It has approximately 300 students. In 1992, the School Parents and Citizens' (P&C) Solar Protection Committee began a comprehensive effort to increase the level of UVR protection available in the school grounds.

A professionally conducted Shade Audit had shown that:

- only 15% of the playground area had shade
- of the total shade, only 61% was usable
- 'out-of-bounds' areas prevented the use of a number of existing areas of shade.

The Audit resulted in the setting of three goals. These were to:

- reduce direct and indirect UVR at the site
- make better use of existing summer shade
- create an additional 400 m<sup>2</sup> of summer shade.

Actions to achieve the goals included:

### re-organisation of outdoor areas

Discussions with school staff resulted in students being able to use previously out-of-bounds areas. A large disused incinerator that had been situated under a shade tree was removed. Existing garden beds were modified to permit access to shaded areas and to allow the planting of additional trees. The P&C paid the local council for the erection of a protective fence in adjacent parkland to increase the shaded area available to the students.

### fundraising

Part-funding for the shade project was successfully sought from the then NSW Department of School Education (now Department of Education and Training). A campaign to raise the balance of the required funding was launched in the local business community. A 'sponsorship' proposal was distributed throughout the community seeking a specific amount from each of ten local businesses for the erection of a shade/rain shelter to protect the children of Balmain School. Sponsors were offered:

- publicity in local newspapers and school newsletters
- promotion in the local community
- guest of honour status at the official opening of the new shade facilities
- tax deductibility for the sponsor's donation through the establishment of a building fund
- the opportunity to contribute to a reduction in the incidence of skin cancer in the Australian community.

### construction of a shade structure

After obtaining quotes from a number of suppliers, a company was commissioned to construct a structure. Construction costs were minimised by negotiating with the company to allow volunteers (parents) to contribute unskilled labour.

This multi-faceted shade project has resulted in a significant increase in protection from UVR for an at-risk population group.

#### Baradine Multipurpose Courts

Baradine is a small township in Western NSW. In 1996 the Baradine Community Health Centre became aware of the need for shade at the town's main community sporting facility, the Baradine Multipurpose Courts. The facility, often used for school sporting events, provided little shade for spectators and participants.

Staff at the Community Health Centre (CHC) sought local community involvement and support for a proposal to provide adequate shade at the site. Extensive consultations were conducted with stakeholders including those from the local municipal council, schools, sporting and health groups. Residents' opinions on the proposed shade project were sought via a survey printed in the weekly newspaper and distributed through the local newsagent, chemist and schools. Respondents to the survey overwhelmingly supported the proposal.

After the consultation phase, an application for a Skin Cancer Prevention Grant was submitted to the Western District Public Health Unit, and a grant of \$1,000 secured.

Following another round of consultation with stakeholders, the type of structure to be erected was determined by the project's building committee. It was apparent from the consultation that insufficient human and financial resources would be available for future repairs and maintenance. So the committee opted for a durable, low maintenance structure with framework, roof and sides constructed of galvanised iron.

Comfort is a major consideration in Baradine's hot, dry climate so the north-east and south-west ends of the structure were left open to take advantage of prevailing winds. Trees and other vegetation were planted around the structure to shield it against the sun's rays and add to the cooling effect.

Community involvement in the project resulted in significant cost savings. A local builder donated his time to design the structure, prepare costs and arrange purchase of all materials. Labour was donated by the local Skillshare program.

With community support, Baradine now has a cost effective shade structure that provides UVR protection for users of its sporting facility.

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## Springwood High School

Springwood High School is a medium-size school located in the lower Blue Mountains, west of Sydney. In early 1996, students at the school submitted a request through their Students' Representative Council (SRC) for more shade in the school grounds.

The school responded by developing links with organisations it believed would be interested in supporting a shade project for the school. A joint working party was formed that included teachers and SRC representatives, along with representatives from Springwood Hospital, the Wentworth Centre for Health Promotion and the NSW Cancer Council.

The goals of the working party were to:

- plant trees in the school grounds
- erect a shade structure by the end of 1997
- raise students' awareness of the need to use shade facilities
- incorporate skin cancer prevention into school policies.

To achieve these goals a number of fundraising activities took place. A seeding grant of \$1,000 was successfully sought from the local Area Health Service and \$3,000 was provided by the Wentworth Centre for Health Promotion. The announcement of the seeding grant was used to generate publicity in the local media, which led to further community interest.

In addition to the seeding grant, \$3,200 was raised through activities such as a guessing competition and an arts and crafts fair, which were organised by the School's P&C Association. The school itself also provided \$3,000.

Students, parents and other interested members of the community donated a significant amount of time to the project. Members of the Faulconbridge Residents' Association who live in the vicinity of the school, made a commitment to 'keep an eye' on the proposed shade structure in an effort to prevent possible episodes of vandalism.

The contributions of all those involved came to fruition in October 1997 with the completion of a shade structure in the school grounds. As the provision of natural shade had been the other key component of the strategy, a total of fifty shade trees were also planted.

The strong motivation and commitment of the working group, students, teachers and the local community resulted in a significant increase in the amount of available shade at the school.

#### Western Suburbs Olympic Pool, Unanderra

The Western Suburbs Olympic Pool, administered and operated by the Wollongong City Council, is located at Unanderra in the Illawarra region of NSW.

In 1995 the local swimming club proposed that solar heating be introduced to heat the pool water for more comfortable swimming during autumn and winter. Around this time, local community health officers conducted a 'Cool Pool' sun protection awareness raising program as well as shade audits of council pools. In addition, the council had been receiving an increasing number of requests for shade from pool patrons.

The potential to provide both solar heating and shade in the one project was quickly recognised by council planners, who put in place a comprehensive strategy to achieve both objectives. Given the nature of the site, it was decided that built shade would be the preferred option.

Media publicity for the project generated significant community support. This support was a major factor in raising \$226,000 from the following sources:

- a 'swimathon' organised by the swimming club raised \$22,500. Students from local schools were sponsored to swim laps of the pool. A local bus company donated its staff and buses to transport the students to and from the pool.
- a grant of \$20,000 from the NSW Department of Sport and Recreation
- a bequest, also for an amount of \$20,000, specifying that the funds be used for the benefit of children attending the pool
- an allocation of \$163,500 from Wollongong Council's capital works budget.

The resulting structure has fulfilled all expectations. Built of timber framing with a colourbond roof, it provides a total of 825m<sup>2</sup> of shade as well as holding 800m<sup>2</sup> of solar absorber panels. Its 'U-shape' provides shade to three sides of the pool. According to staff, the shade provided by the structure is regularly used by pool patrons.

This case study demonstrates how built shade systems can be adapted to serve more than one purpose. It also exemplifies the benefits of involving and gaining the support of the wider community in local shade projects.