Preventing skin cancer:
Understanding the sun's path

The sun's path

Understanding the sun's path is essential when designing barriers to ultraviolet (UV) radiation, as the position of the sun at any given time affects where trees and structures cast their shadow.

Designs should allow for daily and seasonal changes in shade patterns due to:

- The height of the sun in the sky *(the solar altitude)*
- The direction in which shadows fall *(the azimuth)*
- The length of the day *(the summer solstice (shortest day) and winter solstice (longest day)).*

The sun's angles

The angle of altitude (the angle between the sun and the horizon on a given latitude) is used to determine the length of the shadow cast by a solid object.

A higher solar altitude angle means:

- The daylight period is longer
- There is a shorter path of UV radiation through the atmosphere
- More UV radiation reaches the earth's surface since less radiation is absorbed by ozone, vapours and dust particles in the atmosphere
- There is a higher intensity of UV radiation falling on any particular area.

Equinox and solstices

When marking the sun's path each year four days are particularly important. Shade plans should be plotted for these days to get a representative shadow pattern for each season.

- The equinox days (21 March and 23 September) when day and night hours are of equal length, each being 12 hours
- Winter solstice (21 June) the shortest number of daylight hours in the year
- Summer solstice (22 December) the longest number of daylight hours in the year.

Shadows

Shadows move and shift in response to the height and angle of the sun as it passes from east to west. The 3 daily shade patterns are:

- Morning— shadows fall in a westerly direction away from the object casting the shadow
- Midday— shadows will be close beneath the object
- Afternoon— shadows fall in an easterly direction away from the object.

This basic pattern occurs every day of the year, but shadows vary according to seasonal changes. The tilt of the earth's axis changes as it orbits the sun, and as a result the area of the earth's surface receiving the maximum solar intensity shifts between the Tropic of Capricorn (latitude 23.5^0 S) and the Tropic of Cancer (latitude 23.5^0 N).

Calculating the sun's path

Sun charts or commercially available computer programs can help to work out the sun's path at a given location, at any time of the year using:

- Latitude
- Longitude
- Direction of true north.

The solar azimuth (the angle in a horizontal plane between true north and the direction of the sun) determines the direction in which the shadow will fall. Using the height of an object or structure, a sun calculator can work out the shadow length for any time, on any day of the year, for a particular location.