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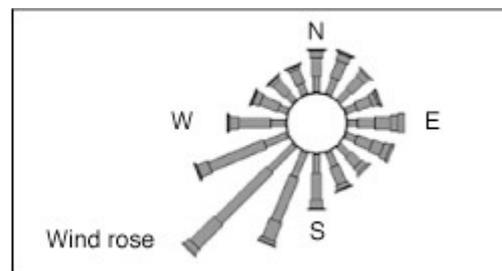
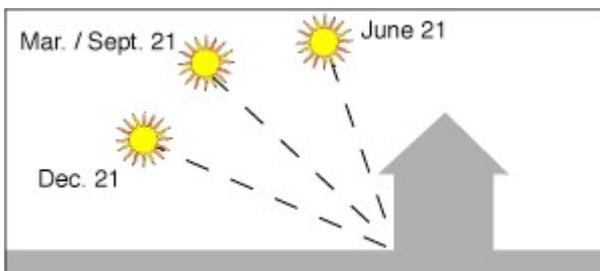
Passive solar design: Siting and Orientation



## Passive solar design: Siting and Orientation

Passive solar design and providing a benign site microclimate both enhances the energy and environmental performance of a building. Ideally the building has good access to solar radiation and daylight, with a site which itself is pleasantly warm and sunny, with good shelter from the wind.

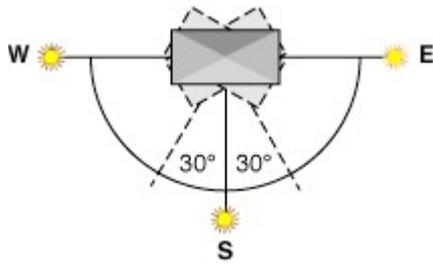
### Site analysis



- Determine the position of the sun throughout the year.
- Establish temperature ranges – both seasonal and daily.
- Identify the direction of the prevailing wind.
- Determine seasonal characteristics eg cold northerly winds in winter.
- Identify topographical features that might optimise or degrade the performance of the building(s) eg slopes, tree belts, the shape and orientation of the site.

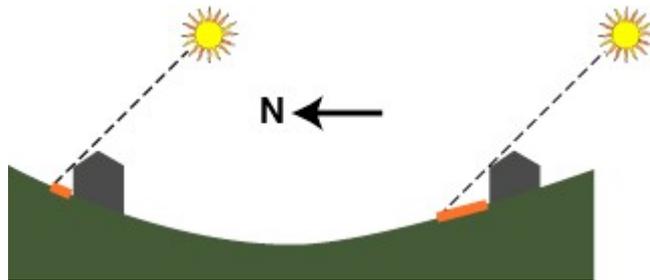
### Orientation

### The individual house



The main orientation of the building should be within 30° of south. Houses oriented east of south will benefit from the morning sun. Those orientated west of south will catch the late afternoon sun – which can help delay the evening heating period.

### The housing layout



A location on a south facing slope optimises solar access whilst minimising overshadowing from adjacent buildings. It also allows for higher density planning.

- Neighbouring houses to the east and west can provide protection from low east and west sun
- roads should ideally run east-west to facilitate south-facing front or rear housing layouts
- design layouts to be self-sheltering from cold winds
- use tree belts around the site to promote sheltering. Arcs across the north of the site will be particularly useful against cold northerly winds.

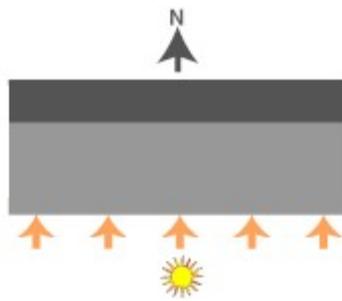
### Building form



- Design to minimise the building surface to volume area.

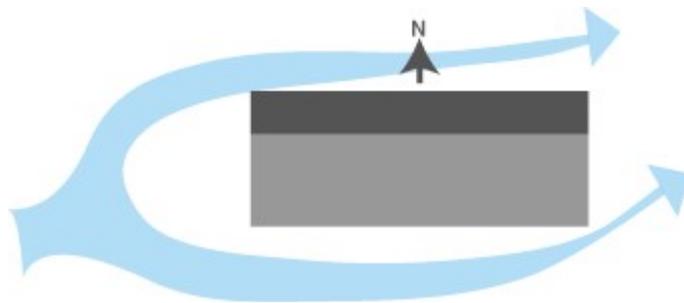


- Terrace housing and blocks provide more efficient envelopes than semi and detached houses.
  - Orientate the house east-west to ensure a long side to face the sun. Minimising east and west



facing walls and windows reduces excessive summer heat gain.

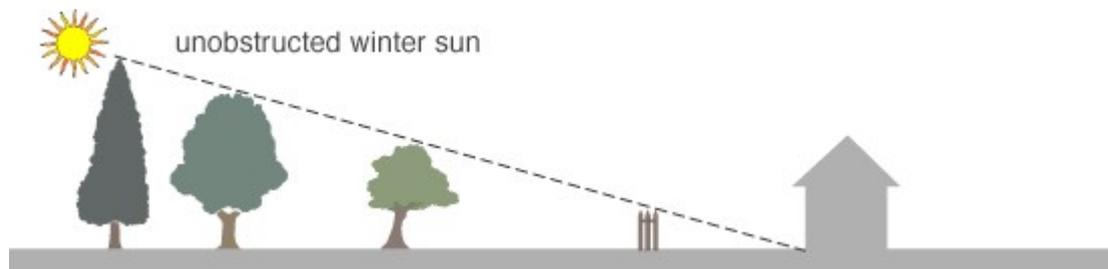
- Plan the rooms so that cooler service spaces are located with a northerly aspect and habitable rooms take advantage of the warmer southerly aspect.
- Avoid the exposed areas of the site and use any natural shelter offered.



• Minimise wind chill from the prevailing wind by presenting a narrow frontage in that direction.

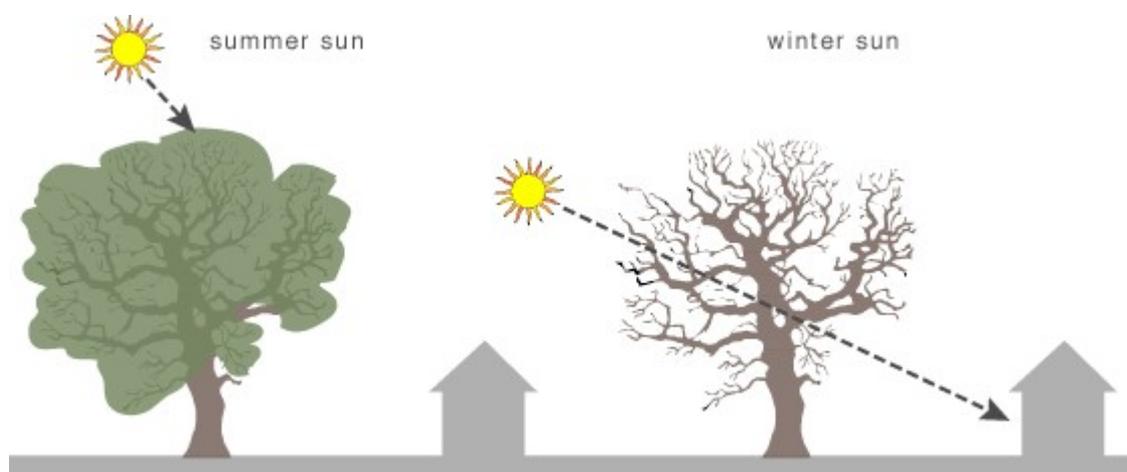
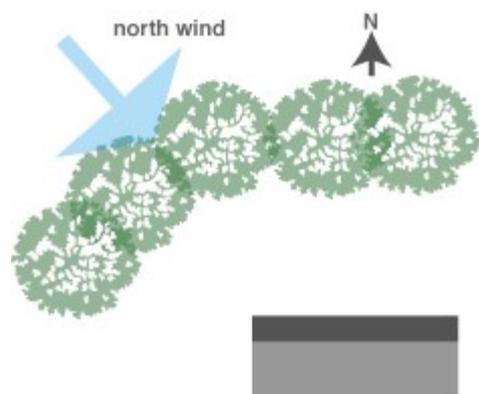
- Think about using vegetation against walls to increase wind drag and provide an extra thermal buffer.

## External environment



- Optimise solar gain in winter - ensure that south-facing windows are not overshadowed between 9am – 3pm

- Use trees and planting to shelter from, particularly cold northerly, winds. The most effective height for trees is the height of the building and placed 1-3 heights away, or 3-4 heights where solar access is required. Use evergreen trees where solar access is not required to provide year-round shelter.



- Trees to create summer shading:

Deciduous trees should be planted to optimise shading in the summer whilst permitting sun to penetrate at low winter angles. Ensure that the planting is not too dense that it limits daylight.

## Publications

- Solar Architecture in Cool Climates, *Porteous with MacGregor, Earthscan, 2005*
- Sustainable Solar Housing, *Hastings and Wall, Earthscan, 2007*
- Solar House, *Galloway, Architectural Press, 2004*
- The Whole House Book, *Borer and Harris, CAT, 2005*
- EcoHouse 2, *Roaf et al, Elsevier, 2003*

## Further information

- BSRIA: Building Services Research and Information Association ([www.bsria.co.uk](http://www.bsria.co.uk))
- CIBSE: Chartered Institute of Building Services Engineers ([www.cibse.org](http://www.cibse.org))

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## Green Building Design

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